Scaffolding Conversations:
Engaging Multiple Media in Organizational Communication

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ABSTRACT

Much of the research on media use in organizations has tended to focus on the use of one medium in isolation from the other media in the organization. Yet the proliferation of communication technologies, especially Internet-based technologies, combined with work configurations such as hybrids of virtual and co-located work, has made it more likely that organizational members will use multiple media, in various combinations, to communicate. This study of a regional facilities group in a Fortune 500 company explores how the use of both single and multiple media in a hybrid work configuration can facilitate a variety of rich and complex interactions. Focusing on the conversation as the unit of analysis, we found that organizational members used single and multiple media to support individual as well as concurrent interactions. We propose the notion of conversational scaffolding to describe how organizational members engaged with various media alone and in combination to accomplish both individual and concurrent conversations.

Changes in technology, especially the adoption of Internet-based technologies and the proliferation of telecommunication technologies, have increased and changed the ways that people in organizations communicate and work with one another. People are using new and existing communication media singly and in combination to work with people who are both co-located and distributed across distant sites. In many cases, work is becoming more mobile (even within a co-located site), and less tied to particular locales.

Boczkowski and Orlikowski (2004) note that despite the common use of multiple media in practice, much of the literature has tended to study a medium in isolation from other media in the organization. For example, research has focused solely on the use of email, IM, bulletin boards, or videoconferencing, or on the choice between two media such as email versus face-to-face. But such stark choices and uses of media are rarely available in practice, particularly in distributed configurations (Belanger and Manheim-Watson, 2003; Nardi and Whittaker, 2002; Whalen, Whalen, and Henderson, 2002). For example, some of the participants may be unable to meet face-to-face, while others can meet but may choose not to because they find it more convenient or more efficient to communicate using other media. In addition, there is increased availability of media that can be used concurrently, which opens up opportunities for multiple media use. Virtual, or distributed, work may be escalating this tendency to use multiple media. In large organizations, many groups whose members work together are not entirely co-located or entirely distributed, but instead constitute a hybrid (Griffith, Sawyer, and Neale, 2003). Such hybrid work configurations allow members who are co-located to communicate and work face-to-face, and allow them to communicate and work with geographically-dispersed colleagues by using one or more voice and computer-mediated technologies.

While the use of multiple media and the existence of hybrid work configurations appear to be increasing in contemporary organizations, our knowledge about how people communicate in such conditions remains relatively unexplored in the organizational literature. It is thus the focus of our analysis here. Our study examines the communication media and practices evident within one regional facilities unit of a large multi-national organization. Members of this regional unit worked in a hybrid work configuration, interacting with both co-located and distributed colleagues via a wide variety of media to accomplish their work of facilities management. Because of the complexity and diversity of its communication and work practices, this site offers an interesting context to study the use of multiple media within hybrid work configurations.

We found that the use of multiple media created the opportunity for organizational members to engage in a multiplicity of individual and concurrent conversations. In these mediated conversations, we found participants deliberately and artfully combining various media and communicative routines to accomplish certain outcomes. The media and routines that members used in their work practices were both situated and emergent, depending on what they were attempting to do at a particular moment and what media were available to them. Through such ongoing use of multiple media, members structured their ongoing communicative interactions, generating the social and material scaffolds that framed and guided their collaborative actions (Bazerman, 1999; Bruner, 1990; Clark 1997).

Our study offers an alternative view of media use in organizations than that traditionally adopted in the literature, emphasizing the recurrent practices of organizational members as they use multiple media over time to construct temporary and emergent scaffolds that structure their ongoing communicative interactions. This research contributes to an understanding of workplace conversations as scaffolded by the use of multiple media, not determined by them. Effective

communication practices are skilled performances, emerging from a constitutive interaction with multiple media that shapes emergent interactions over time and that entails both intended and unintended consequences.

Literature on Media Choice and Use

Distributed work, by definition, cannot take place without the use of various non-face-to-face media. Face-to-face communication is valuable but costly, especially in organizations that are dispersed across multiple locations, and many organizations (and their members) may balk at the costs—monetary, temporal, and personal—that are entailed when engaging in face-to-face communication in such dispersed conditions (Nardi and Whittaker, 2002). The medium of face-to-face has been hypothesized as the most information-rich (Daft and Lengel, 1984), valuable not only for its capacity to convey many kinds of subtle information but also for its role in creating a social environment. In particular, face-to-face activities such as social bonding, sharing meals, touching, sharing experiences, showing up as a signal of commitment, and managing attention are thought to be crucial for sustaining the social relationships that make collaborative work possible (Nardi and Whittaker, 2002).

Media richness theory has been criticized for being overly deterministic in its characterization of different communication medium as more or less rich (Markus, 1994; Yates and Orlikowski, 1992). In particular, communicating face to face does not guarantee that social connections are made or relationships built. However, the various properties of different media are interpreted and appropriated by people, and understanding this interaction sheds light on human choices and uses of media. This has led social influence theories to emphasize the notion that people can have different perceptions of the richness of a medium. For example, situational factors can influence perceptions (Fulk and Steinfield, 1990), and these individual perceptions as well as contextual factors affect media choices more so than the properties of the media (Carlson and Zmud, 1999; Carlson and Davis, 1998; Lee, 1994). Most of this research, however, has focused on the choice and use of a single medium like email (Markus, 1994), instant messaging (Isaacs et al., 2002), computer-conferencing (Yates et al., 1999), video-conferencing (Kraut et al., 1999), or on the choice between two media such as email versus face-to-face (Daft, Lengel, and Trevino, 1987; Zack, 1993).

In distributed and hybrid work configurations, the choices are not as simple as face-to-face versus another medium (Belanger and Manheim-Watson, 2003; Nardi and Whittaker, 2002; Whalen, Whalen, and Henderson, 2002), and usually the choice of one medium does not preclude the additional use of other media. In addition, the focus in much of this research has been on choice of media, that is, the *a priori* deliberations made in anticipation of a communicative event. But ongoing organizational communication is not so deliberative or static; rather, it is an ongoing, dynamic, and emergent process where choice and use cannot be so clearly delineated, and where media use is sometimes less a choice than a habitual response to institutionalized norms and expectations (Yates and Orlikowski, 1992).

In an effort to understand how individuals choose and use multiple communication media to accomplish their work in a distributed setting, Belanger and Manheim-Watson (2003) examined communication practices within the sales divisions of two large information technology companies, both of which regularly relied on remote work. Ongoing communication processes in the two organizations were identified including work coordination, knowledge sharing, information gathering, relationship development, and conflict resolution. Both divisions had access to a wide variety of communication technologies but use of those technologies, while

similar in some cases, differed greatly in others. In both sites, individuals made communication choices based on established local practices, but modified their use depending on the situation.

Drawing on the concept of a genre repertoire (Orlikowski and Yates, 1994; Yates, Orlikowski and Okamura, 1999), Belanger and Manheim-Watson develop the notion of a "communication mode repertoire," a set of routines developed around the use of communication media that are used by members of a community. They identify a number of structuring mechanisms shaping these routines: substitution (using media to replace face-to-face communication), innovation (using a new medium to allow a different form of communication), variation (using different communication media for similar types of communication), and combination (using multiple media concurrently). They found that organizational members often chose to use a variety of media in sequence or in parallel rather than selecting only one medium. The combination of media used appeared to change according to the local conditions and varied even under similar circumstances. Rather than using one particular medium for one particular task, individuals, instead, had a set of routines that allowed them to select and use media in response to the situation.

In addition to using multiple media to accomplish work, individuals also engage in multiple interactions at the same time. Participating in multiple conversations at one time has been characterized as 'polychronic communication' (Turner and Tinsley, 2002), a term derived from the concept of polychronicity, which is defined as "the extent that people 1) prefer to engage in two or more tasks at one time and actually do so, . . . and 2) believe their preference is the best way to do things" (Bluedorn, 2002). In polychronic communication, people use downtime during interactions with one person to interact with others. The use of an asynchronous medium (e.g., email) to communicate creates more downtime during interactions, thus more easily allowing participation in parallel interactions. While there may be less downtime in communicating with synchronous media, there may be more opportunities for several interactions when multiple media are involved in the communication (Turner and Tinsley, 2002). For example, in many meetings, participants can be seen to use a number of media: face-to-face, phone, meeting software, and instant messaging (IM). In these cases, some participants might be talking face-to-face or on the phone, all participants may be looking at the presentation on the computer screen, and some participants might be having a sidebar discussion face to face or via IM, all at the same time.

These recent findings (Belanger and Manheim-Watson (2003); Turner and Tinsley, 2002) —that people in organizations use different media for similar communications, substitute various media for face-to-face communication, and engage in polychronic communication through the use of both single and multiple media—create a picture of media use that is more complicated than one described by existing theories of media choice and use. Multiplicity is common in many of today's workplaces. People in organizations have access to more communication media than ever, and work settings and arrangements are becoming more fluid and varied. Teams or work groups often include some members who are co-located and others who are distributed, rather than being entirely co-located or entirely distributed, and these alternative, hybrid, and shifting work arrangements involve different and emergent ways of using media and engaging in communication. People are also multi-tasking with increasing frequency, taking advantage of the differing capacities and capabilities of different media. Many of them are less tied to particular locales as their work is becoming increasingly dispersed and mobile. The possible communication configurations afforded by the growing numbers and kinds of digital media, the increasing capacity to use communication media concurrently in multiple different

conversations, and the increasing presence of hybrid work groups point to a complexity, multiplicity, and interdependence in how organizational actors engage in interactions at work.

Accounting for the emergence of such complexity, multiplicity, and interdependence in work and communication is a challenge, and we believe that a new vocabulary may be helpful. In particular, we propose that the notion of scaffolding may serve as a powerful metaphor for highlighting the multiple, complex, and interdependent ways in which people's engagement with media at work shape and is shaped by their ongoing and emergent communicative activity.

Exploring the Notion of Scaffolding

Scaffolding is a term commonly used in the construction industry to refer to the (usually temporary) structures that support the work of building or repairing physical structures. The Oxford English Dictionary provides the following definition:

> A temporary platform usually supported on poles or trestles, but occasionally suspended from above, and designed to hold the workers and materials employed in the erection, repair, or decoration of a building.

The metaphor has been used quite often in the sciences, most notably in learning theory and child development by such scholars as Vygotsky (1962 trans.) and Bruner (1990), and most recently and relevantly by such scholars as Hutchins (1995) and Clark (1997, 1998, 2002) in the area of distributed cognition. Clark (1198, p. 163), for example, offers a general description of the nature of scaffolding in human systems:

> Scaffolding … denotes a broad class of physical, cognitive, and social augmentations — augmentations that allow us to achieve some goal that would otherwise be beyond us.

In this general sense, scaffolds include physical objects, linguistic systems, technological artifacts, and institutional rules — all of which structure human activity by supporting and guiding it, while at the same time configuring and disciplining it.

An examination of actual scaffolds as they are used in the construction industry helps to highlight some of their distinguishing characteristics. Consideration of these characteristics can offer some insights into the scaffolding process that may help our use of this metaphor in organizational systems.

- Scaffolds are **temporary**, that is, they are erected on a construction site to support the building of particular elements. They typically exist for the duration of the project (or less), and are dismantled once the elements are completed or self-supporting.

- Scaffolds are **flexible**, that is, they are erected on site and adapted to fit the particular local requirements; as such, they may be used in many different situations.

- Scaffolds are **portable,** that is, they are relatively quickly and easily assembled, modified, and disassembled on the construction site.

- Scaffolds are **diverse,** that is, there are many different kinds of scaffolds; for example, there are scaffolds that allow people to walk along the outside of buildings, scaffolds that suspend workers from above, scaffolds that serve as structural columns to hold up slabs until the poured concrete is cured, and scaffolds that serve as reinforcing formwork that then become integrated into the construction of the piece.

- Scaffolds are **heterogeneous,** that is, they are composed of multiple different components, reflecting both the requirements of the element(s) to be supported, and the materials at hand.

- Scaffolds are **emergent**, that is, they are erected over time, changing as needed to continue supporting the increased scale and scope of the element(s) being built over time.

- Scaffolds are **generative**, that is, they serve as the basis for other (creative) work. In particular, scaffolds facilitate the performance of certain human activities that would not have been feasible without some material augmentation.

- While in place, scaffolds afford a certain temporary **stability** to the disparate assembly of people, materials, and space that are loosely tied together through their use.

- They are **constitutive** of both human activity and outcomes, that is, scaffolds shape the kind of construction work that is possible, and thus the construction outcomes that emerge (e.g., scaffolds afford the building of skyscrapers).

Once a building is complete, the scaffolds used in its construction are no longer useful or required. The building, however, could not be have been built without the scaffolds. So scaffolds are critical supports, but they are of use only during the process of constructing a building. In drawing on the metaphor of scaffolding, we want to focus on the temporary scaffolding that is erected by the temporary and situated use of media to support communication activity. That is, for the duration of a particular communicative interaction, participants use a single medium or multiple media to mediate their communication. Once that communicative interaction is finished, they stop using those media for that interaction. Participants thus erect a communicative scaffold to support their interaction by drawing on specific media, for example, face-to-face, phone, paper, fax, electronic mail, etc. Once their interaction is over, the participants stop using the specific media to support that interaction, and their media scaffold is consequently dismantled (just as when a building is completed the scaffold is no longer needed for that purpose, and is consequently dismantled).

More generally, our use of this metaphor allows us to understand everyday practices as scaffolded both culturally (e.g., through codes, language, norms) and materially (e.g., through physical objects, biological structures, and technological artifacts). In this paper, we explore how organizational members scaffolded their ongoing communicative interactions in both co-located and distributed contexts by using multiple different media in situated and emergent ways. Focusing on the process of scaffolding communicative activity allows us to focus on the activity of using media in specific interactions rather than on the media themselves. This affords a view of media (and artifacts more generally) as "performed" by human agency, or "in practice" (Orlikowski, 2000). Such a view departs from that common in the literature, and focuses attention on knowledgeable practice and how media are drawn on "as needed" within particular times and places to accomplish specific communicative purposes and to structure particular communicative interactions.

We explore the scaffolding of communicative activity in the context of a large multi-national organization where we examined the communication media and practices engaged by members of a regional facilities unit. Members of this unit worked in a hybrid work configuration, interacting with both co-located and distributed colleagues via a wide variety of media to accomplish their work of facilities management. Because of the diversity of media in use and the hybrid nature of the work conditions, this site offered an interesting locale to study how members' ongoing use of multiple media scaffolded their communicative practices, and with what consequences for their work and interactions.

Research Site and Methods

The first author observed FacilityEast, an eastern site of the Facility division of Hardware Inc.,[1] a Fortune 500 company specializing in the manufacture and sale of computer and network equipment. Hardware Inc. is headquartered on the West Coast with the majority of its product development and manufacturing also located there. Four major product development campuses, as well a number of smaller product development and manufacturing sites, are located elsewhere in North America. There are over 100 field and sales offices in North America and Hardware Inc. has a sales presence in over sixty countries. Approximately two-thirds of Hardware Inc.'s employees work in the United States.

The Hardware Inc. Facility division which we studied includes the following departments: Real Estate, which negotiates and manages the real estate investments such as site leases and purchases; Site Development, which develops and builds out the office sites; Facility Management, which manages the company facilities and the services within the facilities; and Space Planning, which evaluates the use of space within sites by employees and business units, and plans any moves into and out of the sites. Two other departments—Employee Services, a group that coordinates services such as the cafeteria and the gym—are considered part of Facility Management but report to headquarters. (See Figure 1 for a Hardware Inc. Facility division organization chart.)

The Facility division is responsible for most of the company's physical assets—the property, buildings and furnishings—which are the company's second largest expenditure annually (employees being the largest). Hardware Inc.'s Facility division manages its global operations with fewer than 200 employees plus hundreds of additional contractors. Most of the Facility division is based in North America and, except for the Facility division's senior management, Facility personnel deal with no more than three time zones in most of their day-to-day work with their Facility colleagues.

Research Site

At the time of the study, Hardware Inc.'s Eastern Region (roughly covering the eastern half of North America) consisted of a number of small sites along with several company campuses. The office we studied, FacilityEast, was part of this Eastern Region and was located on the East Coast in a product development site in a suburban office park. FacilityEast managed four local (within a four-hour drive) and two geographically distant product development sites, a number of local and geographically distant sales sites, and two local manufacturing sales sites.

FacilityEast included members from all of the Facility departments and included both Hardware Inc. employees and contractors. FacilityEast members worked with each other, with all the personnel who worked in and maintained the FacilityEast facilities, with their department counterparts in other regions across the globe, and with management at headquarters. Figure 2 shows the affiliations and jobs of people making up FacilityEast when observations began.[2] For work that was specific to FacilityEast, a team would consist of local FacilityEast members drawn from some or all of the departments, and when called for, involve some geographically-distributed FacilityEast members. FacilityEast members also worked on department–specific work, and most of this work tended to be geographically-distributed. The Space Planning members who organized the moves tended to do more face-to-face work, but were also members

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[1] All names—organization, departments, and people—have been changed to preserve confidentiality.

[2] By the end of the observation period, Space Planning was a separate department and had lost one employee and one contractor. Facility Management also lost workers during the reorganization but those workers did not work in the FacilityEast offices, and are not counted here.

of some geographically-distributed teams.

FacilityEast's offices were in an enclosed area off the main hallway of a company-leased building and were not shared with any other Hardware Inc. group (see Figure 3 for an office layout). The different departmental groups within FacilityEast did not segregate themselves within the FacilityEast space, though the telecom "guys" were clustered together. Located at the end of one row of cubicles was a laser printer/fax station; another printer station with two high-speed laser printers was located at the end corner of a row of cubicles. Two specialized large plotter/printers used to print out floor plans and one floor plan copier were located in an alcove and an open cubicle. Also stored in the alcove were floor plans, upholstery and carpet sample books, and mockups of the interior design of one of the sites. Floor plans of each of the FacilityEast sites, labeled with employee names in their respective cubicles, hung on one wall; maps of the Eastern region and of some of the FacilityEast sites hung on other walls in the FacilityEast space.

Research Methods

The first author spent several days a week for three months from September to December 2001 in the FacilityEast office, and then visited occasionally over the next six months. She was given an empty office in the FacilityEast workspace to use while she was there. She attended meetings—on-site, off-site, and phone—ate lunch with FacilityEast members, shadowed one FacilityEast member (a Space Planner), attended preparatory meetings for, and participated in, a major facilities move, and went to an after-work get-together that was organized to "mourn" the effects of company-wide layoffs and restructuring. She also formally interviewed three Facility Division managers located at headquarters and seven FacilityEast members. She had multiple, recurring, and informal conversations with most members of FacilityEast during the observation period. In addition, she collected documents such as facility move instructions and blueprints, PowerPoint presentations, and web site printouts. She wrote up her field notes and all interviews were transcribed.

When she began her observations, 24 people worked in FacilityEast. Because Hardware Inc. had layoffs during the time of the study, there were fewer people in the group when she finished her observations. She regularly saw the people who had cubicles in the primary site of the study, and occasionally saw others including the three local site managers (mostly at meetings),[3] and never physically met FacilityEast members based in other locations, although she sometimes heard them in phone meetings. Hardware Inc. encouraged telecommuting,[4] so there were people who were part of the FacilityEast group who rarely came in to the office, tending to work from home.

We used an exploratory approach in our data collection and analysis, oriented by a focus on work, temporal, and communication practices, and how these were augmented by the use of various media. The process of data collection and analysis proceeded iteratively, with the early stages being more open-ended than later ones. We employed inductive, qualitative techniques (Glaser and Strauss, 1967) and our research focus on practices and media informed us as we

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[3] Two of the local site managers were laid off during the observation period.

[4] Hardware Inc. had a "virtual worker" program, begun in part to lower real estate costs. A virtual worker did not have a dedicated cubicle but did have a rolling file cabinet with physical documents, kept at the office site that s/he visited most regularly. When such workers went to these offices, their rolling file cabinet would be rolled into a cubicle that they would use for that day. A particular virtual worker was not allowed to stay in any particular cubicle for more than a couple of days. Sales people were considered virtual workers (a FacilityEast rule of thumb is that two salespeople share one desk). In exchange for taking on virtual worker status, Hardware Inc. paid for much of the home IT costs that a virtual worker incurred.

systematically explored the data. Our analysis consisted of multiple readings of the interview transcripts, field notes, and documents and we began by identifying instances of work and communication practices. This initial analysis of the data generated a set of themes centering on the use of communication media within hybrid work configurations. We then re-examined the use of communication media, focusing particularly on how multiple media were engaged by participants in these hybrid work configurations to scaffold particular kinds of conversations. This led us to make a useful conceptual distinction between participants engaging in one conversation (by using a single or multiple media) and many concurrent conversations (by using a single or multiple media). We used this distinction to organize our findings about how participants used media to scaffold different types of conversations.

Scaffolding Conversations with Communication Media

FacilityEast members used a variety of communication media to interact with each other and other members within Hardware Inc. (see Figure 4). In making sense of these activities, we found it useful to focus on how FacilityEast members engaged various media to build conversational scaffolds that supported their emerging conversations.

Building Conversational Scaffolds

Conversational scaffolds do not exist outside of the communication interactions they support. That is, scaffolds are built by organizational members as they draw on different media in the process of engaging in conversations. Scaffolds are thus situated and temporally emergent. Much like actual construction scaffolds, a conversational scaffold is created for a specific interaction, tends to emerge over time, and is meant to be temporary. Given that use of media is typically recurrent, the conversational scaffolds that are built will tend to reflect past choices and experiences, community genres and institutionalized norms. However, such habitual responses are not determined or inevitable, and as members respond to unexpected contingencies, new capabilities, and human learning they may alter their everyday practices, thus adapting and improvising the scaffolds they construct (Feldman and Pentland, 2003; Orlikowski, 1996; Whalen et al., 2002; Yates et al., 1999).

In our study of FacilityEast, we found that members scaffolded their conversations through the use of both single and multiple media, and we identified four types of conversational scaffolds that they constructed in their communicative practices: using a single medium to scaffold individual conversations; using a single medium to scaffold many concurrent conversations; using multiple media to scaffold individual conversations; and using multiple media to scaffold many concurrent conversations (see Figure 5).

Scaffolding Individual Conversations with the Use of a Single Medium

Many individual conversations at FacilityEast could be, and were, scaffolded with the use of a single medium. Common uses include face to face, synchronous phone call conversations (either via cell phones or desk phones), and asynchronous use of phones to leave voicemail. Particularly short individual conversations were scaffolded with such media as IM, pagers, and radiophones (walkie-talkies). Radiophones were typically used when participants were involved in moves, and pagers were common when FacilityEast members were traveling away from the office.

Individual conversations were most often scaffolded through the face-to-face medium, and these occurred in cubicles, offices, and even the parking lot. A common example of a face to face conversation involving more than two people was the weekly FacilityEast staff meeting,

which usually began at 8 am on Fridays in the company cafeteria. Each member got coffee, sat at the "FacilityEast table," and gave a status report on current projects, including moves, site development, mail services, phone systems, evacuation plans, and updates on vacated sites. In addition, people asked questions, made jokes, and traded information.

Individual conversations were also often scaffolded through the use of IM. These were usually brief conversations, sometimes personal but often work-related, and tended not to involve the intense collaborative work noted in the use of IM in other contexts (e.g., Isaacs et al., 2002). The following quote from a FacilityEast member indicates how he typically scaffolded his work with IM:

> A lot of times, say if I'm working on a project and I'm updating something and I have a question that I need to fill in that space with, it is something that I need to know right now, I'll look and see if someone is logged in. … And if I see that they're logged in at the same time I'll instant message them. … Because if I can get that answer right then than I can keep going on my work and complete that portion.

Similarly, another member noted:

> I use it [IM] a lot with Amanda when she is working at home. It's good for things that are quick like 'I'm expecting a fax, did it come yet?' … [and] that quick personal call like 'Are we still on for tonight?' … Multi-tasking has whole new meanings.

Individual conversations were also often scaffolded with paper documents and electronic shared files and folders. One FacilityEast member described her group's use of the latter medium:

> […] my group [finds it] is key to use network-shared folders. So I do my piece of the work and put my information up and then they add theirs. … My main group of folks are in two different areas, in California and Texas, and then me, so we all have to try not to send each other the emails over and over. We put it out in a file. … I put in my piece. And then Sarah puts her piece in. … It makes it a lot easier.

This use of electronic shared files was similar to how FaciltyEast used paper to scaffold their collaborative interaction. Even though a substantial portion of FacilityEast's work was done online, the nature of the work (management of physical facilities) meant that paper—including lists, schedules, diagrams, pictures, instructions, and blueprints—were sometimes the best forms for conveying information. We often saw individuals working in their cubicles with paper documents, referencing them and marking them up, and then passing them on to others for their use. As one member said, "We're talking about space. You need blueprints. This can't be done virtually."

Using a single medium such as paper or shared files to scaffold interaction, without the benefit of additional email or face-to-face discussion, could sometimes lead to difficulties, particularly if genre rules or shared norms were ambiguous. As a FacilityEast member noted: "It is hard when two people [or more] work on something because people have different work habits." While we found members using a single medium to build conversational scaffolds to support their individual conversations, it was more common for members to use multiple media to scaffold their individual conversations.

Scaffolding Individual Conversations with the Use of Multiple Media
FacilityEast members also regularly scaffolded their conversations (whether one-to-one, or in small and large groups) with multiple media. Engaging two media to support individual conversations, was quite common, as when people met in cubicles or meeting rooms and discussed issues face to face and by referring to paper documents (often blueprints, schedules, move instructions, or lists) or online files on computers or projected onto screens. A number of

regularly scheduled meetings included scaffolds using the face-to-face medium and phone to accommodate the distributed nature of this hybrid work unit. For example, the weekly project status meeting updated project managers and participants on the status of projects, and involved the building of a scaffold with two media—face-to-face with co-located participants in a meeting room and the use of Polycom phone conferencing for remote participants. Another example was a regular FacilityEast meeting to discuss progress on a large project site that FacilityEast had under construction. Members from FacilityEast attended either by dialing in separately from their desks or home offices, or by meeting together in a conference room and dialing into the conferencing system. All of their management counterparts on the West Coast attended by phone. Everyone directly involved with the project gave an update. When the updates were completed and questions were answered, the meeting ended. These meetings could take over an hour if there were questions or they could be completed in as few as fifteen minutes.

In other situations, individual conversations that began with a phone scaffolding often added NetMeeting when the work or topic was difficult to describe, and then dropped it once both parties understood each other. For example, the Facility Department, which planned, built, and maintained all Hardware Inc.'s physical sites, used schematics, samples, and pictures as a way of representing information about space. NetMeeting allowed FacilityEast members to share a drawing or picture of the physical space and collectively point to places on it while talking on the phone to each other, rather than trying to describe the space in words. One FacilityEast member described the value of sharing visual images during a phone conversation as follows:

> I can't tell you how many times [my colleague in] Chicago would pull up . . . drawings and talk about different issues. At one point, she had some planning issues. She felt like she could maximize the space a little bit better and rearrange the workstations, so we'd look at that together.

Another FacilityEast member concurred:

> A lot of times I would use NetMeeting [when] calling someone up [with] a question. … [I'll say] "Can you just open up NetMeeting? I just want to show you something." And we'll log onto NetMeeting … [for] five minutes of the conversation, we'll be in and then we'll get out and continue on with the conversation.

Uses of multiple media to scaffold individual conversation were frequent, but both single and multiple media were also commonly used to carry on concurrent conversations. Such conversational scaffolds were more complex because they supported more interactions, but these were also more prone to breakdowns as a result.

Scaffolding Concurrent Conversations with the Use of a Single Medium
FacilityEast members would sometimes use a single medium to scaffold several separate conversations that they were having at the same time (or over the same period of time). The most prevalent medium used to do so was face-to-face. Lunchtime was the main time during the day for this sort of interaction to occur. During lunch, FacilityEast members wandered into the cafeteria, sat together at the "FacilityEast table," typically for thirty to forty-five minutes, and had multiple, interweaving discussions with various participants that move fluidly between personal and work topics, creating a web of social and work talk.

Concurrent conversations were also frequently scaffolded through the use of email. FacilityEast members each received at least fifty emails a day, many of them involving overlapping conversations about projects and work. One FacilityEast member described his email inbox this way: "The emails are popping up, ... so if I've got some meeting I need to go to or some information I'm looking for, it's coming across on the email." Similarly, IM was also

used to engage in concurrent conversations, with individuals having multiple chat windows open on their screens to support the various interaction they were having with different people at the same time. These conversations were usually short, and about topics that could be covered with short questions and quick responses. More common within FacilityEast was the building of complex conversational scaffolds that used multiple media to structure several concurrent conversations.

Scaffolding Concurrent Conversations with the Use of Multiple Media

Use of multiple media in concurrent conversations occurred frequently in meetings in FacilityEast, especially meetings that included people from other locations. For instance, the Space Planning department regularly scheduled all-day meetings for all of Hardware Inc.'s planners to discuss new and ongoing initiatives. For each such meeting, an agenda was emailed to all the participants ahead of time, and on the day of the meeting and the appointed hour, FacilityEast planners around the country gathered in their respective conference rooms (in their distributed locations), dialed into a common phone conference and used a computer hooked up to an overhead projector with NetMeeting running. Presenters used PowerPoint presentations to share information and guide the distributed discussion. In these formal meetings, the primary meeting conversation was scaffolded by the use of two media—phone conference and NetMeeting. In addition, several FacilityEast members erected additional conversational scaffolds as they conducted concurrent conversations, either face to face with their co-present colleagues, or via email and/or IM on their own laptops with distributed planners or other colleagues.

Such complex interweaving of media use and conversations was common in FacilityEast, and members were conscious of their juggling of multiple conversational scaffolds. For instance, a Facility manager at headquarters described media use during meetings this way:

> [We do] Instant Messaging when we're on these conference calls [at the] same time. So there's a lot of ways that we communicate with each other while we're having the conference calls, not just telephonically.

Similarly, a FacilityEast member observed:

> I didn't think about my conference calls because … I'm multi-tasking. And a lot of times conference calls aren't through NetMeeting, so you could be on the computer [doing email] and in a meeting at the same time.

Building conversational scaffolds to support multiple concurrent conversations also happened outside of meetings, as people coped with multiple demands on their time and attention. One FacilityEast manager noted:

> To me, working is — the computer's going, cell phone's going, pager's going and you're responding and you're chatting with people. … I'm very comfortable reading email, working on something, picking up the phone, getting a couple things done.

As these quotes show, there was widespread and routine use of multiple media to construct conversational scaffolds that support concurrent conversations.

Using Conversational Scaffolds

In order to explore the ongoing use of conversational scaffolds in more detail, we found it instructive to look at a single conversation in detail. We will examine a meeting we observed at FacilityEast that involved the construction of interconnected scaffolding with multiple media to support the concurrent conversations of a number of participants.

Announcing a Reorganization

The meeting was a special, division-wide distributed meeting that was held to announce a new reorganization within the Facility division of Hardware Inc. The meeting was a critical one for the Facilities managers as the reorganization had important implications for how their work and responsibilities were to be assigned and negotiated within this division. Two FacilityEast managers (Dick and Jane) participated in the meeting, during which the new VP of the Facilities Division (Charles, located on the West Coast) presented the new reorganization.

Dick and Jane come into the conference room in the Facilities North East building, and sit down at the table. Dick plugs in his laptop computer and tries to get onto the Intranet. He fails to connect to the network, complains in frustration, reboots his system, and tries again. He gets on.

Dick then turns on the Polycom phone on the table and dials into the conference call. He announces that he and Jane are attending the meeting. The conferencing software connects Dick and Jane, plays a beeping tone so that others know that someone else has checked into the conference, and plays back a recording of Dick saying his and Jane's name.

After people are announced on the conference there is silence except for Charles, who is running the meeting, saying hello. Jane has a copy of the new organization chart and checks off people's names as they announce themselves.

Dick and Jane have an agreement that they push the mute button at the beginning of meetings. This allows them to make comments to each other during the meeting; when they want to participate in the discussion they turn the mute off.

Charles announces to the attendees that his presentation is on the corporate server and that they should connect with his administrative assistant, Dorothy, in order to find out how to access the presentation.

Dick accesses his email and sees Dorothy's instructions for how to log onto NetMeeting. He connects into NetMeeting and gets tied into the presentation. He then opens an Instant Messaging window on his laptop (a subset of the meeting attendees are part of Dick's IM "buddy list").

Charles then begins the meeting. He has control of the screen that displays on the attendees computers and walks through the PowerPoint slides, going through the mission and values of the new organization, and the new assignment of territories among the Facilities Managers.

As Charles goes through his presentation, Dick and Jane start discussing the political implications of the new structure, and what it means for them and their situation in the North East.

At the same time, Dick and Tim (Facility Manager of the South Region) start an IM exchange. One of the strands of their conversation is griping about the reorganization. Another has to do with the territories that each has been assigned in the reorganization. They send messages back and forth about swapping some of their assigned territories. For example, Dick thinks it might make more sense for Tim to have Pennsylvania.

The meeting lasts 45 minutes. Charles does not take a lot of questions, and notes that things like reporting relationships still have to be worked out. He ends the call by announcing that there will be another meeting next week. At the end of the meeting, there are a lot of beeps as people shut off their Polycoms and get off the conference call. There are no goodbyes. Dick unplugs his laptop and his connection to the network, and he and Jane leave the conference room.

The reorganization conversation was a distributed one, involving six participants in four locations, and dependent on numerous media: Face to face, Polycom phone (with mute) and conferencing software, Email, NetMeeting, Instant Messaging, and Paper. Over the duration of the meeting, By and large, the media performed as expected (except for a minor hitch as Dick struggling to sign onto the network at the beginning of the meeting), and their use structured the multiple conversations that were engaged in the participants over the 45-minute period.

Using the scaffolding framework, we can see how this reorganization meeting as well as

the various other concurrent conversations were both enabled and constrained by the use of the multiple media:

- The engagement of the participants in the concurrent conversations was structured by the performance of the scaffolding constructed through the use of various multiple media. Thus, Dick and Jane's use of multiple media constructed a rich and interconnected conversational scaffolding that afforded their participation in a number of concurrent conversations: their participation in the reorganization conversation via phone, email, paper, and NetMeeting; their face-to-face conversation about the implications of the reorganization; and Dick and Tim's IM negotiation about reassigning territories.

- The performance of the conversational scaffolding was enacted by the participants who used the multiple media. For example, it was constructed over time as participants interacted with the Polycom phones, dialed into the conferencing system; accessed and checked email via the network; connected to NetMeeting to view the PowerPoint presentation; activated the mute button to have face to face discussion; and engaged in IM exchanges across locations.

- The performance of the conversational scaffolding was emergent, unfolding over time, on as-needed basis. For example, the use of the mute button and face to face to allow alternation between private and public talk; the use of IM during the meeting to informally negotiate reassignments.

- The performance of the conversational scaffolding afforded by the use of the multiple media was temporary, and it was dismantled at the end of the 45-minute meeting when the various concurrent conversations were also completed.

- The performance of the conversational scaffolding linked and stabilized (at least temporarily) a heterogeneous assembly of people, places, and things, including, the VP of Facilities and five regional managers distributed over five locations and three time zones, the use of phones, computers, messages, presentations, and talk.

- The performance of the conversational scaffolding entailed (reproduced/generated) a range of cultural, political, personal, and institutional relationships. For example, Charles, the newly appointed VP of Facilities asserted and reinforced his new authority through running the reorganization conference call and presenting the PowerPoint slides on the restructuring. The private face-to-face interaction that Dick and Jane engaged in reflected and reproduced their position in this conversation as they grumbled about the implications of the restructuring for their work practices. In the IM exchange between Dick and Ted, that led to a discussion about reassigning territories, we see these two participants attempting to enact a different power dynamic, as they informally negotiate what seems to them to be a more sensible and equitable allocation of territories. Whether this informal reassignment is sustained over time and against Charles' formal design, remained uncertain.

- The outcomes of the concurrent conversations emerged from the interaction of participants with the multiple media that scaffolded their interactions. That is, the nature and quality of the conversations was shaped by the form and functioning of the various media (e.g., networks, telephones, computers, email, IM, mute, etc.) as engaged by the multiple participants (e.g., Dick, Jane, Tim, Charles, etc.).

The dependence of the various conversations on the scaffolding becomes very apparent when it does not perform as expected. This was evident in another meeting we observed, a regular, division-wide distributed meeting of Facilities managers that was held periodically to discuss issues and initiatives within the division. The meeting we observed focused on initiatives to generate cost savings and performance enhancements. Dick from FacilityEast attended, and the meeting was again run by the VP of Facilities (Charles, on the West Coast).

The meeting was to start at 1pm. Dick goes into a conference room in the Facilities North East building, plugs his laptop computer in, and then dials into the meeting with the Polycom phone. After entering the Meeting ID (which he had been sent earlier in an email), a mechanical voice answers, saying "This is not a recognized meeting ID number." Dick notes that there is typically a window of time that you can dial into a meeting, usually limited to about 5 minutes before the start of the meeting, and that he must be early.

Dick tries dialing into the meeting a couple of times (all the time saying that he hopes the meeting will be cancelled). He then goes to IM on his computer, types a message to one of colleagues (Jim, based in North Carolina), and asks about the meeting. He then checks his email to see if he had received an email with details about the meeting. He spends about 5 to 10 minutes sending IM and email messages, trying to find out how to log into the meeting.

Dick finally gets an email message from another Facilities manager (Debra in New York) with a different Meeting ID number, and dials into it, saying in an aside that he wishes the meeting wasn't going to happen. The meeting software answers and asks for his name and Dick says his name into the speaker of the phone. The meeting software then transfers Dick into the meeting and plays back the recording of Dick saying his name.

Right after Dick checks into the meeting, Jim (in North Carolina) and Debra (in New York) check in, and the three of them talk and joke while waiting for the meeting to start. Then Charles and two other people checks into the meeting. Charles says, "The three amigos are here," and explains that they were late to the meeting because he and the other two guys had been in a meeting that ran over.

At this point Charles says, "We don't need to use NetMeeting" and directs everyone to go over to the Facility Division's Initiative Web site that he has set up. There are 21 initiatives with a number of keywords. Charles discusses the various initiatives and says they need to develop a more global perspective and identify 4 to 6 key metrics that will serve as "levers or triggers for cause and effect," such as customer satisfaction and cost per square foot. Charles notes he would like to create a "dashboard" for this website to keep track of these key metrics.

Charles then says that he and the people in the room with him have been working on the layout of the performance dashboard. He then unrolls a piece of paper [you can hear paper rustling]. He shows the paper to the people in the room and begins to try to describe what is drawn on the paper, for example, "and in the upper right hand corner is a box." The people in the room with him begin to speak with each other while looking at to the drawing, but this conversation becomes difficult to follow as their voices overlap and it is not clear what they are referring to. The remote participants (Dick, Debra, and Jim) quickly resort to reading email and sending instant messages to each other.

[...]

Halfway into the meeting, Paul (Facility manager in Texas) dials in to the meeting. He had not known the revised meeting ID number, and had finally sent a message to Dick who forwarded the number to him.

[...]

The meeting lasts an hour and forty minutes, at which point they end the call, and Dick switches off the Polycom phone, unplugs his computer, and leaves the conference room.

The metrics conversation was also a distributed one, involving seven participants in five

locations, and dependent on numerous media: Polycom phone and conferencing software, web, Email, Instant Messaging, and Paper. We can see that over the 100 minutes of the meeting, Dick's engagement was scaffolded by the performance of multiple media and it afforded his participation in a number of concurrent conversations: his phone and website participation in the metrics conversation; his IM conversation with Jim about the location of the meeting, as well as his email conversations with Debra and Paul, at different times, on the same topic; his phone conversation with Jim and Debra before the meeting; and his IM conversations with Jim and Debra during the meeting.

However, we also see in this example how conversations can be constrained by poorly constructed scaffolding, that is, not all the participants knew the virtual meeting location — both Dick and Paul struggled to get the correct Meeting ID, and Paul missed almost a half of the meeting as a result. Further, the decision by Charles not to include the NetMeeting medium in his metrics discussion essentially cut out half the participants from the conversation during part of the meeting. Charles, the Facilities vice-president knew about NetMeeting as his quote "We don't need to use NetMeeting," demonstrated, and this meeting would have seemed like an appropriate occasion to use that particular medium (since many similar Facility meetings had been run using it), yet he decided not to include it in the metric meeting's conversational scaffold. In doing so, he did not create a sufficiently robust conversational scaffold to allow everyone to participate effectively in the discussion about dashboards. He needed to think about the conversation as a whole, but instead was thrown off by the face-to-face presence of a few colleagues. He saved time up front by not making NetMeeting a part of the conversational scaffold but this decision led to a conversation where only the face-to-face members could fully participate. Not surprising, the lack of participation by the other participants in this primary conversation spawned their secondary concurrent conversations among themselves.

Implications

Our study of FacilityEast suggests that understanding the choice and use of multiple media within hybrid work configurations can be usefully understood through the lens of scaffolding of conversations. As we saw, people use both single and multiple media to weave together a rich tapestry of individual and concurrent conversations. We found that participants at FacilityEast deliberately and artfully combined various media to share information and interact with each other in more ways than were possible through the use of any one medium alone. As such they built complex, emergent, and interdependent conversational scaffolds to support their work. We identified four different types of conversational scaffolds constructed by FacilityEast members using both single and multiple media to support both individual and concurrent conversations. While these scaffolds supported and enabled ongoing conversations, we also found that people become very dependent on them, particularly when they work in hybrid configurations that involve distributed participants and multiple time zones. So that when one or more of the media are used inappropriately or incorrectly, or they are not available, or they slow down, break down, or even shut down, reliable and useful conversational scaffolds cannot be constructed, and conversational interactions and outcomes suffer as a consequence.

The media that seemed to be used together most often at FacilityEast—IM, phone, NetMeeting and face-to-face—all allowed the building of synchronous scaffolds. One manager in an interview referred to all face-to-face, phone, and IM use as "face-to-face" interaction. While he made distinctions among these when pressed, his labeling of these three synchronous media as face-to-face suggests that the differences among these media mattered less than their

similarities and their ability to facilitate synchronous conversations. When used in combination, synchronous media may help create a deeper sense of participation in conversations by allowing multiple people to interact at the same time. The construction of synchronous scaffolding, which afford real-time response and rapid information sharing and negotiation may be helpful in the effective working of many teams, both virtual and hybrid.

As we saw with the use of IM in both the meetings, the additional interactions that arose out of the use of this synchronous medium allowed the participants to share information as well as strengthen their relationships. In the reorganization meeting, while the phone and NetMeeting were used to share information about the new structure, IM was used by Dick and Tim to share their gripes about the new restructuring and to explore how they could alter their assigned regions. At the same time, Dick and Jane, were involved in their own face-to-face discussion about the meaning and implications of the reorganization. These concurrent conversational interactions facilitated by the use of multiple media added to the interaction complexity and attention requirements of the participants, but it also provided conversational richness and supported additional interactive purposes.

The construction of dense, interconnected conversational scaffolds with multiple media increases opportunities for creating innovative new ways of communicating and working with colleagues. When new potential combinations present themselves, people have to draw on their previous experiences with each of the constituent media. How people have used a medium or combination of media previously contributes to how they construct scaffolds for future use. There was much about how FacilityEast members used communication media, and thus the conversational scaffolds that they constructed, that was habitual at times, improvisational at other times, and sometimes both at the same time. The use of the phone in meetings among distributed team members was taken as a given. All meetings that had at least one member who was not co-located involved a phone. Phone use in meeting communications was habitual and taken-for-granted, although some phone use was artful and deliberate (e.g., the use of the mute button). The use of IM, however, was much less habitual, especially at the time of this study (IM was introduced into FacilityEast around the time of this study, at first informally by FacilityEast members who installed third-party software on their systems). In FacilityEast, people used IM with their other co-located co-workers for quick questions, both work-related and social, when they were sitting at their desktops. When FacilityEast installed a wireless network and members could wander around with their laptops, untethered from the physical network, IM became more prevalent in meetings. While IM continued to be used for quick questions and comments in meetings (similar to its use outside of meetings), IM exchanges were also used to solidify social relationships between colleagues who were not co-located.

The availability of particular media do not automatically determine their use in conversational scaffolds. People working in Hardware Inc., especially those in the Facility department, often used NetMeeting so that people working at a distance could all access a common document and follow an explanation related to that document. In the case of discussions about blueprints and space plans, the use of NetMeeting was an unusual but highly useful and innovative practice used throughout the Facility department that made it possible to use a virtual team to manage physical space. People in FacilityEast considered NetMeeting a key application to getting their work done and were accustomed to using it in many different ways. Individuals, however, might not choose and/or use the appropriate media for a conversation even when the media are available. As we saw in the metrics meeting, when NetMeeting was not included in the conversational scaffold, not everyone was able to participate

effectively in the discussion about dashboards, and the conversation essentially broke down into two: the one face-to-face and with paper among the co-present participants in the West Coast meeting room, and the virtual IM conversation among the distributed participants.

Studying conversations in the workplace that include both multiple media and multiple participants highlights the difficulty of characterizing communication and media use. Each conversation has a point of view, and a different and shifting set of media that scaffold it. A bundle of conversations that take place at the same time may all be directed toward the same point, but as the Hardware Inc. examples illustrate, it is more likely that the different people having conversations at times connect and at times diverge. Using the metaphor of scaffolding allows us to talk about conversational scaffolds that are constructed over time and with various interconnections to other scaffolds. In the example of the reorganization meeting, Dick's scaffold allowed him to participate in the distributed phone conference conversation and follow a set of PowerPoint slides via NetMeeting (both part of the reorganization conversation), and converse with another member using IM, while also talking face-to-face with Jane (creating a series of concurrent conversations). Part of Jane's scaffold was shared because she looked over Dick's shoulder at the slides on the laptop screen and read Dick's IM messages. She did not, however, send any IM messages of her own as IM was not part of her conversational scaffold. As this example demonstrates, the scaffolds created for different conversations interlock, with linkages for shared conversations being common across all conversation members and each individual member adding linkages for additional conversations that they are engaged in.

Our study of Hardware Inc. has a number of limitations that may affect the application of its findings to other situations. The downturn in the economy in 2001 hit Hardware Inc. quite hard and there was a series of layoffs that affected FacilityEast as well as other parts of Hardware Inc. The use of various media may have been particularly influenced by the cost-cutting and layoffs. In some cases, this was readily apparent as FacilityEast members used to travel to their more geographically distant facilities regularly and they used to travel to headquarters to meet counterparts at least twice a year. During the downturn, travel was severely curtailed and Hardware Inc. members made more use of communication media to get work done in their hybrid work configuration. The layoffs reduced the number of employees and contractors in the Facility department and as fewer people took responsibility for larger geographic territories, hybrid work teams became more prevalent. One site would not have all of the requisite people available to do the work in that site, and Facility members became adept at working on virtual and hybrid teams that afforded them the resources to get work done. The nature of the work of the Facility department also changed somewhat during the downturn in the economy. During the "dotcom" boom, Hardware opened offices. Facility members spent as much time planning for future growth as they did managing current properties. In the downturn, there was very little building taking place, the opening of new sales offices was curtailed, and many sites were consolidated and the Facility department used the downturn as an opportunity to move more of their records and processes to the Web, creating a greater need for virtual and hybrid teams, as knowledge and expertise was spread across the organization.

Our study suggests that organizational members enact conversational scaffolds through their use of various media that are available to them, through drawing on both their knowledge of these media, the norms and expectations of their group and organization, and their emergent improvisations in the contingencies of the situation. The implementation of multiple communication media in organizations, as well as the increased prevalence of teams with at least one geographically-distributed member, creates the opportunity for more varied and complex

forms of communication, including the practices of combining multiple media and participating in multiple conversations, than had been envisioned in earlier theories. Organizational members are able to use various media to create scaffolds as guides to their communicative practice. Yet such use and the communication media are not stable, and changes in the environment, technology, and organizational conditions can alter both, shifting the kinds of conversational scaffolds that can be constructed, and generating both intended and unintended consequences.

What shapes the composition and use of conversational scaffolds in different circumstances is an interesting area for future research. Conversations are mediated and structured by media, and communication is mindful, skillful work. This research proposes that members of an organization enacting hybrid work configurations are more likely to have to engage in more complex and interdependent conversations with a growing array of multiple media. Using the metaphor of scaffolding allows us understand how such members structure their various individual and concurrent conversations by constructing and connecting many different kinds of temporary conversational scaffolds to accomplish their ongoing work and communication, and with what organizational and interactive outcomes.

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Figure 1: Hardware Inc. Facility Organization Chart

Function:
Employee Services

Function:
Security
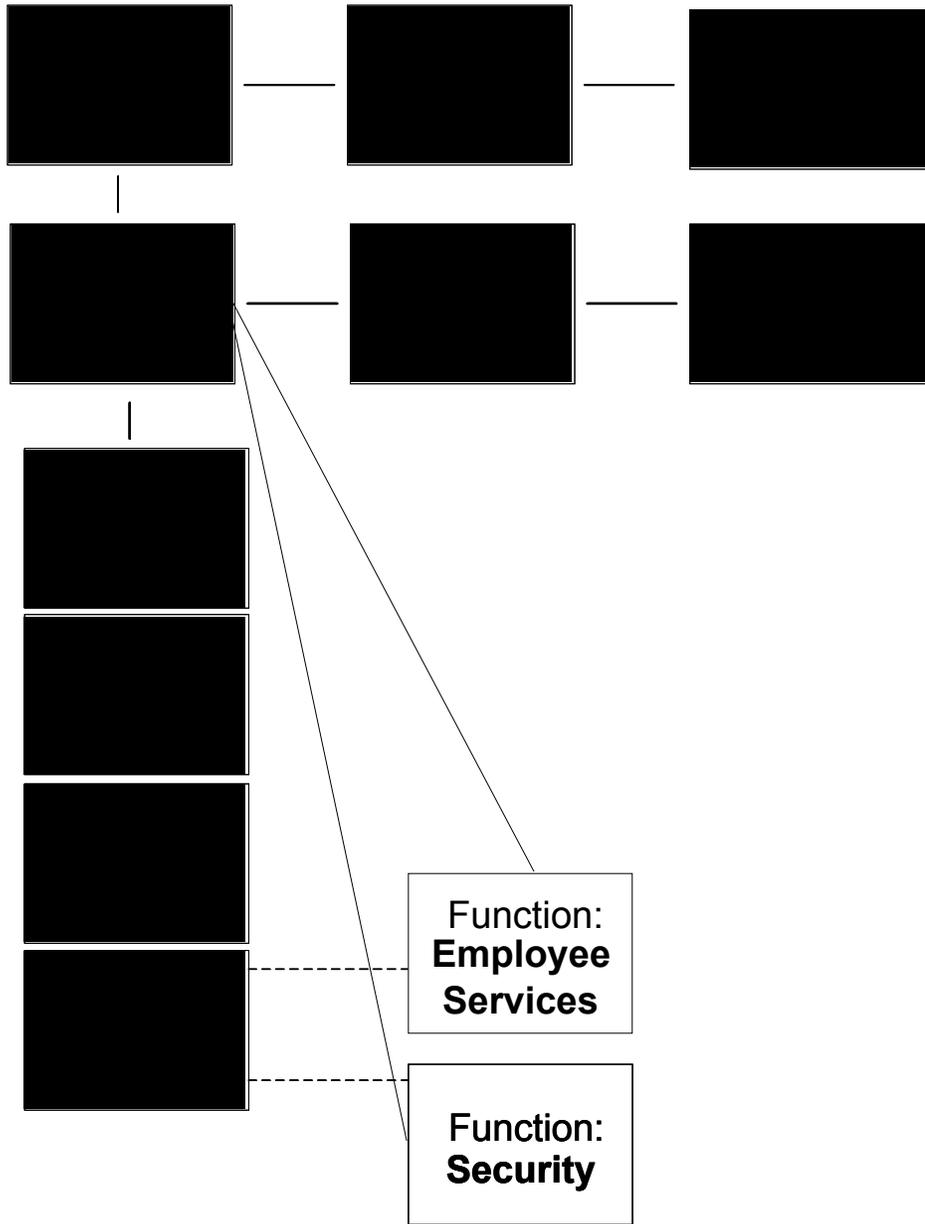
Figure 2: FacilityEast Employees and Contractors

Facility Department	Number of Hardware Employees	Number of Contractors	Number of Contracting Firms	Gender	Tenure > 3 Years
Real Estate	2	0	0	1 M; 1 F	1
Site Development	2	0	0	2 M	2
Facility Management	1	5	1	2 M; 4 F	1
Space Planning	2*	4	1	6 F	
Employee Services	1	1	1	1M; 1 F	1
Phone Network	0	4**	1	3 M; 1 F	
Mail and Packages	0	1	1	1 M	
Security	0	1	1	1M	
Total	8	16	6	11 M; 13 F	5

*One of the Internal Coordination employees was considered "virtual" but she was often in the office during the time of the study.
**One of these contractors was "virtual" but participated in the study.

Figure 3: FacilityEast Office Floor Plan

Corridor

| Office | Conference Room | MotherC Room | Conference Room |

Mail/Copy Room

Storage

Plotter Floor Plan Copier Hanging Racks

Bulletin Boards

Sample Books

Plotter

Dean
¥ Security
¥ Contr.

Jane
¥ Plan
¥Contr.

Linda
¥ Plan.
¥ Employ

Keith
¥ Devel.
¥ Employ

Ken
¥ Site
¥ Contr.

Dick
¥ Facil.
¥ Employ

Steve
¥ Facil.
¥ Contr.

Diane
¥ Facil.
¥ Contr.

Susie
¥ Plan.
¥ Contr.

Barbara
¥ Facil.
¥ Contr.

Jane
¥ Site
¥ Employ

Printers Fax

Howie
¥ Mail
¥ Contr.

Lisa
¥ Plan.
¥ Contr.

Denise*
¥ Plan.
¥ Employ

Marty
¥ Devel.
¥ Employ

Jack
¥ Phone
¥ Contr.

Kate*
¥ Phone
¥ Contr.

Jillian
¥ Facil.
¥ Contr.

Cheryl**
¥ Plan.
¥ Contr.

Joan
¥ Facil.
¥ Contr.

Tom
¥ Phone
¥ Contr.

Ike
¥ Phone
¥ Contr.

Gordon
¥ RealE
¥ Employ

Amanda
¥ RealE
¥ Employ

Printers

Conference Room

Office

Conference Room

Office

Windows to Outside

*Worked virtually and did not use this cubicle though it was assigned to her.
**Laid off part-way through observation period.
*** Left Hardware for another job part-way throu observation period.

Figure 4: Communication Media in Use at FacilityEast (during research period)

Media	Use	Details
Face-to-Face	In cubicles, offices, corridors, parking lot, cafeteria, at after-work gatherings, out on a job site, or in meetings.	Propinquity important though lunchtime in the cafeteria, the one time when cubicle proximity, task demands, and individual friendships did not factor strongly in face-to-face interactions.
Phone • Desk phone (w/voicemail) • Polycom phone • Cell phone • Radiophones (walkie-talkie)	• With handset or as a "speakerphone" in cubicles • In the conference rooms for meetings • When away from desk • Typically on job sites for coordination	• For one-on-one or multiple-party conversations • For conversations with multiple participants, local and remote • For one-on-one conversations • For short and broadcast conversations
Email	To document meetings and conversations, to control workflow, to craft a consistent message, and to remind participants of appointments, meetings, and agreements.	Ubiquitous use for individual and group conversations.
Instant Messaging	Sidebar communications in meetings, both to ask questions and to conduct quick social interactions; also for short conversations with work colleagues, friends and family members while in cubicle; and as a form of control by at least one manager.	Initial use bottom-up; a corporate IM application adopted later and its use became more prevalent. Considered an internal form of communication.
Pager	Use varied, with some using pagers only at work while others keeping them on all the time (e.g., the manager overseeing all facilities kept his pager on all the time).	Treated as messages that needed immediate attention, more so than email or phone.
Internet-based Conferencing	Facilitated real-time sharing in meetings, training sessions, and one-on-one phone calls, typically to illustrate or explain.	Newer versions of this technology also had audio, video, and chat capabilities.
Videoconferencing	Primarily used in "all-hands company meetings" across Hardware Inc.	Used infrequently, scheduled ahead of time, and prone to break down.
Shared Folders and Internal Web Sites	To collaborate, store, locate, and distribute information.	Collaboration sometimes done by round robin, with hand-off via email attachments; other times, shared folder allowed others to work on document.
Paper	As blueprints and space layout diagrams, and as memos, lists, instructions, and reminders to the people in the business units who were being moved from one site to another.	Paper-based reports, memos, or notes rarely sent within FacilityEast; most communication done online, via email, PowerPoint decks, or web sites. Paper memos, instructions, lists, and reminders physically distributed to cubicles of employees being moved; online communications did not command as much attention.

Figure 5: Typology of Media Use and Conversations
(showing examples observed at FacilityEast)

	Individual Conversation	**Concurrent Conversations**
Single Medium	- Face-to-face - Phone (Desk & Cell) - Pager - Radiophone - Shared Folder	- Face-to-face - IM - Email
Multiple Media	- NetMeeting and Phone - Phone and Email - IM and Shared Folders	Conference Meeting Calls using Polycom Phone, IM, NetMeeting, and Face-to-face

Figure 6: Use of Media in Communication and Work at FacilityEast

	Commonly used as a single medium	Commonly used combinations of two media for individual conversations	Commonly used combinations of more than two media for concurrent conversations
Face-to-face	Yes	w/Phone	w/Phone, IM, and NetMeeting
IM	Yes	w/Shared Folder	w/Phone, Face-to-face, and NetMeeting
Email	Yes		
Pager	Yes		
Radiophone	Yes	w/Face-to-face	
Desk Phone	Yes	w/IM or NetMeeting	
Polycom Phone	Yes	w/Face-to-face	w/Face-to-face, IM, and NetMeeting
Cell Phone	Yes	w/Shared Folder or NetMeeting (at home)	
Voice Mail	Yes		
NetMeeting		w/Phone	w/Phone, Face-to-face, and IM
Video Conference (for meetings only)		w/Face-to-face	
Paper	Yes	w/Face-to-face	
Shared Folder/Web Site/Common Files	Yes	w/IM or Desk Phone	