Participation in ICT-Enabled Meetings

Katherine M. Chudoba
MIS Department
Jon M. Huntsman School of Business
Utah State University
3515 Old Main Hill
Logan, UT 84322-3515 USA
kathy.chudoba@usu.edu
+1 (435) 797-2344 (voice)
+1 (435) 797-2351 (fax)

Mary Beth Watson-Manheim
Department of Information and Decision Sciences
2426 University Hall, 601 S. Morgan Street, MC 294
University of Illinois, Chicago
Chicago, IL 60607-7124 USA
mbwm@uic.edu
+1 (312) 996-2370 (voice)
+1 (773) 868–3204 (fax)

Kevin Crowston
School of Information Studies
348 Hinds Hall
Syracuse University
Syracuse, NY 13244-4100 USA
crowston@syr.edu
+1 (315) 443–1676 (voice)
+1 (866) 265–7407 (fax)

Chei Sian Lee
Division of Information Studies
Wee Kim Wee School of Communication & Information
Nanyang Technological University
31 Nanyang Link
Singapore 637718
leecs@ntu.edu.sg
+65 6790 6636 (voice)
+65 6790 5214 (fax)

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Abstract

Meetings are a common occurrence in contemporary organizations, and almost everyone shares an understanding of what a meeting is and what participation in a meeting looks like. Yet our exploratory study at Intel, an innovative global technology company, suggests that meetings are evolving beyond this familiar perspective as the pervasive use of information and communication technologies (ICTs) changes work practices associated with meetings. Drawing on data gathered from interviews prompted by entries in the employees' electronic calendar system, we examine the multiple ways in which meetings build and reflect work in the organization and derive propositions to guide future research. Specifically, we identified four aspects of meetings that reflect work in the 21st century: meetings are integral to work in team-centered organizations, tension between group and personal objectives, discontinuities, and ICT support for fragmented work environment.

Keywords

meetings, distributed work, organizational impacts of IT, ICT, work practices, qualitative research

Participation in ICT-Enabled Meetings

Meetings are "a focused interaction of cognitive attention, planned or chance, where people agree to come together for a common purpose, whether at the same time and same place, or at different times in different places" (Romano & Nunamaker, 2001, p. 1). Meetings are pervasive in contemporary work life, serving as important forums where social relationships are created and changed in organizations (Schwartzman, 1989; Weick & Meader, 1993). Time spent in meetings appears to be increasing (Romano & Nunamaker, 2001; Stephens & Davis, 2009) and meetings are prevalent across all levels of workers (National Research Council, 1999) as a mechanism for collaboration, coordination, information sharing, and decision-making (Tropman, 1996).

Though meetings would appear to be a stable and mundane feature of organizational life, we suggest that the practice of meetings is in fact changing dramatically with the pervasive use of information and communication technologies (ICTs). We present an exploratory study conducted at Intel Corporation where participation in meetings has evolved beyond an activity that is perceived as peripheral to work to one where it is an integral part of the work. The taken-for-granted image of individuals sitting around a table engaging in verbal discussion is no longer the norm. At Intel (and in many other organizations), meetings are frequently enabled by ICT, specifically voice and audioconferencing, screen sharing (such as NetMeeting®) and document sharing (e.g., through a Web site or shared file storage), to enable the participation of geographically distributed individuals. This technological change is reflected in evolving work practices, which include new expectations about who participates, what participation looks like, and more generally, how work gets done when people meet. Understanding the role of ICT in changing the way meetings are enacted provides insight into the conditions under which employees work, as well as the infrastructure that is necessary to support work.

We begin with a review of the relevant literature, including the practice lens and prior research on traditional meetings and GSS-supported meetings. Then we describe our methods and the findings from

our qualitative analyses, which are reflected in the form of propositions derived from our data. We conclude with a discussion of our findings, including implications for research and practice.

Background

Practice view

Because work and use of ICT can be highly intertwined, it is important to have a theoretical perspective that helps make sense of their relation. In this paper, we adapted Orlikowski's (2000) application of a practice lens to analyze the interaction between ICT use and meetings. A practice lens focuses on human agency and the open-ended set of structures or work practices that arise through recurrent human activities. The approach uses people's everyday activities as the unit of analysis, and examines the structural and interpersonal elements that create and are created by these activities (Schultze & Orlikowski, 2001). While offering a broad perspective on which to base an investigation of meetings, a practice lens encourages a focus on specific work practices and the structures and norms associated with them. It provides guidance about what factors should serve as the focus of an investigation, rather than providing a predictive framework of cause and effect relationships that are examined. In our adaptation of the practice lens view, we focus on practices as organizational members report them and use the insights that emerge from these practices to generate propositions to guide future research.

Figure 1, adapted from Orlikowski (2000), shows the relationship between agency and work practices and their constituents. Work practices of social systems are enacted through recurrent human activities and are mediated through settings, norms, and interpretive schemes that guide human action. Settings include the context that supports meeting activities such as participants' physical location and technology; norms, the codes of conduct and etiquette that guide and regulate the activities; and interpretive schemes, the categories and assumptions that give meaning to the activities. By examining meetings as a collection of work practices, we can study the effects of ICT-enabled distributed meetings. To the extent technology is used in different ways, different practices emerge, thus leading to a shift in the way people accomplish their work.

--- Figure 1 about here ---

Research on face-to-face meetings

As an introduction to our empirical study, we first briefly analyze prior research on the role of face-to-face (FTF) meetings. We identify the settings, norms and interpretative schema explicitly or implicitly assumed in this research, and the related structures and practices.

Settings. Traditionally, meetings are described as FTF events held in a conference or meeting room. Participants use technologies such as whiteboards and computer projection equipment to facilitate information sharing. For example, Romano and Nunamaker (2001) reviewed research on meeting analysis over the prior 15 years. While their definition of a meeting is broad enough to include distributed participants, in fact all the literature they reviewed assumes that participants in meetings are collocated. The influence on the effectiveness of the meeting's location on the meeting itself, e.g., on-site vs. off-site, is discussed but no literature is cited where meeting participants are in different locations. Similarly, Luong & Rogelberg (2005) surveyed 37 people in a university setting who attended at least three meetings per week, but meetings were defined as events held in conference rooms with all participants collocated. Sonnentag (2001) studied 60 software professionals from 10 software projects, where teams members were collocated in various parts of Germany. Thus, historically research on meetings has focused on FTF gatherings and not distributed settings.

Norms and rules. Prescriptive rules for improving meetings have long been a topic of practical interest, as evidenced by books such as *How to Make Meetings Work* (Doyle & Strauss, 1976) and, almost 30 years later, a *Harvard Business Review* article, "Stop Wasting Valuable Time" (Mankins, 2004). Both publications suggest adding regulating processes (e.g., agendas, minutes) to make meetings more efficient and effective. In the research literature, meeting success is proposed to be largely dependent on the existence of group processes that regulate activities (Nunamaker, Dennis, Valacich, Vogel, & George, 1991; Sonnentag, 2001), though there is often little evidence of meeting preparation that includes these regulating processes (Romano & Nunamaker, 2001).

Interpretive schema. Interpretive schemas are the meanings that participants give to meetings, such as its purpose. Sometimes meetings stress individual accountability (Luong & Rogelberg, 2005) and

sometimes group accountability (Sonnentag, 2001). A second aspect of the interpretive schema is the way meetings fit with other work. Rogelberg and colleagues conducted research on individuals' perceptions of meeting effectiveness and the link between perceived effectiveness and employee well being (Luong & Rogelberg, 2005; Rogelberg, Leach, Warr, & Burnfield, 2006). Participants in these studies described meetings as peripheral activities that were a disruption to their primary responsibilities. As a result, increased frequency of meetings led to feelings of fatigue and increased workload because the completion of primary tasks was delayed. A final aspect of interpretive schema is the likely effectiveness of meetings. In the literature, meetings are often perceived as costly and ineffective, wasting money and time, and leading to decreased morale and productivity (Sonnentag, 2001).

Work practices. In summary, the work performed by individuals involved in FTF meetings may be individual or collaborative, and meetings are more successful when there are group-regulating processes. There is a general feeling that meetings are often costly and ineffective. Individuals believe meetings are an interruption to primary work activities, but are also necessary activities to generate some discrete outcome, e.g., a decision is made.

Research on GSS-supported meetings

We next review the literature to examine how the use of group support systems (GSS) has been documented to change the structures and practices described above. GSS for meeting support has been the subject of information systems research for more than 20 years (Fulk & Collins-Jarvis, 2001).

Settings. The most obvious difference between FTF and GSS-supported meetings research is the technology available to support the meetings. Research has focused on the development of tools and techniques to support and structure group interaction, e.g., by supporting group activities such as brainstorming and voting (Nunamaker, et al., 1991) or strategic planning (Adkins, Burgoon, & Nunamaker, 2003). Almost all of the published research has examined the use of GSS when all participants meet FTF in a specially equipped meeting room. Some researchers have suggested that the technology can support people participating in the meeting from different locations for specific tasks such as requirements negotiation (cf., Boehm, Grunbacher, & Briggs, 2007) or collaborative engineering

(Briggs, Vreede, & Nunamaker, 2003), but we are aware of no published research that has specifically examined the use of a GSS to support synchronous meetings with distributed participants.

Norms and rules. Consistent with the prescriptive literature on FTF meetings, the role of GSS is to provide increased structure for meetings, which is in turn hypothesized to lead to more successful group meetings. A basic tenet of GSS is that enhancing group outcomes depends on maximizing process gains and minimizing process losses. Increased use of technology support for meetings should lead to increased effectiveness by supporting group processes and providing structure (Romano & Nunamaker, 2001). In this study, we will consider how norms surrounding the use of other types of ICT are associated with meeting effectiveness.

The support for group processes and structure become instantiated as norms and rules to the extent that participants use GSS technology as intended by its designers and faithfully appropriate the GSS (DeSanctis & Poole, 1994). The information technology infrastructure facilitates communication among meeting participants through parallel communication, anonymity, and collective memory (Nunamaker, et al., 1991) or by enhancing workspace awareness (Haines & Cooper, 2008). To the extent that meeting participants faithfully appropriate a GSS they have adopted the norms and rules generally associated with use of a GSS. In other words, faithful appropriation means 1) participants use the GSS for parallel communication instead of engaging in extensive verbal communication that requires sequential turn-taking, 2) participants evaluate ideas independently without knowing who submitted them (e.g., they appropriate the anonymity feature of a GSS), and 3) participants use the textual record of a GSS session to document ideas and decisions (cf., Fjermestad & Hiltz, 1998/1999; Jackson & Poole, 2003).

Interpretive schema. Generally speaking, the interpretive schema for GSS-supported meetings research appears to be the same as for traditional FTF meetings, with two exceptions. First, norms and rules are assumed to be derived from use of the technology, to the extent that it is faithfully appropriated. Second, an additional assumption focuses specifically on the role of anonymity. Traditional FTF meetings are believed to suffer from participants' inhibitions against contributing publicly, and so the technology is

believed to help by providing an anonymous channel, although most of the research on anonymity is lab- not field-based.

Work practices. In both traditional and GSS-supported meetings, there is an underlying assumption that meetings are held to accomplish specific purposes outside of normal work activities (cf., Briggs, et al., 1998/1999). Much of the GSS research is experimental and focuses primarily on enhancing the group process, rather than investigating its use in field settings. In other words, while the settings are different for traditional and GSS-supported meetings, the assumptions about appropriate rules and norms and individual interpretive schemes have changed very little, with the exception of anonymity.

Changes in work practices

From our review, we note that the missing element in the study of meetings is how meetings with geographically distributed participants are supported with ICT and the effects on work practices. Our interest differs from studies of virtual teams, (Powell, Piccoli, & Ives, 2004), which have mostly examined asynchronous interactions using electronic mail (e.g., Ahuja & Carley, 1999; Cramton, 2001) or computer conferencing (e.g., Sarker & Sahay, 2002). Instead, we are interested in how ICT enables synchronous interactions. Some teams may rarely or never meet FTF and yet still form effective teams (Crowston, Howison, Masango, & Eseryel, 2005; Orlikowski, 2002). The goal of our empirical study is to provide evidence for the relationship between ICT use for meeting support and changes in work practices.

Methods

Research setting

The study was conducted at Intel Corporation, a Fortune 100 company in the information technology industry[1]. Company headquarters is in the United States, and R&D, manufacturing, and sales operations are located in multiple sites within the U.S. and around the world. Intel is recognized as an innovative company in a fast-paced, global environment. Employees routinely work and collaborate with colleagues across the globe. For example, it is common to find employees who work in the same project

[1] The field site has not been anonymized at the request of our sponsor in the company.

team to be distributed in different worldwide sites or to find employees who report to managers who are not collocated (up to 25% of employees in support areas).

Data collection

Data were collected from semi-structured telephone interviews, guided by a protocol developed according to recommendations for conducting qualitative research (Miles & Huberman, 1994; Strauss & Corbin, 1990). We interviewed 30 employees for whom communication with colleagues was an important and significant part of their work responsibilities. A snowballing technique was used to identify respondents. We were initially given names of two mid-level knowledge workers. At the end of each interview, employees were asked to refer us to other employees. As the interviews progressed, researchers asked respondents to identify subjects located outside the U.S. and across different functional areas in order to achieve a stratified sample (Eisenhardt, 1989). Data in Table 1 show the demographic profile of the respondents. Each interview lasted approximately one hour, with two members of the research team (one interview only had a single researcher). Interviews were not tape-recorded, although both interviewers took copious notes. Having two researchers allowed one to focus on listening and note taking while the other led the questioning (Mason, 1996).

--- Table 1 about here ---

A semi-structured interview protocol was used to ensure that comparable data was collected from each interviewee. The interview protocol was grounded by reference to entries in the respondent's electronic calendar for the most recent typical week. Everyone in the company used the same electronic calendar application and kept their schedules online and accessible to others. Respondents were asked to discuss all entries on their electronic calendar from the most recent, typical workweek. We asked a number of questions to characterize each meeting including its purpose and frequency (e.g., one time or recurring); what happened during the course of the meeting, including interactions among participants; participants and their location, first language, and function and organizational affiliation; and the technologies used and how they were used. These questions were aimed at uncovering the settings, norms

and interpretive schemes that illustrate agency, as well as the structural properties of the overarching social systems (Mason, 1996).

Data Analysis

After each interview, notes were transcribed and compared across the researchers who conducted the interview. Transcriptions were entered into qualitative analysis software. Two members of the team inductively and iteratively studied the data, and independently identified issues and themes. These were compared and differences resolved. The synthesized coding was repeatedly reviewed with the rest of the research team (Strauss & Corbin, 1990). Analysis continued as we sought to understand respondents' perspectives about meetings, ICTs, and roles they played at Intel.

We now present our findings and research propositions derived from them. The practices associated with meetings attended by knowledge workers at Intel allowed us to move toward an understanding of participation practices in ICT-enabled meetings.

Toward an Understanding of Participation in ICT-enabled Meetings

In this section, we first summarize our research findings. We next elaborate the findings and offer a set of propositions to further examine the relationship between ICT use for meeting support and changes in work practices.

Research Results

Our data clearly show that meetings are a defining aspect of work life for knowledge workers at Intel. Data in Table 1 describe the demographic characteristics of our respondents and their reported meeting participation. Sixty-six percent of respondents reported having more than 15 meetings scheduled on their calendars during the week being covered in the interview. Almost two-thirds of the respondents reported 20 or more hours a week in meetings during the week, with more than a quarter of them spending 30 or more hours in meetings. Strikingly, 80 percent of respondents reported meeting with more than 4 different teams each week.

Our 30 respondents provided data covering a total of 524 meetings. Table 2 presents data about these meetings. One-third of meetings in our sample involved two participants, while another 30% had 3-

9 participants, and 20% had 10 or more participants. Ninety percent of meetings were scheduled regular meetings, occurring on a recurrent and planned basis. Only 10% were ad hoc meetings, occurring on a one-time, as-needed basis, though this small proportion may be due in part to our sampling strategy, which was based on respondents' calendars—it may be that some ad hoc meetings did not get recorded, and were not recalled by the respondent.

--- Table 2 about here ---

We asked respondents to discuss the purpose of each meeting that appeared on their calendars. The overwhelming majority of meetings reported were for team collaboration (76%). Meetings for collaboration purposes included meetings for status updates, brainstorming, problem solving, and coordination. Almost all of these meetings were recurring, as members of teams met periodically to address the team's charge and objectives. Our analysis of the data revealed no significant difference in work practices in meetings that involved these different collaboration objectives. Fifteen percent of meetings were between a manager and employees reporting directly to that manager. Eight percent of the meetings were classified as information dissemination. In these meetings the direction of communication is one-way (e.g., announcement, presentation, training). Finally, respondents described a small number of meetings (1%) that were held for a purely social purpose.

A number of different ICT applications were instrumental in the meetings described to us by participants, with many in heavy use. Most prevalent was the audio bridge (42% of meetings), an internal teleconferencing facility. The audio bridge had to be requested prior to the meeting and information sent to meeting participants to establish the connection. Employees differentiated telephone use from audio bridge use, with the telephone used for meetings with two or three participants. Team collaboration tools that allowed shared view of documents and collaborative editing were often used in conjunction with teleconferencing (34% of meetings). Some respondents reported use of shared web repositories (12%) to store project documents. Email was used to disseminate information before, during, and after the actual meeting. On the other hand, instant messaging (IM) was reported used in only 4% of meetings. IM, and sometimes email, were used for impromptu communication during meetings although this number is

likely understated. IM technology was just being introduced into Intel at the time of this research, and its use did not surface until relatively late in our interviews, so it may be that our numbers reflect an early stage of adoption. Employees also reported using IM and email for unplanned communication throughout the day because they were considered them less intrusive than an unplanned telephone call to a colleague.

The pervasive use of ICTs in meetings reflects a form and structure of meetings that is different from the traditional setting of meetings with participants seated around a conference room table. Participants no longer have to be in the same location in order to attend a meeting. Only 19% of the meetings reflected the traditional scenario of a meeting as a FTF gathering with all participants in the same room. In fact, 58% of the meetings involved no collocated participants. An additional 12% were partially collocated, meaning some participants were in the same room and some were in different locations.

Employees described an organizational culture emphasizing individual productivity influenced by the rapid pace of change in Intel's product line and the intense global competitive environment. The ease of including people in meetings, no matter where they were physically located, was reflected in a proliferation of scheduled meetings on individuals' calendars. The flexibility to attend a meeting from whatever location was most convenient—be it home, office, or conference room—meant time saved from reduced travel, but concurrently, savings in time dissipated because of an ever-increasing number of meetings to which knowledge workers were invited. Because they did not have to physically attend a meeting, employees felt there was an expectation they would be available to attend meetings whenever they were scheduled. This was especially notable for employees who lived in places that were not in the same time zone as the majority of those with whom they worked, which meant frequent early morning or late evening meetings for them.

Research Propositions

While Mintzberg (1973) documented the extensive amount of time executives spend in meetings, prior research has not indicated that knowledge workers can spend 20% or more of their work week in meetings, as they do at Intel. The sheer number of meetings meant our respondents frequently had to

make decisions about the extent of their participation in a given meeting because of conflicting demands on their time. Three levels of participation in meetings emerged from our data.

- Non-participation—people who are on a distribution list for a group and who have been invited to participate in the meeting, but after reviewing the agenda, decide not to attend this particular meeting.
- Partial participation—those who attend only a portion of the meeting or who "listen with one ear" without being fully engaged in the meeting, most often because they are multi-tasking and working on other things such as checking email during the meeting.
- Full participation—participants who are actively engaged in the meeting.

Table 1 shows that about half our respondents participated only partially in some of their meetings, and 10% of the respondents partially participated in half of their scheduled meetings. The employees with whom we talked explicitly noted that different degrees of participation were not only accepted, but were expected and deemed necessary in order to manage one's various responsibilities. Employees felt they were empowered to decide for themselves whether a given meeting called for their integral membership, or full participation during most of the meeting, versus partial participation in which they would only attend a portion of the meeting or peripherally participate by multi-tasking during the meeting. Therefore, we propose:

P1: As the number of ICT-enabled meetings increases, participants will be more likely to adapt interpretive schemas and media practices to include different modes of participation.

There was a general belief among respondents that increased structure and full participation, especially among core team members, led to enhanced meeting effectiveness. Norms were evidenced by a number of different strategies employed by meeting leaders to enhance effectiveness. For example, one norm was the regular preparation of meeting agendas and minutes. These documents were either distributed as email attachments or posted in team repositories. Published meeting agendas and minutes served as screening mechanisms and provided meeting participants greater flexibility in deciding the extent and nature of their participation for any given meeting. With open blocks of time increasingly

scarce on one's calendar, people reviewed agendas or minutes to help them decide the importance of attending a given meeting, and more specifically, how engaged they needed to be in the communicative interactions that took place during the meeting.

Agendas were sometimes structured to facilitate partial participation or participation during only a portion of the meeting, One respondent noted about his group: *"They begin with product related updates, delivery schedules, customer's requirements, etc. immediately during the first 10 to 20 minutes, then people can leave if they're not interested in the rest of the items on the agenda."* Another respondent observed, *"Agendas are sent out before the meeting so some people review the agenda and choose not to attend the meeting if they think that their item(s) may not get discussed."* Some of our respondents chose to remain on a meeting list even if they rarely attended the group's meetings, because by doing so, they received the agenda and minutes of the meetings and could monitor project progress and activities. This was especially important in teams with distributed membership. At other times, respondents chose not to attend a meeting based on its agenda in order to have time to accomplish other, more pressing responsibilities. This suggests that artifacts that have previously been viewed as structuring meetings and providing documentation can also be used as boundary objects (Star, 1989). In other words, agendas and minutes provide information that is recognized by multiple categories of participants, but each participant may interpret the information differently, based on her or his interpretive schema. Based on this evidence, we propose:

> *P2: As the number of ICT-enabled meetings increases, artifacts such as meeting agendas and minutes will serve as boundary objects that influence the extent of an individual's participation in meetings based on the individual's interpretive schema.*

A novel practice reported was respondents choosing to attend a meeting remotely by using the audio bridge, even when FTF participation was an option. By attending meetings from their desks, meeting participants were physically isolated from the rest of the group, which made it easier for them to multi-task during the course of the meeting. Multi-tasking behavior took different forms in these situations. ICT, specifically IM and sometimes email, were used to create side conversations during

meetings, the electronic version of whispering or passing notes. At other times, *"side conversations are a problem in these meetings. If the meeting really disintegrates, then people will stop talking about the task",* which increased the isolation of remote attendees. While side conversations happen at traditional meetings, participation is limited by physical proximity, e.g., talking to the person sitting next to you or passing a note to someone close by. Such conversations are also limited by timing, e.g., conversations take place during breaks in formal meetings. Also, side conversations are usually visible in traditional meetings (although they may not be noticed). But when meeting participants are in different locations, these interactions are not visible to other participants in a meeting. One respondent noted that she did not attend a meeting that was on her calendar because of a schedule conflict but while in the other meeting, received an IM from a participant in that the first meeting requesting information.

Respondents expressed understanding of and support for meeting activities that encouraged full participation in order to enhance group effectiveness (e.g., limited or no multi-tasking). At the same time, they also understood the importance of, even necessity of, ensuring their own personal productivity to meet performance objectives. This conflict often led to tension in their decisions as to meeting behavior. For example, respondents understood the importance of a 'level playing field' for meeting participation. Intel Human Resources even recommended meeting etiquette norms for this purpose, e.g., if all participants could not meet in the same room, everyone should join the meeting over the audio bridge. While this etiquette rule was understood as a way to insure participation equality, it had the unintended effect of actually enabling partial participation, albeit for different reasons. A number of interviewees saw the ability to attend meetings from their desk as necessary to enhance individual productivity since it helped them balance their responsibly to multiple teams. As one respondent explained: *"In terms of productivity, using phone allows more flexibility but the risk is I may miss out a couple of questions during the meeting [if multitasking]. The good side is I can do more activities (e.g.: check email) than in a FTF meeting. Particularly, for FTF meeting, it is rude to type on a computer especially when people travel all the way to [location name] to meet up. Thus, FTF meeting will probably result in around 60% productivity lost for Intel."* Based on the preceding discussion, we propose:

P3: As the number of ICT-enabled meetings increases, participants who expect to be only partially engaged in a meeting are less likely to attend a meeting FTF if they can attend using ICT.

Meetings with non-collocated others meant a change in expectations about meeting participation at Intel such that "full participation" by everyone who attended a meeting was the exception. While daydreaming and side conversations invariably happens in traditional FTF meetings, the use of ICT led to new forms of participation when people did not gather in the same room for a meeting. Team collaboration tools made it possible for people in different locations to view the same document, making active participation by everyone possible. Yet, being in a different location and out of visual sight of coworkers made it easier for meeting participants to reduce their participation by multi-tasking, such as checking email or using IM to respond to a question from someone attending another meeting. Partial participation was also evident in the use of published meeting agendas and minutes as screening mechanisms, as discussed earlier. Use of agendas and minutes have been used in the past to help a person decide whether or not to attend a meeting, but they allow a more nuanced decision in distributed meetings since attendance no longer means one must at least give the pretence of full participation as it does in a FTF meeting.

Use of the telephone audio bridge allowed employees to attend a meeting from anywhere, which provided a positive sense of freedom and allowed the team members to accommodate individual priorities. On the other hand, its use did sometimes leave respondents feeling left out of interactions. This effect was especially evident when a subset of meeting participants was located together in a conference room, with remote participants joining the meeting over the audio bridge. One respondent observed: *"You can sense the energy and activity in [location] and that shuts down activity for those on the telephone… balancing creative energy with total team participation [is difficult]. You don't want to squash that [creative energy] for those in the conference room by doing a more structured thing like asking people on the bridge 'what is your input?' It's hard to balance."*

Recent research on geographically-distributed teams indicates that the configuration of the team, i.e., how many different sites team member are located in and how many members at each site, influences the norms of behavior and ultimately productivity of a distributed team (O'Leary & Mortensen *forthcoming*). Imbalanced teams can lead to the formation of subgroups with negative effects on team dynamics and performance. Alternatively, one isolated member can lead to higher team performance as members adjust their interactions to accommodate this person. Although we did not measure team performance, our data provides additional support for the changes in the norms of behavior and assumptions about the meeting effectiveness that occur in different team configurations.

Thus, we propose:

P4: As the number of ICT-enabled meetings increases, the configuration of attendees and their interpretive schemes will be more likely to lead to different levels of participation.

While employees agreed meetings were important to getting work done, they also felt that time spent in meetings was sometimes unproductive. Use of ICT enabled more meetings to take place, however, employees felt that technology was not always used as effectively as possible in this global environment. As one employee explained, there is *"lots of non-productive time in meetings …people have not changed their behavior to deal with asynchronous work…everything doesn't have to be done together in a meeting … they need to save synchronous time for discussion."*

Because meetings at Intel frequently crossed multiple, far-flung time zones, participants, especially those outside of headquarters location, were expected to attend meetings outside of their traditional work hours. While most respondents accepted the need for these meetings, as noted above, respondents devised interesting mechanisms to manage how the workday intruded on personal time. For example, respondent 6 noted that his wife also worked at Intel so they made use of each other's calendars to schedule time commitments for family responsibilities. Before accepting a late evening meeting, he might check his wife's calendar to see if she was available to pick up the children, and if so, add that commitment to her schedule so he could attend the evening meeting.

Meeting scheduling typically revolved around the same time zone as Intel's headquarters in the western U.S., understandable since the majority of employees worked in several locations within this time zone. This meant that "minority" participants residing in other time zones often set their clocks to "headquarters' time." These employees accepted evening meetings (for those in Europe/Middle East) and pre-dawn meetings (for those in Asia) as "just the way it was." One respondent in Europe/Middle East blocked the 6-8 p.m. slot every day on his calendar so no meetings would be scheduled then to keep this time slot to travel home, have dinner, and put his children to bed. After 8pm local time, he then joined meetings via audio bridge, and when only his partial participation was required, spent the late evening with a phone to his ear and the local football game muted on the television.

Managers and other meeting conveners at Intel were aware of multi-tasking techniques used by meeting participants because they also used the techniques when attending meetings that they were not leading. The presence of laptops and/or use of ICT led meeting conveners to employ strategies to reduce multi-tasking such as cold-calls to assure that participants were paying attention or directing "laptops down" in FTF meetings so that no one was tempted to use a computer for a purpose not directly associated with the meeting. Managers reported that they did this when they believed that full attention and participation by members was necessary for team productivity on a specific task.

However, many participants with whom we talked revealed the self-oriented strategy of blocking time on one's calendar for individual work time. This meant that anyone else trying to schedule a meeting during the block of time would see it as unavailable, and so would be more likely to look for another time to hold the meeting. Respondents told us this was the only way they could assure themselves of quiet work time to prepare analyses or presentations. Interestingly, a number of Intel employees considered unplanned telephone calls intrusive. One respondent noted, *"The norm is to set people's expectations ahead of time [before a telephone meeting]. You schedule time on their calendar for a phone call so they can get the materials ready."* Instead of impromptu telephone calls, Intel employees used email or IM, technologies that were perceived as less intrusive.

Based on these observations, we propose:

P5: As the number of ICT-enabled meetings increases, the tension individuals experience between maximizing personal objectives and maximizing group objectives will increase.

Our respondents reported multiple team memberships, with 80% reporting concurrent membership on four or more teams. The frequency of multi-teaming is an important insight into the reality of networked organizations that is only now being recognized (Mortensen, Woolley, & O'Leary, 2007). Although probably not a new phenomenon (Watson-Manheim & Belanger, 2002), multi-teaming is likely more prevalent today, partially because ICT makes it easier to connect across distance, and partly because of the emergence of networked organizational forms. Multi-teaming makes it easier for people to follow new trends within the organization and expand their social networks (Griffith, Sawyer, & Neale, 2003; Orlikowski, 2002). It also promotes knowledge sharing across teams, a common knowledge management objective (Alavi & Leidner, 2001), but the benefit comes with the cost of time spent in additional meetings. In general, however, multi-teaming likely benefits both the organization and individual even as it brings complications of coordinating across multiple responsibilities and possible cognitive overload from persistent boundary spanning activities (Carlile, 2002).

The vast majority of meetings we examined at Intel were recurring, usually on a weekly, monthly, or quarterly basis. The predictability and repetition from recurring meetings establishes and reinforces norms about the meeting process, including which ICTs will be used and how they are used (Maznevski & Chudoba, 2000). This enhances the social context for non-collocated participants, which reduces the information that must be conveyed at any one time since much of it resides in the minds of meeting participants. Indeed, another study at Intel identified the lack of shared practices as a bigger detriment to effective team performance than distance (Chudoba, Watson-Manheim, Lee, & Crowston, 2005). HR at Intel tried to promote practices such as meeting agendas and minutes to increase individual productivity, although not all teams implemented these practices in the same way. For example, some teams distributed agendas and minutes as email attachments to meeting notices, while other teams posted such documents to a team repository. Teams also used different ICT during meetings (e.g., a Microsoft meeting support

tool versus a locally developed meeting support application). Respondents noted the frustration of trying to remember the set of norms associated with a given team, which was especially challenging when they had back-to-back meetings on their schedules and had limited time to "shift gears" from one team's work to another.

An employee's work life consists of concurrent membership on multiple teams, along with their attendant administration and reporting, so an emergent, unstated responsibility people have is to manage across the entire bundle of teams, each with its own documents, deadlines and deliverables. Work, therefore, requires a perpetual state of polychronic activity or multi-tasking (Ancona, Goodman, Lawrence, & Tushman, 2001; Lee & Liebenau, 1999). Work behavior becomes fragmented so that people cannot as readily organize their responsibilities across meetings and teams or "see" the overlapping activities and deliverables for which they are responsible. Thus we propose:

P6: As multi-teaming increases for an individual, decreased productivity is likely to be associated with ICT-enabled meeting structures and norms that are inconsistent across teams.

Discussion

We have seen that meetings enabled by ICT are an occasion to enact new work practices around participation in meetings. Drawing on data gathered from interviews that used entries in the employees' electronic calendar system, we found that knowledge workers at Intel attend a large number of meetings, with two-thirds spending more than half their workweek in meetings. The vast majority of these meetings included non-collocated participants, enabled by extensive use of ICT. When meetings are held with people joining the event from separate workspaces, it is easier for participants to emphasize their individual objectives (e.g., to multitask) than when everyone meets in the same room. ICT provides a degree of anonymity in the sense that work on other tasks is less visible to non-collocated participants. GSS research emphasized use of technology to mask a person's identity, whereas today's ICT-enabled distributed meetings mask a person's work habits. To the extent that use of ICT enables different participation practices to emerge, the nature of work in organizations shifts.

Our research suggests that the conventional view of meetings as a unitary phenomenon differs from what was experienced by these workers. A more complex picture emerged. While a relatively comparable repertoire of ICTs was used across all 524 meetings, they were used differently depending on whether the objective of the meeting participant was to advance group needs or to protect individual productivity. Similarly, use of an ICT broke barriers through its use in one situation, and created barriers in another. ICT simultaneously enabled a flexible organizational structure by linking people independent of their geography and reduced flexibility as additional structured meetings were added to electronic calendars to compensate for the lack of heretofore commonplace, impromptu interactions. ICT enabled individuals to participate in meetings without being physically co-located and provided them more control over the extent of their participation in a meeting. There is evidence in the literature that the total time spent in meetings has increased concurrent with the deployment of these technologies (Majchrzak & Malhotra, 2004), which is consistent with our finding that 2/3 of those we interviewed spent 20 or more hours a week in meetings. Our data point to new ways of participating in meetings as reflected in evolving work practices. Four aspects of meetings emerged from our data that highlight these changes.

Meetings are integral to work in team-centered organizations

Meetings continue to be integral to work in that they are a central means of communication and sharing of information across the organization. This is especially important when work must be accomplished by far-flung organizational members who work together in geographically dispersed teams. Unlike prior research on meetings that portrays them as an artifact of work that is peripheral (Luong & Rogelberg, 2005; Rogelberg, et al., 2006), meetings at Intel were the venue where work got done to the extent that they were a central means of sharing information across the organization. Our data suggest this is the case for all types of meetings, whether all participants met FTF or participants were distributed. It was not just managers, the subject of Mintzberg's (1973) ethnography, who spent a large part of their workday in meetings, but also knowledge workers. This trend is in line with the move toward flatter, networked organizational forms. As the ranks of middle managers decrease, those who remain in the organization assume some of their boundary spanning responsibilities as represented by frequent

attendance in meetings. These meetings provided an opportunity for sense making from the perspective of both individuals and the organization (Schwartzman, 1986, 1989). They also appear to be especially important to effectiveness in teams with non-collated members (Maznevski & Chudoba, 2000).

Tension between group and self-oriented objectives

The proliferation of meetings to which knowledge workers are invited increases the difficulty of balancing between group and personal objectives, which is exacerbated by concurrent membership on multiple teams. Employees must reconcile conflicting organizational norms that encourage their participation in multiple meetings every day at the same time they must complete work requiring individual attention. When meetings are no longer held with collocated participants, individuals are isolated physically from the group. Tension between group and individual objectives may emerge as the different form of meeting facilitates a change in practices. Traditionally, meetings include someone who facilitates discussion and participants who are, at least theoretically, fully engaged in the meeting. In fact, much of the early research and development of GSS was centered on the need to provide process structure to meetings in order to enhance full participation and encourage input from all meeting participants (Nunamaker, et al., 1991).

Partial participation has emerged as an acceptable practice at Intel, in part because of the widespread structure of self-managed work teams and the results-oriented culture that valued self-reliance. Employees had the autonomy to decide how best to manage the myriad demands on their time. In such an environment, self-oriented practices were often beneficial to the organization, even if they might conflict with the group-oriented practices enacted by a meeting convener whose objective was to encourage active participation. Participating in meetings by listening "with one ear" was necessary since it facilitated knowledge sharing and served as a mechanism for keeping track of developments throughout the organization as what was important moved beyond the physical confines of the work location of the individual. "One of the key battlegrounds in the future knowledge war will be the management of attention: understanding how it is allocated by individuals and organizations …" (Davenport & Volpel, 2001, p. 218).

Discontinuities

Two especially interesting changes in work practices that we observed were the presence of multiple discontinuities in meetings and multi-teaming. The notion of boundaries or discontinuities (e.g., geographical, functional, temporal, organizational, and technology) has often been used as a conceptual anchor to help clarify the challenges and opportunities encountered in the distributed environment (cf., Espinosa, Cummings, Wilson, & Pearce, 2003; Orlikowski, 2002; Watson-Manheim, Chudoba, & Crowston, 2002). However, most of this research has investigated geographically distributed workers (Powell, et al., 2004; Watson-Manheim, et al., 2002). Our research at Intel highlights the complexity of this environment, as workers were members of multiple teams that crossed multiple boundaries. Moreover, the concurrent membership on multiple teams highlights the potential for negative impacts on personal productivity when different teams have different norms for conducting their work, sharing information, and using ICT. Finally, over eighty percent of the meetings described to us included one or more non-collocated participants, suggesting an additional level of complexity to a distributed meeting that has rarely been examined in prior research (O'Leary & Mortensen, forthcoming).

ICT Support for Fragmented Work Environment

Although some form of ICT was used in almost all of the 524 meetings we analyzed, our data did not suggest that meetings were uniformly easier or more difficult. For example, while use of ICT made it easier for people to participate in meetings irrespective of their geographic location, spontaneous interactions became more difficult, adding structure to one's work routine. Even telephone calls were scheduled in advance and noted on one's electronic calendar. Thus, it was not harder to have scheduled meetings at Intel; it was more difficult to have unscheduled meetings. Perhaps because of the number of meetings that filled their calendars, people appeared covetous of unscheduled time and tried to maintain control of it as much as possible.

In their review of research on technology-supported meetings, Fulk and Collins-Jarvis (2001) found that most of the research focused on enhancing social presence (Short, Williams, & Christie, 1976) and the information carrying capacity of the ICT (Daft & Lengel, 1986). One would have expected, then,

to see use of ICT such as video conferencing during meetings to replicate collocation, especially since the research was conducted in a technology company known for being innovative. Instead, we found that most meeting participants chose the least rich interaction possible in order to make it easier for them to engage in self-oriented practices such as multi-tasking and balance the many demands on their time.

As communication channels were added within meetings, they were more likely to be used to visually share meeting artifacts rather than increase the social presence among meeting participants through the use of video cams. Meeting participants sometimes had the option of attending a meeting from their desk or traveling to a conference room that had been reserved for the collated invitees to a meeting. However, rather than choosing collocation or attempting to replicate it with a laptop camera, the more important objective was to maximize one's control over how much non-verbal information was conveyed to other meeting participants in order to maintain the flexibility to multi-task.

Indeed, our data suggest it is more important that ICT be used to facilitate people's need to monitor work across teams and meetings, with multiple means of communication available. This can be even harder with computer files than the traditional reliance on piles of paper files of documents related to a topic. Now files are buried in trees within the electronic filing system. The coherence principle includes the ability to see at a glance one's personal world of work at least in some graphic form so that it is peripherally "present" rather than buried in a hierarchy.

Visibility is a critical component of work. In collocated meetings, people watch a presentation, or use whiteboards and flipcharts at the front of the room for diagrams and to-do lists so that everyone can see and comment on issues. Available tools for distributed meetings offer some degree of visibility in the form of screen-sharing applications and in some cases, video connections. However, people tend to focus on individual elements and specific tasks. Screen sharing applications are widely used at Intel, but people concurrently check e-mail, run Internet searches and perform other tasks while viewing foils on a shared screen. The content is there but it is limited and often not sufficiently compelling to be the sole focus of attention. More integrated ICT tools would allow a more coherent form of multi-tasking and possibly concentrate some of this peripheral activity back to the team at hand, e.g. through online chat with other

team members, opening other team-related documents and allowing people to peruse team-mates' current situated environments of either content, physical conditions or cultural surroundings.

Implications for Practice

Our research suggests several implications for practice. Meeting artifacts such as agendas and minutes serve to make meetings more effective not only because they provide structure and documentation, but also because they make it easier for someone to manage her or his own productivity. To the extent that employees have some autonomy in directing their own work activities, these artifacts can make it easier for them to make decisions about how best to spend their time at work and accomplish their performance objectives. If a meeting convener needs full participation from meeting participants rather than having them participate with "one ear", then agendas and minutes need to convey this in a way that participants will choose to devote their full attention during a meeting. While a meeting convener may be able to mandate attendance at a meeting, he or she must explicitly "earn" participation by helping participants understand why it is in their interest to remain engaged in meeting discourse.

Meeting conveners should also recognize that active participation may not be required of everyone who attends a meeting, and that organizational objectives may be best met with different levels of participation. For example, a meeting convener could require "laptops down" for those who are gathered in a conference room as a way to remove the temptation to multitask from collocated meeting participants by not allowing participants to use ICT during the meeting. Doing so, however, means meeting participants do not have access to information from a colleague who is not attending a meeting. As noted earlier, the ability to use ICT to request and receive information from someone who is not in attendance allows the meeting to continue and decisions to be made based on information received from the non-participating person, which enhances meeting processes and improves decision-making. These productivity gains may outweigh losses from multi-tasking and so we recommend that meeting conveners be judicious in their restrictions on ICT use during meetings.

Organizational norms play a strong role in whether and how ICT are used in meetings (Stephens & Davis, 2009), and meeting conveners must learn to take advantage of organizational norms regarding

ICT use in order to meet their objectives for a given meeting. For example, to the extent that organizations value multi-tasking, conveners may choose to invite people to meetings even when their input is required for only a portion of the meeting's objectives. The participant can provide information and insights during the portion of the meeting that concerns her and focus on other tasks during the portion of the meeting that does not need her input, maximizing both personal and group productivity objectives. In addition, as organizations increasingly rely on far-flung teams, frequent meetings are important to keep everyone on the same page and to replace impromptu meetings around the water cooler that FTF team members have relied on in the past. Meetings can serve as a heartbeat or predictable rhythm for team members, as Maznevski and Chudoba (2000) noted in their paper, which is especially important for far flung team effectiveness. Organizations should recognize this important role of meetings, and not be overly aggressive in reducing the number of meetings that are held for members of distributed teams.

Organizational policies that seek to create a level-playing field for all participants in a meeting (e.g., if everyone cannot meet FTF, then all participants will join the meeting using ICT) may unintentionally encourage partial participation in meetings because distributed participation makes it easier for team members to multi-task during the meeting. However, as discussed above, this unintended consequence may be acceptable in organizations that value multi-tasking. Organizations must also weigh the demands they make on employees to work outside normal hours with the need for employees balance their work and personal lives. To the extent that some degree of participation (e.g., partial participation) is better than no participation, meeting conveners should make it as easy as possible for those who attend a meeting outside of normal work hours.

Limitations

Our evidence paints a rich picture of the evolution of meetings as a form of organizing enabled by the use of ICT. Of course, it is important to acknowledge the limitations of our work and possible boundaries to our conclusions. The primary limitation of this research is that we only studied meetings among knowledge workers at Intel Corporation. Intel is obviously a meeting-intensive organization, with

a proclivity toward distributed work. As such, our findings may not be a reflect work in other organizations today. At the same time, we suggest that work at Intel may be a bellwether for the evolution of work practices in the 21st century. By considering our findings, practitioners can be alerted to these new ways of working and make appropriate adaptations within their own organizations.

By examining the electronic calendars of the interviewees, our study focused more on the scheduled interactions than the unscheduled interactions. Specifically, we might have missed out on ad-hoc or unscheduled meetings that might have taken place but were forgotten by our respondents because they were not recorded in their electronic calendars. However, such ad-hoc and unscheduled meetings that were not recorded in the calendars were not common in Intel Corporation. Nonetheless, caution should still be exercised when generalizing the finding to organizations that do not use the electronic calendars as actively.

Conclusion

Meetings are such a common occurrence in contemporary organizations that almost everyone shares an understanding of what a meeting is and what participation in a meeting looks like. Even upon first joining an organization, people bring a set of assumptions about meetings that likely includes individuals sitting around a table, engaging in verbal discussion about one or more topics. Yet our exploratory study at Intel, an innovative global technology company, suggests that the structural role of meetings and how they are enacted is evolving beyond this familiar perspective. Whereas twenty years ago the use of technology such as group support systems to support meeting processes was optional, in the distributed work environment, ICT is necessary for the meetings to occur. By examining meetings as a collection of work practices, we have highlighted these changes in taking a first step toward understanding new ways to participate in ICT-enabled meetings. Specifically, we identified four aspects of meetings that reflect work in the 21st century: meetings are integral to work in team-centered organizations, tension between group and personal objectives, discontinuities, and ICT support for a fragmented work environment. Together, these point to new ways of working in the distributed work environment as seen in the practice of meetings.

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Table 1. Demographic Profile of the Interview Respondents (N=30)

Function	**Number**	**Percent**
Sales & Marketing	10	33
Information Technology[2]	7	23
Engineering	6	20
Human Resource	2	7
Others	5	17
Location		
United States of America[3]	21	70
Asia	3	9
Europe/Middle East	6	21
Years with organization		
1 to 5	9	30
6 to 10	8	27
11 to 14	3	10
More than 15	9	30
Unknown	1	3
Number of meetings in a week		
1 to 5	2	7
6 to 10	2	7
11 to 15	6	20
16 to 20	7	23
21 to 25	6	20
26 to 30	6	20
More than 30	1	3
Number of different teams in a week		
1	1	3
2 to 3	5	17
4 to 5	15	50
6 to 7	6	20
8 to 9	3	10
>10	0	0
Meetings with peripheral[4] membership in a week		
<20%	16	53
20-40%	11	37
40-60%	2	7
60-80%	1	3
>80%	0	0
Meetings with integral membership in a week		
<20%	0	0
20-40%	1	3
40-60%	2	7
60-80%	11	37
>80%	16	53

[2] Respondents in the IT function supported operations in other functional areas (e.g., manufacturing, sales) as well as internal IT operations (e.g., strategy).

[3] Respondents were in 5 states located across 3 time zones.

[4] Peripheral membership refers to those who only attended a portion of the meeting, "partial participation" (e.g., respondent reported significant time spent multi-tasking during meeting), or reviewed agenda and/or minutes and then decided not to attend the meeting. Integral membership refers to full participation during most of the meeting.

Table 2. Meeting Characteristics

ICT used during meetings (N=524)	**Count (%)**
· Audio bridge	221 (42)
· NetMeeting or similar application	179 (34)
· Telephone	102 (19)
· E-mail	60 (11)
· Shared workspace	61 (12)
· Instant messaging	22 (4)
Meeting size (N=524)	
· 2 people	174 (33)
· 3-5 people	77 (15)
· 6-9 people	77 (15)
· 10-14 people	50 (10)
· 15 or more people	54 (10)
· Unknown	92 (18)
Extent of FTF interaction (N=524)	
· No FTF (all participants distributed)	305 (58)
· Some FTF (combination FTF & distributed)	63 (12)
· All FTF (all participants in same room)	101 (19)
· Unknown	55 (11)
Purpose of Meetings (N=524)	
· Collaboration	399 (76)
· Management	79 (15)
· Information dissemination	41 (8)
· Social	5 (1)
Meeting Frequency (N=524)	
· Recurring	471 (90)
· Ad hoc (one of)	53 (10)
Meeting Attendance (N=524)	
· Attended	502 (96)
· Did not attend	22 (4)
Discontinuities in meetings attended (N=502)	
· Time (2 or more time zones)	92 (18)
· Function (2 or more)	47 (9)
· Organization (2 or more)	37 (7)
· Nationality (2 or more)	122 (24)
· Technology (at least 1 participant did not have equal access to ICT)	5 (1)
· Language (2 or more "first languages)	70 (14)

Figure 1. Practice perspective template