CMC Influence on Voluntarily Collaborating Knowledge Workers’ Perception of Equivocal Tasks

Completed Research Paper

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ABSTRACT

Computer-mediated communication (CMC) is a crucial coordination option for knowledge workers who rotate at their discretion across locations and projects. Through field-based research, we find that this discretion may encompass even the act of communication. As incoming information from knowledge worker colleagues overwhelms the recipients, conciseness and brevity communication norms arise to signal sender competency and reduce the receivers’ efforts to review and respond, thereby encouraging the receiver’s participation. These meticulous communication norms result in highly structured exchanges, biasing the workers’ shared meaning of the task nature from equivocal to routine. Contributions to theory include theory-building regarding the use of CMC in a specific but increasingly prevalent innovative knowledge work context. Practical implications include that those knowledge workers who adopt effective face-to-face communication norms to complement these CMC norms will achieve greater innovative success.

Keywords

Computer-mediated communication, knowledge work.

INTRODUCTION

Davenport (2005:85) offers that we lack an understanding of computer-mediated communication’s (CMC) framing of knowledge workers’ behaviors, identifying knowledge workers as those who “think for a living.” Such a description evokes an image of the knowledge worker as the highly educated, white collar professional, yet “thinking” can arise from those serving in any role. For instance,

One of the secrets of Toyota’s success, says Takis Athanasopoulos, the chief executive of the Japanese carmaker’s European operations, is that the company encourages every worker, no matter how far down the production line, to consider himself a knowledge worker and to think creatively about improving his particular corner of the organization (Economist, 2006).

It may be more productive to define the knowledge worker as someone who is accountable for conducting knowledge work, in turn defining knowledge work as “…inherently emergent…and rarely, if ever, standard to the point that the work can become routine” (Davenport, 2005:10-11), requiring complex communication, expert thinking (Levy and Murnane, 2004), creativity, and judgment. The result is an idiosyncratic, inimitable effort that may be a source of innovation.

As the assembly line worker might unexpectedly create value by purposefully envisioning a routine task as instead equivocal, might also the knowledge worker unwittingly construe an equivocal task as routine, stifling the associated efforts of creativity and compromising possible innovation gains? A significant factor shaping the knowledge workers’ task interpretation is communication with colleagues (Salancik and Pfeffer, 1978), a factor particularly pronounced as knowledge worker coordination is often achieved through communication-intensive autonomous mechanisms such as mutual adjustment (Kozlowski, Gully, Nason, and Smith, 1999) and self-direction (Cohen and Bailey, 1997). As knowledge workers are increasingly rotating across projects and organizations to provide their specific domain insight as availability and need dictate (Ancona and Bresman, 2007), CMC tools are used extensively. Our specific research questions are whether the extensive use of CMC influences self-directed knowledge workers’ interpretation of equivocal tasks and if so, what are the contingent factors that shape this influence.
We shadowed multiple collaborating knowledge workers chartered to perform what a priori could be characterized as an equivocal task of IT-enabled strategic issue diagnosis (Dutton, Fahey, Narayanan, 1983). In the following sections, we review existing CMC theory as it relates to task interpretation, describe our research approach and research setting, then present our findings and suggest practice implications.

**CMC RESEARCH AND THE EQUIVOCAL TASK**

CMC researchers’ use of the construct equivocal task, defined as one with limited clarity regarding the information needed, ambiguity for the nature of the solution to be provided, and a lack of shared understanding among the participants (Dennis and Kenney, 1998), is consistent with the earlier knowledge work definition. While the equivocal task is a central construct of CMC research, the interpretation of the nature of the task is inconsistent with the media richness theory (MRT) paradigm and not a focus of adaptive structuration theory (AST).

MRT researchers consider the nature of the task as invariant, focusing instead upon the prescriptive match between the degree of task equivocality and the communication modality richness (e.g., Daft and Lengel, 1986), defined as the medium’s ability to carry information that changes users’ understanding (e.g., Daft, Lengel, and Trevino, 1987) through the use of multiple communication cues (e.g., body language, inflection, bolding), variety, and personalization (e.g., expressing attitude and opinion). MRT researchers consider CMC artifacts intrinsically limited with respect to conveying cues, leaving face-to-face (FTF) communication the medium better suited for supporting the nuanced communication required for addressing equivocal tasks. Later IS research calls into question this task to medium relationship, identifying mitigating factors such as time available for communication (Walther, 1995) that may enable CMC-supported rich cues. However, the ambiguity defining the equivocal task is never projected to the interpretation of the task itself.

AST researchers reject the MRT intrinsic CMC tool limitations premise, instead examining CMC tools as socially constructed artifacts (DeSanctis and Poole, 1994), deployed in a context of social structures where richness and structure are not solely a property of the modality. Instead, the institution in which modalities are used shapes the user affordance of the tools and the CMC tools in turn shape the daily behaviors that over time define the institutional scripts. Under this research paradigm, CMC tools such as email can convey richer meaning (Lee, 1994). Though IS researchers continue to extend these insights, for instance, to consider affordance of potential CMC uses (Markus and Silver, 2008) and affordance differences across individuals and groups (Leonardi, forthcoming), the research construct remains the construction of the communication medium rather than the assigned task.

CMC researchers relying on social information processing theory (Salancik and Pfeffer, 1978) establish social exchange as a significant influence upon users’ interpretation of CMC use (e.g., Schmitz and Fulk, 1991). However, the only recognized change in the nature of the task concerned the reduced task uncertainty as information is obtained (Fulk and Collins-Jarvis, 2001), a natural process outcome that does not reflect a change of interpretation as a change in status.

Our research interest is theory-building regarding CMC influence upon the shared interpretation of equivocal tasks by specialized knowledge workers who have a significant discretion in project participation. We seek to identify consistent patterns of communication that shape the interpretation of what would be considered a priori an equivocal task and whether these patterns reinforce or undermine the perception of the task as equivocal.

**RESEARCH SETTING AND METHODS**

We conducted our field research by examining knowledge workers employed by a large, international information technology (IT) organization that provides hardware, software, and consulting services to clients. This organization employs highly educated consultants with specific domain specialties, such as IT security, visualization tools, insurance, engineering, or law. The IT organization and large, high revenue clients recognized the specialists’ unique expertise as an exclusive resource to provide further innovative guidance outside any specific, contracted project. This innovative guidance concerns the identification of opportunities and subsequent development of formal proposals that are client-specific, creative, IT-related “business solutions.” This effort can be characterized as an instance of “strategic issue diagnosis” (Dutton, Fahey, Narayanan, 1983), a management literature construct introduced to address the processes through which “ambiguous data and vaguely felt stimuli” are through interpretation and judgment crafted into a set of alternatives for evaluation. These issue diagnosis tasks are consistent with the definition of equivocality and serve as a representative knowledge work instance.

The specialists’ discretion for participation in these issue diagnosis tasks is a central contextual attribute of our research. Given that cross-domain specialists possess a specific, narrow expertise that can be used across many projects, the demand for their time exceeded their ability to contribute. In addition, the specialists reported to managers in their functional domains and did not formally answer for their choice of participation to other domains. Furthermore, the specialists’ were
neither consistently virtual nor present, but instead revolved across many concurrent projects with a single large client or across many clients, delivering “just in time” expertise (Ancona and Bresman, 2007). As discussed in the next section, this autonomy coupled with an information-intensive environment profoundly impacted communication norms.

The IT organization offered for our research five settings based upon our request for environmental variety. The variety included locales (North American and South American), industries (insurance, oil and gas, finance, publishing, and utilities, with annual revenues ranging from 1.5 billion euros to over 23 billion euros), client relationships (from significant client tension to productive, decades-long relationships), and proposal development success.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Client location</th>
<th>Culture</th>
<th>Client Interests</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>A large U.S. city</td>
<td>Most specialists worked in the same city, focused on this client but worked with other clients</td>
<td>Expanding on-line offerings and managing acquisition</td>
<td>Under fire, suffered a significant loss of business with the client</td>
</tr>
<tr>
<td>Two</td>
<td>Very large U.S. city</td>
<td>Price focused; Specialists primarily served the client</td>
<td>Transitioning customer services to the internet, diversifying service offerings</td>
<td>Disappointing; many of the specialists expected to be replaced</td>
</tr>
<tr>
<td>Three</td>
<td>Very large South American city</td>
<td>Specialists spent most of their time on site</td>
<td>Addressing new competition due to regulation changes</td>
<td>Among the highest performers</td>
</tr>
<tr>
<td>Four</td>
<td>Small U.S. town</td>
<td>Specialists primarily served this client; often socializing with client outside the office</td>
<td>Development of financial services, uses for employee blogs</td>
<td>Exceptional</td>
</tr>
<tr>
<td>Five</td>
<td>Large U.S. city</td>
<td>Specialists served other clients extensively</td>
<td>Combining IT departments obtained via acquisition</td>
<td>Unexceptional, not innovative</td>
</tr>
</tbody>
</table>

Table 1. Research Setting Descriptions

We conducted our research primarily through participant observation, a technique recommended for uncovering insight regarding collaborative knowledge work (Davenport, 2005). As specialists rotated through opportunities that they defined, there was no enduring “team” to observe, so we used as a unit of analysis an “episode” (Barely, 1986), defined as an action through which scripts are developed. While scripts have been defined as the recurring pattern of interactions through which the institutional realm is brought into the realm of action, in this setting of autonomous knowledge workers, the institutional realm as prescribed structure was not a significant factor. Scripts in this setting concerned the repetition of patterned behavior through which themes can be identified. The episode is the actual observed behavior between actors during a substantive work interaction.

We experienced these episodes through the selection of an initial client setting, and then serendipitously shadowed knowledge workers through the day. For instance, we began one day with a consultant knowledge worker who was hosting a client breakfast and next followed her to the client’s office for a meeting. After this meeting concluded, we shadowed a software knowledge worker to yet another meeting with her developers, and then sat with her during lunch. From lunch we returned to the original knowledge worker, who directed us to a call conducted by the insurance industry domain knowledge workers. Finally, we accompanied an insurance specialist knowledge worker to the IT organization’s offices for the afternoon and evening. We recorded unstructured, reflective notes for these episodes. When not disruptive, we also asked those shadowed to share their thoughts while carrying out their work in a form of “real-time” interviewing (Barley and Kunda, 2001). The first author conducted the observations, serving a week at each setting.

We complimented our observations with twenty-six exploratory interviews (Fielding and Fielding, 1986) and archival analysis to enhance the reliability and validity of the observations (Patton, 1980). Finally, we held joint sense-making sessions (Van de Ven, 2007), where emerging research themes are shared with organization workers not involved with the

observed specialists. This collaboration technique served as a methodological control where “…participants, just as much as the researcher, can be seen as interpreters and analysts” (Klein and Myers, 1999).

**FINDINGS**

**Participation Discretion Leads to Structure and Brevity, In Turn Evoking Discrete Exchanges**

We observed consistent CMC patterns across each site, finding that CMC in isolation, when FTF communication is a viable if not always available option, is less likely to successfully advance equivocal tasks. The distinguishing setting attribute was not the CMC tools inability to convey subtle communication cues or provide immediate feedback but the culture shaped by and surrounding CMC that encouraged the deliberate crafting of brief and structured messages.

The bias towards writing brief messages was the result of expectations regarding the review of and response to CMC messages. CMC use is inexpensive; a message written once can be communicated to many. Some specialists we observed received an email on the average every other minute throughout the day (and at times into the night). Communication was so overwhelming that it was common for the recipient to neither respond nor read an email related to exploratory issue diagnosis requests. Given the knowledge workers’ autonomy, a cultural response had evolved where the sender took the responsibility for evoking a response. Developing messages that reduced the recipient’s effort to review increased the likelihood of receiving a response. The message brevity was not an innate result of CMC use but a cultural outcome that evolved with CMC use, inspired by the intense CMC messaging environment.

The CMC messages were also written with meticulous structure, a term we use to describe the organization of messages through numbering of topics, addition of bullet points, and attention to clarity. This structure served two purposes. First, similar to the purposes behind brevity, structure lessened the recipients’ effort to review and respond. Second, the specialists’ correspondence served as representation of the specialists’ quality. Poorly written, error filled messages served as a permanent reason to dismiss the sender, of particular concern when specialists found it otherwise difficult to evaluate the competence of those in another domain.

This brevity and structure was anathema to open-ended communication and led the recipients to perceive the sender’s request as asking for information rather than prompting a conversation. The subsequent response was then shaped as the completion of a request rather than as a contribution towards an on-going dialogue; these messages can be characterized as evoking exploitive rather than exploring responses. As a result, the interpretation of the task’s nature evolved to one that could be addressed through the forwarding of information rather than the exploration of opportunity. The outcome was an exchange of information that changed the specialists’ perception of the equivocal task to one that was routine. CMC use in this context did not impede the specialists’ ability to arrive at a shared meaning but rather led to a shared meaning of a task interpreted as routine. This progression is depicted in Figure 1.

![Figure 1. Communication Modality and Task Perception](image)

The distinguishing factor for successful innovative efforts is a FTF communication culture less rigid, more forgiving of errors, and more tolerant of open discussion (made possible by factors described in the following section), thus allowing for richer exchanges and allowing CMC to serve as a useful communication compliment. We next describe the different CMC to FTF communication combinations we observed, labeled as transactional, transformational, and territorial collaborative efforts.

**Transactional Collaboration: Communication as Exchange**

The specialists in setting one and setting five communicated almost exclusively through CMC despite having ample FTF communication opportunities. The specialists in setting five served several smaller clients and felt constantly harried to
address the demands that arose during their day. These specialists worked through lunches and rarely interacted with one another in-person outside of formal meetings, which they treated as a bureaucratic hurdle to be hurried. Indeed, many specialists sought to avoid even impromptu conversations. These specialists viewed success as clearing their “to do” list, and the time spent answering an open-ended e-mail could be spent instead answering multiple brief, structured e-mails. Many setting five specialists received over a hundred email messages a day, and it had become accepted that at times an email would need to be sent multiple times to increase the likelihood of receiving a reply.

The setting one specialists, generally the youngest of those we shadowed, were not as adverse to in-person meetings but were also the most comfortable with the CMC use and had no inclination to seek in-person interactions. These specialists were not as calculating as more experienced specialists with respect to drafting refined written messages but still adopted CMC habits such as message brevity and were most likely to use texting and instant messaging within their functional group, with other specialists, and with the client. One telling episode involved an industry specialist receiving a client email request for a help desk request for proposal (RFP). Within hours the industry specialist assembled (via brief, structured email requests) help desk specialists to offer assistance. Despite the effective assembly of talent, senior management shared that under a richer communication culture, the specialist would have been involved in an on-going dialogue with the client and aware in advance of the RFP development, even ideally contributing to the RFP content. When we shared with senior management the skill that another specialist displayed in leading a meeting while multitasking across emails, teleconferences, and instant messages, they again noted the failure to take advantage of more constructive, reflective communication that led to the more insightful proposals. Both sets of specialists were less successful as rated by senior management based upon the proposals’ adoption rate and strategic quality. These proposals, although more numerous than those developed by other specialists, were less innovative and less integrated across domains.

The specialists’ CMC use as the channel for brief, structured messages with little FTF communication corresponded with the specialists’ framing of their work as isolated, domain-specific processes and atomistic views of the proposals. Each specialist evaluated the situation as an isolated challenge with little sense of collective purpose or effort. The result was a “retreat” to their own domains, passively waiting for questions from specialists in other domains and answering questions as succinctly as possible. Senior management noted that it was often clear that one domain’s specialist may not have worked on or even read another section written by a specialist in another domain. We label this behavior as transactional, as the specialists’ paradigm concerned exchange rather than collaboration, with each message a discrete event that was related by topic but did not build on previous exchanges.

| “Email has destroyed the bonding with the client, turning relationships into transactions. To save time, CIOs and directors want to get written proposals through email, and ask questions that we have no opportunity to shape. We get to answer ‘yes,’ ‘no,’ and ‘here’s the price.’” |
| “Cell phones, IM, email, calendars… it creates a remote workforce in every sense of the word. Even if (the workers) are assigned space in the same building, they can work from home, take calls in the car, work off site – we’ve had new employees working on the same floor not recognize each other at the firm’s parties six months after they’ve started.” |
| “With so many demands on our time, it’s hard to know how to prioritize. Ten years ago, I had to pick which balls to juggle. Today, I have to decide which balls I am going to have to let hit the floor.” |
| “I used to think of anyone that interacted with the client as part of my team. And I met with or had lunch with everyone… Now, with (employees) referring specialists who refer other specialists all through email to the client, I’ve lost that view and control of culture and message.” |

Table 2. Transactional Collaborative Quotes

Transformational Collaboration: Complementing Modalities

The specialists in settings three and four used CMC as previously discussed, but also used reflective, open-ended FTF communication. Brief, structured messages were still the norm and extended CMC messages met not with indifference but impatience and an invitation to visit in person. CMC was thus afforded the ability to convey information, and as such the expectation was a concise, brief message. At the same time, the FTF communication enhanced CMC as the common frames of reference that were arrived at in FTF communication were used effectively during CMC exchanges. For instance, during one exchange, a specialist IM’d that the client member “Jeff” had shared some information with other specialists. The
context was immediately identified due to the familiarity across specialists as to what the label “Jeff” implied (evidently information that should be accepted with a measured skepticism).

The specialists in setting three attributed their productive FTF communication to their national cultural norms of socialization. While there were other projects in the same country that were not as successful, this common cultural understanding facilitated interactions and became self-reinforcing. Meanwhile, the specialists in setting four were socially as well as professionally co-located, thus intertwining social and professional communication, thus the practice of communication was not simply a matter of exchanging information.

In both cases, FTF meetings were not a bureaucratic burden to be hurried through but an opportunity for open-ended conversations. We attended one status meeting where the setting four specialists had to be seated on the floor given the attendance; many commented afterwards that no one wanted to miss the ad hoc conversation and brainstorming that may occur during the meetings. Similarly, during a meeting for the specialists in setting three, one specialist shared a recent announcement concerning the client’s interest in customer portals. Not only was every specialist in the meeting aware of the announcement, but expected all other specialists to be aware as well. Here again the opportunity to reflectively converse was more important than the announced information to be shared, given that important information was dispersed long before any formal meetings.

These specialists considered their FTF communication as a process through which insight emerged (as described by Brown and Duguid, 2001). CMC was a useful complement to this information; indeed, for the necessary tactical information the specialists needed to exchange, CMC served its purpose and allowed FTF communication to serve its purpose. We label these specialists’ behaviors as transformational, as their proposals offered innovative, holistic solutions framed by client needs rather than by domain-specific capabilities.

“Because so many people (make the time to come to) the office, it makes it worthwhile to suffer the commute in. In fact, the scheduled team meetings are a waste of time because we are all already talking all the time.”

“We eat together, our kids play together, we all know each other, and we can have what I call ‘respectful conflict’ because we all know we want each other to succeed.”

“High performers recognize one another, and want to work together again. Now (due to CMC) there is less ‘self-selection’ as people don’t get the chance to really know who is getting the work done. At the same time, the weaker guys aren’t as visible.” (speaking in contrast to the specialists in other settings)

Table 3. Transformational Collaborative Quotes

Territorial Collaboration: It Takes More than Balance

The specialists in setting two revealed that FTF communication was not necessarily leveraged for open-ended communication. While sharing some of the same setting qualities as the transformational specialists (e.g., frequent interaction, single client, close proximity), their behaviors were significantly different. CMC messages were still brief and structured; however, the FTF exchanges were administrative-oriented and contentious, mostly taking place through scheduled meetings and following agendas with allocated time for topics. Specialists within a domain were not indifferent to other domains but instead viewed other domains as rivals. Only the most obvious cooperation opportunity was pursued. The specialists in setting two had developed solutions even more domain-specific than the transactional specialists developed. As a result, the solutions offered by these specialists were typically replicable on the market.

A representative episode concerned a client complaint to a services specialist regarding a software issue. From the organization’s perspective, the preferred process would be for the service specialist to engage the software domain specialist to bring the issue to the domain specialists’ attention. Instead, the services specialist had the client open a helpdesk ticket that would provide the much less immediate, indirect communication to the software specialist. This solution removed the software specialists’ opportunity to appear proactive and concerned and thus further reinforced the cross-domain tension.

Still another specialist shared how this climate had evolved in such a way that specialists saw others as an ingredient to leverage their own efforts. For instance, we witnessed an episode where the software specialist suggested that the organization offer free consulting services if a software transaction were made, to the services specialists’ frustration. The domain-specific focus was self-reinforcing, success limited, and personnel changes were expected.
FOUNDATIONAL DIFFERENCES AND PRACTICE IMPLICATIONS

In each setting, CMC messages were brief, structured, and “information-oriented” rather than exploratory; those teams that failed to effectively overcome this CMC framing through the effective leveraging of FTF communication produced less innovative proposals. We identified several factors that distinguished these outcomes. First, counter to existing research (Davenport, 2005), co-location per se was not a key driver for deliberate, reflective communication; all five settings had co-located specialists. Instead, it was either a forced intertwining of social and professional lives (setting four) or the collective perception of cultural norms (setting three) that facilitated productive FTF communication. Second, the stakeholders outside the team can undermine this FTF communication. Finally, when the expectations for future interactions were low, specialists directed less energy into collaboration, despite any prior history between the specialists.

The primary contribution to theory is the finding that in this autonomous knowledge worker setting where innovation is the goal, the CMC tools though socially constructed as is consistent with AST, demonstrated the limitations suggested by MRT. The variation in outcomes can be attributed to how CMC was leveraged with in-person interactions rather than differences in CMC use per se, which suggests a consistency in the manner in which CMC was incorporated into the activities and mores of the collaborating workers.

The practical implications are as follows. First, senior management can seek to shape expectations with all stakeholders that the specialists’ mission is multi-disciplinary innovation, thereby reducing the zero-sum domain mindset some knowledge workers may possess. Senior management might also foster a stable environment, for instance, by providing significant lead-time for reassignments so that specialists do not expect that tomorrow “everything could change.” As the scarcity of time is a primary factor in the need to obtain a receiver’s attention, recognizing the value of slack time and considering it as part of a productive day may result in more constructive exchanges. Finally, senior management should seek to increase the opportunities for specialists’ social interactions, such as through team-building exercises. There is no guarantee that specialists will develop cross-domain affiliation, but without such forums, there is less chance that it will develop at all.

REFERENCES


