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Knowledge management technology as a stage for strategic self-presentation: Implications for knowledge sharing in organizations

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ABSTRACT

This article explores why it is often difficult for organizations to capture, store, and share employees' individually held expertise. Drawing on studies of the social construction of expertise and theories of transactive memory systems and self-presentation in computer-mediated environments, we argue that knowledge management technologies are not simple *containers* for the storage of expertise, but that they are *stages* upon which individuals enact performances of expertise. Through a longitudinal study of the work of IT technicians we show that users of a knowledge management technology strategically craft their own information entries to position themselves as experts vis-à-vis their co-workers. The data suggest that proactive self-presentations enacted by a few actors early on may spur reactive behaviors of strategic self-presentation across the organization. We explore implications of these findings for theories of transactive memory systems and technology use in organizations.

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1. Introduction

Organizational theorists typically suggest that successful firms effectively leverage the expertise of their employees. Consequently, over the past half-century scholars have offered various mechanisms by which managers can capture individuals' expertise and share it throughout an organization. In the 1960s, [Cyert and March \(1963\)](#) suggested that expertise held by employees could be

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embedded in a firm's standard operating procedures and, in so doing, persist as organizational expertise after the employee left. In the 1980s, Nelson and Winter (1982) argued that organizations could develop routines based on the actions of experts within the organization and, through evolutionary processes, the best of those routines would be selected and retained as organizational expertise. Today, organizational theorists and managers alike are excited by the prospect of knowledge management technologies like intranets, recommender systems, and social networking sites for capturing individuals' expertise such that it becomes actionable organizational expertise (Fulk, Heino, Flanagan, Monge, & Bar, 2004; Heinz & Rice, 2009; Wasko & Faraj, 2005). This optimism remains despite a good deal of research suggesting that such technologies often fail to capture, reflect, or enable the expertise of organizational members (Dreyfus & Dreyfus, 2005; Flanagan, Pearce, & Bondad-Brown, 2009; Malhotra; Pipek, Hinrichs, & Wulf, 2003).

In this paper, we claim that the discrepancy between what people know and what information resides in a system as a representation of organizational knowledge arises as the result of the interplay between motivated individual actions, the relative visibility of contributed information, and the affordances of knowledge management technologies. This claim is based on a conceptualization of knowledge management technologies not merely as straightforward *containers* for individual's expertise, as prior literature has largely treated them, but also as *stages* upon which performances of expertise can be played out. As we will show, individuals can use and may sometimes feel compelled to use knowledge management technologies to strategically build their reputations. Moreover, the visible, communal, and interdependent nature of contributions to knowledge management technologies may dissuade individuals from entering information that is helpful to the organization. To develop these claims, we combine insights from social constructivist views of expertise, transactive memory system theory, and impression management theories. Combining these literatures allows us to develop a theoretical framework that explains how users of a knowledge management technology can take advantage of particular features of the technology to lead others to believe that they are experts in certain areas in which they really have limited knowledge, or that they are not experts in areas in which their knowledge is actually quite expansive. We illustrate this framework through an ethnographic study of computer technicians using a new knowledge management technology to coordinate their work. Our empirical study allows us to explain some conditions under which strategic self-presentations are likely, and the processes by which they occur. We conclude with implications for research on knowledge management technology use, strategic self-presentation in organizations, and theories of transactive memory in organizations.

2. Theoretical framework

2.1. Social construction of expertise in organizations

Across all domains of social scientific research, scholars acknowledge that an important relationship exists between knowledge and expertise. A burgeoning social constructivist perspective on the relationship between knowledge and expertise from the sociology of science holds that although they are interrelated, knowledge and expertise cleave as distinct phenomena along relational lines. Individuals enact knowledge in the practice of their work (Kuhn & Jackson, 2008). Once it is developed, knowledge belongs to a person; it moves with that person as he or she moves across contexts and it changes with unique respect to the person as his or her practices change. Experts have knowledge. But unlike other traditions that treat experts as individuals who do something special with knowledge, a social constructivist perspective argues that experts are simply individuals who are seen by other people as having more knowledge about a particular domain than someone else does (Collins & Evans, 2007). As Agnew, Ford, and Hayes (1997, p. 221) suggest:

We think of experts less in terms of their possessing some particular rare cognitive competency, or a greater quantity of 'true' knowledge than their colleagues than as having been selected by a constituency willing to attribute expertise to them.... Expertise is not synonymous with knowledge. Expertise, unlike knowledge, does not reside in the individual, but rather emerges from a dynamic interaction between the individual and his physical/cultural domain... Experts are not necessarily the most knowledgeable among us.

Within this perspective, multiple people could possess equivalent knowledge about a given topic, but their differential success at translating that knowledge into visible displays that others can use as the basis for their attributions is what allows for the social construction of expertise. As Evans (2008, p. 282) suggests “constructivism invariably sees expertise as a relational attribution in which you acquire the status of an expert by virtue of your position in a network of social relations.” For someone to be considered an expert, then, two criteria must be met. First, an observer must be able to make a determination of what that person knows. Second, the observer must be able to compare the quality or quantity of that knowledge to the knowledge demonstrated by another. Presentation of knowledge in some observable form (e.g. talk, written documentation, action) is necessary so that others will have cues with which to make comparisons and infer whether or not the presenter is an expert (Bunderson, 2003).

2.2. Visibility of knowledge and perceptions of expertise

When individuals share a physical context, determinations of who has what knowledge and how much of it can be made through direct observation of behavior in the normal course of work. But when individuals are physically separated from one another, knowledge is much more difficult to assess. Such physical separation is common in today's workplaces. Individuals are physically separated from others based on the departments in which they work, their level of seniority, and the projects to which they are assigned. Further, knowledge-workers are often assigned to work on jobs individually with the result that even one's own colleagues might be unable to physically observe his or her behaviors (Cross, Borgatti, & Parker, 2003). Nardi and Engeström (1999, p. 2) suggest that the “invisibility” of work behavior is a key characteristic of contemporary organizational settings: “Because of the extreme division of labor in postindustrial society, work is, in a sense, always invisible to everyone but its own practitioners.”

The introduction of a networked, desktop-based knowledge management technology provides one economical way to make knowledge visible to others: through the entry of information. Knowledge management technologies are normally configured to allow users to enter information (e.g. descriptions, financial figures, reports, instructions) into them and then sort, tag, and search that information. Because knowledge management technologies are typically communal – each person in a particular social group enters his information into the same system accessible by all – comparisons of knowledge via entry of information (e.g. observers can compare information entered by multiple people about how to fix a frozen computer) take relatively little effort and can be accomplished in a short amount of time (Yuan, Fulk, & Monge, 2007). The information used for determinations of one's knowledge could be of two types: direct information about a problem (e.g. “to fix a frozen computer simply reboot it”) or indirect information about one's relation to a problem (e.g. “I know how to reboot computers”) (Child & Shumate, 2007; Nevo & Wand, 2005). In contexts where actors are physically separated from observers such that their behaviors are invisible, visible displays of information may well serve as the means by which observers can determine whether an actor has knowledge about a particular topic. Thus, when a knowledge management technology is employed, observers may use the information actors enter into it as a proxy for their knowledge. As Zuboff (1988) notes, because information technology “has the power to convert events and processes to a symbolic medium and make them visible in a new way” it presents information in a way such that “the electronic text becomes a new medium in which events are both observed and enacted.” (p. 126).

By providing a visible, communal presentation of individual's knowledge, use of a knowledge management technology has consequences for the development of individual and group knowledge. Choi, Lee, and Yoo (2010) noted that the material features of information technologies afford a number of communicative behaviors (i.e., listing document authors, making all material visible, categorizing content) that aid in the formation of a transactive memory system. At the most basic level, a transactive memory system (TMS) is an understanding amongst individuals about “who knows what.” This formal or informal understanding serves as a directory of where expertise in the group resides (Palazzolo, 2005; Wegner, 1995). If people develop a shared conception of expertise among group members and use that shared directory to allocate knowledge to and retrieve knowledge from domain experts it forms a TMS that operates as “a combination of individual minds and the communication among them” (Wegner, Giuliano, & Hertel, 1985, p. 256). When developed, a TMS allows experts to focus on areas that require their own domain

of knowledge and assume that others are doing the same, with the result that individuals do not need to see or know all knowledge held by the group, only where that knowledge is stored. As a result, an idealized transactive memory is one in which “communication potentially allows the group to know all knowledge of its members” (Wittenbaum, 2003, p. 618).

Typically, TMS theorists argue that people come to know what others in the work group or organization know through visible displays of information, such as watching others work, seeing others interact with customers, or communicating with others directly to ask them what they know. As Wegner (1987) stated, “The construction of a working transactive memory in a group is a fairly automatic consequence of social perception. We each attend to what others are like and in this enterprise learn as well what we can expect them to know” (p. 194). For this reason, early studies on the development of TMS examined communication via shared experiences, training, or conversations (Liang-Rulke & Rau, 2000), which allowed direct observation of others’ task abilities and lead individuals to move beyond demographic stereotypes assumptions when inferring expertise (Hollingshead & Brandon, 2003). Researchers have also argued that communication about one’s expertise, absent face-to-face interaction, such as through formal reports to management (Moreland & Myaskovsky, 2000), may provide similar performance benefits as in-person interaction (Hollingshead, 1998; Wegner, Erber, & Raymond, 1991). The development of a group level or organizational level TMS is consequential for individual action because when individuals perceive another as an expert, they are likely to assume that person will take responsibility for information in that area, and, in turn, assume responsibility for developing and maintaining a different area of knowledge (Hollingshead, 2000). This finding also extends to functional groups where individuals presumably possess similar knowledge (Littlepage, Hollingshead, Drake, & Littlepage, 2008).

Organizational communication and information systems researchers have argued that knowledge management technologies are promising vehicles for the creation of TMS in contexts where organizational or team members are distributed such that they cannot communicate directly and their work behaviors are not visible to others (Hollingshead, Fulk, & Monge, 2002; Jackson & Klobas, 2008; Majchrzak & Malhotra, 2004). Indeed, because they are networked and accessible by all, knowledge management technologies can be used as both repositories of people’s knowledge and directories of who knows what (Choi et al., 2010; Yoo & Ivarsson, 2001). Of course, for knowledge management technologies to be successful in helping to develop a TMS, individuals need to enter their knowledge into them. Not surprisingly, the question of how to incentivize individuals to enter their knowledge into a knowledge management technology has dominated research on technologically-mediated TMS development (Cabrera & Cabrera, 2002; Cress, Kimmerle, & Hesse, 2006; Fulk et al., 2004; Jarvenpaa & Majchrzak, 2008). Today most TMS studies assume that once organizational members have documented information related to work into a knowledge management system, development of a robust transactive memory can begin (Anand, Manz, & Glick, 1998; Choi et al., 2010; Nevo & Wand, 2005).

2.3. Knowledge management technology and self-presentation in organizations

Studies of IT support technicians by Pentland (1992), Orlikowski (1996), and Pollock et al. (2009) have shown that users of a new knowledge management technology actively utilize the information entered into the software to learn what subordinates or coworkers know and to make judgments of their expertise. These studies suggest that once knowledge that was privately held (knowledge that was invisible to others) becomes visible, others in the organization begin to use it not only to accomplish work, but also to evaluate he or she who contributed it.

As one detailed example, Vaast and Walsham (2005) examined knowledge sharing among sales agents in a large French insurance company. Initially, the sales agents were reluctant to use a newly implemented knowledge management technology because they saw documentation of their work as an extra burden, not something that could benefit sales. But over time, and after some key championing by a webmaster at the company’s headquarters, sales agents began to realize that both their peers and their managers were reading their posts and, consequently, that they could capitalize on this newly enabled visibility to enhance their own reputations as good sales agents by posting their best practices and experiences.

A second example illustrates the potential for visibility of information entered into a shared system to lead observers to make attributions of expertise that contributors find unfavorable. Schultze and Boland (2000a, 2000b) examined the use of a knowledge management technology called “KnowMor” by analysts,

consultants, and contractors at a large building materials firm. The authors noted that even though KnowMor technology “changed the speed of information delivery... the information that the analysts relied on had been available previously. The document and knowledge management technologies merely repackaged that information for easier use” (Schultze & Boland, 2000a, p. 205). Because KnowMor made an individual's domain knowledge visible for others in the organization, co-workers, and managers became aware of who had skills in certain areas and began to assign jobs to people who they believed had the skills to do them. Consequently, employees found themselves often working on specialized tasks. This task specialization produced tension amongst the employees who “strove for a position of... general rather than specialist knowledge” so that they would be more marketable if they had to move to a new workplace (Schultze & Boland, 2000b).

As Goffman (1959) observed more than fifty years ago, a realization that others hold impressions of you that you find unfavorable is a powerful catalyst for strategic self-presentation. In building a dramaturgical perspective on impression management, Goffman argued that individuals are normally aware of the thoughts and opinions that others hold of them and, to influence those thoughts and opinions, are strategic about how they present themselves to those others. The goal of such strategic self-presentations is, as Goffman notes, to gain “control over what is perceived” (p. 67).

Since Goffman's writings, organizational researchers have sought to uncover the various interpersonal situations in which individuals engage in strategic self-presentation, which they typically define as “the manipulation of information about the self by the actor” (Schneider, 1981, p. 25). Research suggests that, within organizational contexts in particular, employees engage in strategic self-presentation behaviors when they find that colleagues have impressions of them that they believe are incorrect or inaccurate (Giacalone & Rosenfeld, 1991). The emergence of strategic behaviors is often tied to how comfortable actors are about what others think of them. People who are comfortable with the ways they believe themselves to be perceived are less likely to engage strategically in self-presentation (Bozeman & Kacmar, 1997). It is only when an individual identifies a potential gap between desired and existing perceptions that they will be motivated to actively regulate information about themselves to others. Although most research on self-presentation has focused on behaviors aimed at leading an audience to form positive perceptions, self-presentation can also be defensive and used to maintain or avoid certain attributions (Roberts, 2005). For example, organizational members may present themselves unfavorably in order to avoid an undesirable or onerous task.

Because, in many of today's organizations, knowledge management technologies are often the primary location at which individuals present information about their behaviors to others, it would seem that there is sufficient physical distance for the appearance of successful strategic self-presentations. Additionally, because the conduct of work in knowledge-intensive organizations is so often invisible to one's colleagues and is independent in its nature, there is also the possibility of sufficient conceptual distance between actors and audience such that actors may have some leeway in choosing which of their behaviors they describe to others and the extent to which they are honest about them. Thus, we argue that knowledge management technologies may, in Goffman's terms, serve as a *stage* on which strategic self-presentations can be made.

Walther (2007, p. 2541) suggests four ways in which the stage provided by networked, text-based technologies can afford forms of strategic self-presentation that exceed the capabilities of face-to-face interaction. First, text-based communication via technology is editable. Because it is tied in to keyboard usage, computer-based communication allows users to change what they write before they transmit their messages. Second, the amount of time one can spend constructing and refining a message prior to its utterance is greater than in face-to-face conversation. Third, users of information technologies compose and exchange messages in physical isolation from receivers, masking involuntary cues. In other words, senders do not unintentionally communicate their natural physical features and non-deliberate actions into the receivers' realm of perception. As Walther (2007) argues, “there is much less ‘leakage’ in computer-mediated communication ... Thus, users are able to convey about themselves a much more discretionary front, better concealing that which they do not wish to convey while accentuating that which they do.” (p. 2541). Fourth, individuals can reallocate cognitive resources from environmental scanning and nonverbal management toward message composition. Environmental scanning refers to the activities in face-to-face conversation of sensing ambient stimuli and monitoring feedback. Nonverbal management pertains to the efforts required to regulate one's own expressions through nonverbal means in a face-to-face setting such that they do not conflict with the verbal message. In communication that does not require body, face, voice, or space, energies normally devoted to managing these expressive systems can be disregarded and reallocated to the strategic production of messages.

Research focusing on how these affordances of computer-mediated environments can influence self-presentation has suggested that such communication affords message senders a number of communicative advantages over traditional face-to-face interaction, enabling a selective and optimized presentation of one's self to others (Walther, 1996). Studies focusing on computer-mediated communication have shown that informants who use information technologies report a heightened ability to strategically present themselves to others compared to non-mediated environments and, consequently, are often more deceptive about their true personalities and identities than they are when presenting themselves in face-to-face contexts (Carlson, George, Burgoon, Adkins, & White, 2004; Hancock, 2007).

Combined with the social constructivist perspective on expertise, the literature on strategic self-presentation suggests that individuals who use a knowledge management technology may have more opportunities than they would in a face-to-face setting to strategically present information about themselves. Consequently, because they can edit that information in ways that are favorable, and they can devote their time and effort to self-presentations without having to worry about extra cue leakage, users of a knowledge management technology can influence others' perceptions of the type, quantity, and quality of knowledge they possess. Further, the communal nature of knowledge management technologies affords actors the opportunity to see what information others have contributed to a system, and choose to enter information that appears better, more complete, or, if desired, worse than what their colleagues have entered. Users can then evaluate the information in the technology in order to make judgments about the relative expertise of workers.

For these reasons, we might expect that users of a knowledge management technology do not always enter information that accurately represents their expertise; instead, they may use the technology to enter information they know will help them to achieve the goal of being seen as an expert. To explore these possibilities, we elaborate the theoretical framework sketched above through an empirical study guided by the following research questions: (1) Under what conditions do users feel compelled to enter inaccurate or incomplete information representing their knowledge? (2) In what ways does use of the technology allow users to be strategic about their self-presentations and shape others' perceptions of their expertise? and (3) What effects do strategic self-presentation and resultant perceptions of expertise made through use of a knowledge management technology have on the system of relations through which work gets done in the organization?

3. Methods

3.1. Study context

This study focused on the work of technicians in the IT department at SkyLabs (a pseudonym, like all names presented in this paper), a large government-funded research center in the western United States from January–May 2003. The 36 employees who worked in the IT department were charged with employing computing and networking technologies to support over 1200 employees in the Administration and Finance (A&F) division. The A&F personnel, in turn, kept the business running so that the scientists could conduct their research. The scientists who worked in the research laboratory relied on a different IT department for support. Scientists, administrators, and IT technicians all indicated that they enjoyed working for SkyLabs because it was a “laid back environment” where people could “build a career” and help “advance important science.” Interpersonal interactions across departments and hierarchical levels in the organization were normally informal. Although the culture in the research labs promoted collaboration, the culture of the A&F division was much more individualistic.

In August of 2002, five months before the first author began data collection, the IT department was internally reorganized. Rick, the IT director, had come to SkyLabs two years earlier and found himself in charge of 10 project teams (see Fig. 1). Most project teams were comprised of four individuals, each from a different technical specialty: (a) Systems technicians ran basic user support for software and hardware applications, (b) software engineers wrote, modified, and debugged software employed in the specific division, (c) database technicians maintained the large hard drives that backed up scientific and administrative work, and (d) media technicians arranged phone bridges, videoconferencing and set up technologies such as LCD projectors for presentations by administrators. Each project team was responsible for IT support in

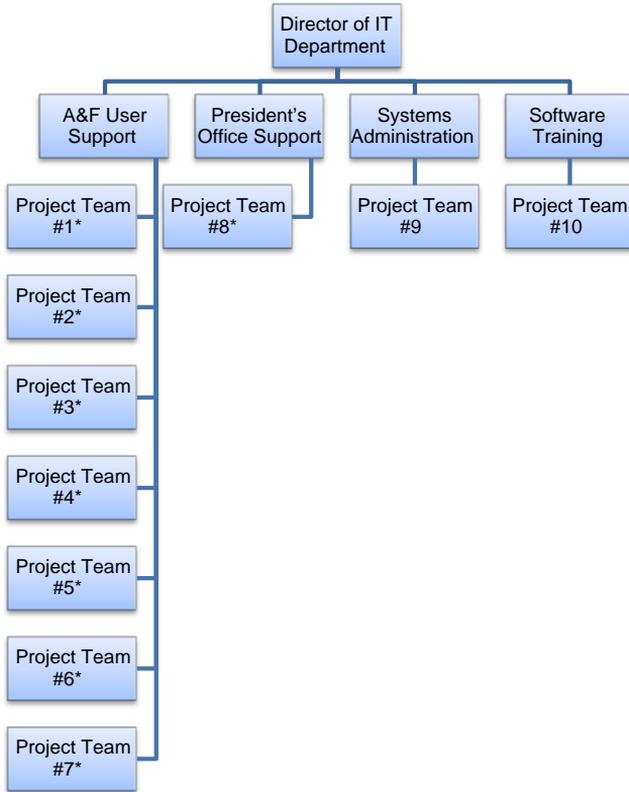


Fig. 1. Organization of IT Department under Project Team Structure. Note: Project teams marked with (*) indicate teams on which Systems Technicians (future NETS members) worked. Project Teams #9 and #10 had no technicians who came to work on NETS.

one of the seven A&F departments: Human Resources, Legal, Finance, Travel, Contracts, Safety Services, and Facilities, and the President's office.

Rick joined SkyLabs fresh out of an MBA program at a local university to help the IT department provide better user-support for the A&F divisions. When Rick arrived, he conducted a survey with all A&F users about their satisfaction with the IT services. The results from the survey showed significant dissatisfaction with the IT department. Based on material he learned in his MBA program, Rick reasoned that one of the reasons that the IT department was underperforming was that there was not enough knowledge sharing and collaboration — opportunities for people to learn from each other. To increase knowledge sharing, he decided to reorganize the department out of the project team structure and into four functional teams (see Fig. 2). Each of the functional teams was organized around a different core process. The “Support Services” team was comprised of the database technicians, the “Media Services” team was comprised of the media technicians, the “Software Engineering” team was comprised of the software engineers, and “Network Engineering and Technical Systems” team was comprised of systems technicians. Together, the four teams would provide support for all seven of the A&F departments.

In this paper we focus primarily on the work of the Network Engineering and Technical Systems (NETS) team. The eight members of the NETS team responded to help-desk calls from across the organization for software and hardware problems. They also made recommendations and approved all software and hardware purchases across the organization and were responsible for implementation and testing. Additionally, the NETS team maintained the organization's data archiving systems and internal network. After the re-organization, the NETS members continued to occupy their old offices, which were located in the A&F divisions for which they used to work (the divisions were spread across different floors in

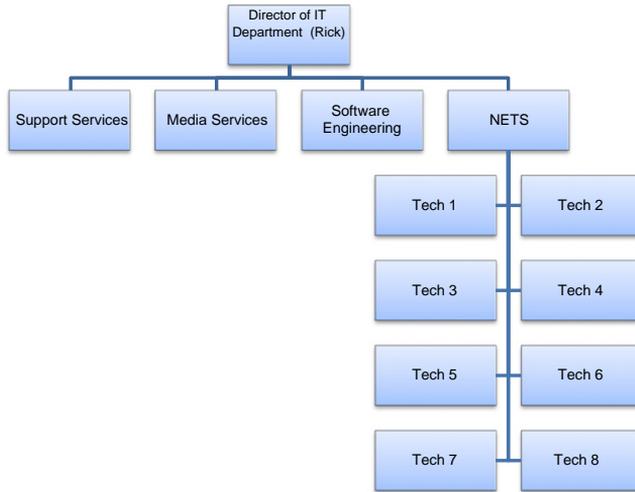


Fig. 2. Organization of IT Department under functional team design.

two buildings). Thus, technicians who now were organized into a team had little physical contact with each other aside from formal staff meetings.

Six months after implementing the organizational redesign, Rick conducted a new survey of users' satisfaction. Although the scores had improved marginally, he still felt that the performance of the NETS team, in particular, had not reached an acceptable level. To promote more collaboration and to make technicians' knowledge available for use by their team members, Rick decided to implement a technology called "ShareIT", which was already under license at SkyLabs, to help with knowledge management on the NETS Team. ShareIT was configured with a basic help-desk queuing application that technicians could use to assign tickets to others and to track help tickets coming from the various A&F divisions. It also included fields that allowed users to post notes about their solutions to users' problems, to add detailed documentation, and to search the contents of the tool (e.g. the contents of all notes, documentations, and tickets). The technology was networked such that all technicians had access to it and there were no private files or folders. As Rick noted,

ShareIT is a perfect tool for knowledge management. It is easy to use, everyone has access to it, and because they [NETS technicians] also use it for ticketing its integrated into their work so they're actually likely to use it to document their knowledge and share it with others. Thus, although ShareIT was not marketed as a knowledge management system, it was specifically implemented to assist technicians in sharing information about their work tasks with one another.¹

ShareIT was installed on technicians workstations in February of 2003 and they began to use it right away. Given the timing of the implementation, we were able to observe how technicians worked prior to the introduction of the new technology, the way they incorporated ShareIT into their daily work, and how these uses influenced the way that NETS technicians worked during the subsequent four months of this study.

3.2. Data collection

To conduct this field study, the first author established a regular observation schedule for 5 h a day, three days a week, alternating between morning and afternoon visits in order to capture a range of

¹ Although ShareIT may not have been designed to be or marketed as a "knowledge management system," it had many of the same features as more traditional knowledge management systems. Because it was implemented and used as a knowledge management system, we refer to it as such in this paper.

activities. When key events were happening, such as training sessions and departmental meetings, we would come in on additional days for observation. Because we were interested in the specific work practices carried out by each individual, each NETS technician was shadowed for 5 to 7 h a day four separate times throughout the course of the study, alternating between mornings and afternoons. Each round of shadowing occurred at the beginning of the month. During these shadowing episodes, and all work related tasks were documented in the researcher's field notes as well as the amount of time each technician spent on each activity, and with what other technicians (if any) they consulted.

To supplement the field notes generated through observations, the first author interviewed each of the NETS technicians three times. The first round of interviews was conducted after the first month of the study, and the second round after the third month and the final round after the fourth month. Each interview lasted from one and a half to two and a half hours. The interviews used in this study were semi-structured interviews (Kvale, 1996) inquiring about participants' perceptions of their work. NETS technicians were asked a series of open ended questions that comprised six general categories: (a) the ways they worked with technology, (b) the ways they worked without technology, (c) the nature of their interactions with other NETS technicians and with technicians in other functions, (d) how they perceived their work in relation to the overall success of NETS, (e) what NETS members they considered experts in which domains, and (f) their perceptions of what other NETS members considered them to be expert at. After following this protocol, we moved to questions specific to the technician we were interviewing, asking him or her to clarify or provide commentary on their observed actions.

To obtain an outsider's perspective on NETS work, the first author conducted interviews with users in the A&F divisions about their perception of NETS' work. In total, we conducted nine interviews with users. Also, in the last month of the study we conducted interviews with two members of each of the other three functional teams. Finally, in addition to the standing weekly meeting that the first author had with him, three formal interviews were conducted with Rick, the director of the IT department. All interviews were audio-recorded with the permission of our informants and later transcribed verbatim.

3.3. Analytic strategy

A previous paper published from this same dataset (Leonardi, 2007) showed how and why NETS technicians changed the way they used ShareIT's features over time and, consequently, how shifts in usage patterns affected their communication during face-to-face interactions. This previous analysis documented that NETS technicians came to their face-to-face interactions having already developed some preliminary evaluation of their communication partner's area of expertise. These face-to-face communication encounters were rarely used to make assessments of who was an expert, but were used instead to learn information from someone who the questioner already decided (through some other communication channel) was an expert on a particular topic.

Spurred by this observation, we sought to uncover how and why NETS technicians determined, before arriving at these face-to-face communication encounters, that someone else on their team was an expert in a particular domain. To begin our analysis, we constructed a narrative of how work was conducted in the IT department before the reorganization, how work was conducted after the reorganization but before ShareIT was implemented, and finally, how work was conducted after technicians began using ShareIT. By constructing this "realist tale" from our ethnographic data (Van Maanen, 1988), we had a richly described narrative of how technicians conducted their work, how they learned about others' areas of expertise, and how they dealt with their customers (users in the A&F divisions) prior to, during, and after two major disjunctures – the organizational change and ShareIT implementation – in their routine work environment.

To help explain why technicians' practices did or did not change following these disjunctures, we employed a more fine-grained coding scheme outlined by Glaser (1978). We began this stage of our analysis using three waves of "selective coding" through the data analysis program Atlas.ti©. In the first wave of selective coding, we identified all instances in the data in which informants professed their knowledge about a specific technical problem, asked another technician about their knowledge of a particular problem, or searched in ShareIT for information added in by someone else. After identifying these incidents we began the second wave of selective coding in which we searched for indicators of why informants engaged in these information presentations or information seeking practices. In the third wave of selective coding, we coded for the methods that enabled technicians to present or seek knowledge (e.g. making a telephone calls, looking at documentation in ShareIT, writing a report). To link all of these variables together, we followed Glaser's method

of “theoretical coding.” In so doing, we created hypotheses about what led technicians, at different points in time, to present information to or seek it from others and how certain technologies allowed them to do so. We then engaged in an iterative process, revising these hypotheses based on the data, and looking for new data (based on our codes from the three waves of selective coding) that supported or changed those hypotheses.

We present the results of these analyses in three parts. We begin by discussing how the reorganization of the IT department from project teams into a functional team brought together technicians who were largely ignorant about what types of knowledge their new team members had and we illustrate how the practice of fielding help-desk calls from technicians' old divisions perpetuated this problem. Next, we show how use of ShareIT as a centralized location to document resolutions of user tickets made information about “who knew what” visible to all NETS team members and how the visibility of this information acted as a proxy for who had what knowledge, and created a stage for comparisons of expertise. Finally, we describe how technicians, who tired of being considered experts in a particular domain and, consequently, receiving task assignments for more work in that area, strategically manipulated how others constructed perceptions of their expertise. Excerpts from our field notes and from interviews are presented to illustrate how informants experienced the changing nature of their work.

4. Findings

4.1. Reorganization of work: lack of insight into “who knows what”

The IT department at SkyLabs had been organized into project teams for nearly a decade. Under the project team design, none of the eight technicians who would later come to comprise NETS worked together directly. Each of these technicians worked on a separate project team that serviced one of the seven A&F divisions, and the eighth technician was a member of a team that provided technical support for the President's Office. The official job responsibility of these technicians was to provide support for all user-end and back-end software and hardware service and implementation in the specific A&F division they serviced. This meant that they routinely updated client software, fixed user computing issues, and maintained access to various databases. Consequently, each of these technicians performed roles on their specific project team that were not overlapped by any other members, but were similar to the roles performed by the technicians on other teams.

Despite the fact that the technicians all had offices in the same building, they did not interact with one another frequently. There were few departmental staff meetings where technicians would come together to share examples of projects they'd worked on. In place of these departmental meetings, each project team held a weekly meeting, which the IT manager attended, where issues were discussed that were germane to the A&F division for whose service the team was responsible. These meetings reinforced the insularity of the project teams and placed further cleavages between technicians who occupied similar work roles but who worked on different teams.

Due to their unfamiliarity with members of other project teams, technicians were largely ignorant of activities occurring in other divisions. Instead, technicians prided themselves on being the “IT Expert” on their team and felt a sense of ownership over user problems occurring in their respective division. As one technician observed:

When you work for one division you become the expert about the tools that division uses. I worked with the Facilities division and the tracking software they used to keep tabs on equipment reservations wasn't used by any of the other divisions. So I basically had to learn all about the application so I could support it. That meant that I also was in charge of deciding about when and how to upgrade it and to make modifications to it. None of the guys [technicians with similar roles] on the other project teams would have known anything about that.

Because one technician rarely interacted with technicians who worked for other divisions, it was common for informants to be working on the same types of problems unbeknown to one another. Technicians did not know what skills others had, what projects they'd worked on in the past, or what knowledge they had about different software applications or hardware devices.

The IT manager hoped that a structural reorganization, which grouped technicians who occupied the same roles into one functional group, would foster knowledge sharing and collaboration. Yet when we began our observations of the NETS technicians at work five full months after the reorganization it was obvious that such changes had yet to materialize. Under the old project team structure a technician had a specific and limited user-base. When a user in the particular A&F division that a given technician serviced had a problem he or she would call or email the technician and ask for their help. The new functional team design did not suggest any particular division of labor. Thus, the decision about who should respond to what user problems was a question the NETS team had to solve together.

Informants recounted that one of the first formal NETS team meetings held was to determine how to allocate assignments. Thus, NETS members made the conscious decision to maintain the division of labor encouraged by the old project team structure under the new functional team structure. The result of this decision was that technicians did not pool their knowledge to solve user problems. Instead, they worked as they had in the past — as the sole user contact or “expert” for a particular A&F division. During our observations, we saw a number of examples of technicians struggling to solve problems that technicians working in other divisions had solved previously. For example, Technician 5 was working to install new software on a back-end web server in the Finance division. During the installation, the technician found that he needed to update to a newer version of a PHP script. When attempting to upgrade the script he encountered the following error: “Fatal error: Allowed memory size of 134,217,728 bytes exhausted.” The technician was confused by the error and worked for 2 h to troubleshoot the problem. With no luck, he turned to the web to search for solutions. After 3 h of browsing and of trying various fixes he finally determined that the most likely problem was that there was a bug in one of the PHP modules, which was producing a spurious reading of memory exhaustion. After another hour of tinkering, then he finally solved the problem by changing the memory limit in the “php.ini” file, essentially tricking the program into thinking there was more memory than what was actually available.

Several weeks later, we observed Technician 8, who was upgrading software on a server in the Human Resources division and encountered a similar error message. The technician turned to the observer and commented:

This is a pretty common problem right here [*she points to the error message on the screen*]. I saw this before when I worked at [*my last job*]. When you encounter this you have a couple options you can either debug it by disabling each module one-by-one and see if the error goes away or you can just change the memory limit to something higher, like 32 megs. That’s probably the easiest.

The technician turned back to her monitor and began working on the fix. Within 5 min she had the problem solved. The same problem that took Technician 5 more than 5 h to solve took Technician 8 only 5 min. Technician 8 did not have more skill or work experience than technician 5. Her past exposure to a similar problem, however, provided her with the knowledge to expeditiously deal with unexpected errors and to successfully upgrade the server software. During the next round of observation with Technician 5, the researcher recounted Technician 8’s quick fix of the “fatal error” problem. Technician 5 commented, “Damn, I wish I knew that before. I didn’t know that she knew how to do that. That would have been helpful.”

Examples such as the one presented above illustrate that despite working in the same functional group, technicians were largely unaware of the knowledge held by other members in their work group. In fact, informants believed that because all the technicians had done essentially the same job for different A&F divisions, they possessed relatively similar bases of knowledge. As technician 4 commented, “Well, we probably all have about the same knowledge and the same skills. That’s why we were hired for these jobs.” Yet it is apparent that technicians did not all possess the same knowledge. In fact, our observations suggest that despite a large overlap in what they did know, each of the eight technicians held knowledge germane to his work that was not held by any of the other technicians on the NETS team. Yet because technicians did not have occasion to interact regularly, reinforced in large part because they continued to work independently for separate A&F divisions, knowledge about who knew what remained largely unknown under the functional team structure, just as it had been before the reorganization.

Despite the organizational shift to a functional team the knowledge responsibilities and applications of NETS team members remained largely cross-functional in nature. In other words, technicians had little motivation to monitor the knowledge of others on the NETS team because the structure of assignments

was such that individuals' knowledge was uncontested. Additionally, individuals on the team had not been trained together, had little insight into the jobs that others completed, and had little ongoing communication after being integrated into a single team. As a result, there was little evidence that the NETS team had developed a transactive memory system and instead informants continued to operate using the transactive memory system they developed in their prior position. Technicians knew little about who knew what on the newly formed team, but that was not a primary concern at this time because technicians were conducting tasks with their respective A&F divisions, not with each other.

4.2. Implementation of technology: information about work behaviors is presented to others

By late January 2003, the IT manager was aware that the departmental reorganization had failed to bring about significant changes in the way that NETS technicians solved problems and user evaluations of the technicians remained stable, belying the improvement intended by the reorganization. With the hope of encouraging technicians to pool their resources and work collaboratively to solve problems across the seven A&F divisions, the IT manager decided to purchase licenses for NETS to use ShareIT. The technology was a basic help-desk queuing application. It provided functionality so that users could submit requests for IT help directly via an automated script to the software. Alternatively, technicians who fielded phone calls or received emails from troubled users could enter the information into ShareIT and create a formal "ticket." After entering basic information into the application's fields such as (a) the name of the user, (b) a brief description of the user's problem, the level of priority assigned to the problem, and (c) the name of the technician who created the ticket, the software would automatically assign the ticket a number and a status (open, pending, or closed) and record the date on which the ticket was created. The IT manager required all technicians to abandon their existing methods for recording help requests (e.g. jotting them down on a piece of paper or entering them into an Excel file) and to use ShareIT to track all user help requests.

NETS technicians began using ShareIT to track tickets at the beginning of February 2003. After the first two weeks of use, all technicians commented that the technology was easy to operate and they were all able to demonstrate mastery of its data entry, search, query, and extraction functions. Despite the ability of all technicians to use the technology effectively, their work remained unchanged during the first month after it was implemented. Although technicians were recording details about what sorts of problems users encountered into the fields of ShareIT, they did not work more collaboratively than they had in the past. Instead, technicians would field calls from members of the A&F divisions to which they were assigned under the project team structure. Technicians used ShareIT to record these requests for help, but they did not assign these tickets to other technicians. Instead, they continued to respond as they always had directly to the users in their divisions.

Although technicians' work did not immediately change following the implementation of ShareIT, the centralized nature of the database and the fact that all technicians could access the information for all tickets made the practice of "ticket browsing" as several technicians called it, common. As Technician 3 commented:

Sometimes you go into ShareIT and you ticket browse. You know just look to see what other people had done. That was sort of interesting because, well I don't know maybe you'd expect it but I never thought about it much, but the kinds of problems that occur in one division are pretty much the same, with some important differences I guess, to problems in other divisions. Sometimes you don't browse intentionally but you go to search on some term like let's say "key encryption" to look for some ticket that you did before and you'll see that other tickets are returned so you look at them and you see that someone else saw that problem too.

This exposure to information about what problems other technicians were working on served as a catalyst for informal interactions between technicians. When technicians would bump into each other in the hall they would often say things like "Hey, I saw you were dealing with a printer configuration issue," or "Did you reformat those drives so you could ghost those machines?"

Perhaps more important than simple awareness of the kinds of tasks other technicians performed was the realization that certain technicians possessed domain knowledge that was not shared by

everyone else. Consider the following example of a chance hallway encounter between Technicians 6 and 7:

Tech 6: So I saw [when I was browsing the tickets in ShareIT] you dealt with some issue with BIOS being corrupt on one of those old Toshiba's.

Tech 7: Yeah they still like those over there in Safety Services. That was a couple weeks ago. I'm trying to get them migrated to some new Dell's but

Tech 6: What did you do? Did you boot block it?

Tech 7: No, because there was some issue with the CMOS configuration so I basically had to end up hot swapping it.

Tech 6: Hmm, I didn't really know that. How did you know to do that?

During encounters such as these, technicians were slowly becoming aware of the types of domain knowledge their colleagues held. Seeing tickets in ShareIT and being able to easily interpret their content provided fodder for everyday interaction and for questioning about how other people solved routine problems.

Slowly, technicians began to realize that if they could match a particular problem with someone else's area of expertise, it would make sense for the expert to take the ticket as opposed to the first technician who entered it into the system. This emerging and occasional practice became institutionalized at a staff meeting during the first week of March in which Technician 5 persuaded the NETS team to begin using ShareIT to assign tickets to technicians based on their knowledge of what other people knew. After some discussion, the NETS team decided to assign tasks based on people's expertise of a particular topic. The technicians felt comfortable about making this decision because, as Technician 3 noted, "we're all good at understanding what other people write in ShareIT, so the team is all pretty clear on it and we can apply it in our work if we want to or decide to give it to someone else because we can see what the application of it would be for someone else." Within three weeks of the decision, most technicians were assigning tasks (by replacing their name with another technician's name in the "assigned" field of ShareIT) to others.

The determination about who was an "expert" on a particular topic was not always straightforward. When a new ticket came in and only one comparable ticket could be found in the archive, the decision about whom to assign the ticket was easy. But it was often the case that a ticket came in and a quick search of the archive revealed that multiple technicians had worked on a similar problem in the past. In such cases, the technician who received the ticket had to make a decision about assignment. There were two standard and overlapping heuristics that technicians employed to make their choice. First, they would compare existing tickets and decide if the author of one of the tickets or the other had more knowledge about the problem. As Technician 2 recounted, this decision was often made based on documentation entered into the ticket:

If you're trying to decide who to give the ticket to I'll look at their documentation first. I mean you sort of see if they wrote any notes in the "comment" field about what they did to solve it. Usually you'll see that if someone wrote good documentation then they probably know how to do it better. Sometimes maybe someone who really knows it will not write anything they did but that's rare. I mean from my own experience if it's like a complex problem – and those are the only kinds that you're going to think about giving the ticket to someone else because you don't have the time to learn it – then someone will write good documentation if they solved it good. So it's sort of a no-brainer that if someone knows it better than you should give it to them because they'll get it done faster and be less intrusive about it.

Thus, technicians often used the length and quality of one's documentation on difficult problems as a proxy for their domain knowledge on a certain issue, and then weighed the relative knowledge of individuals to determine who has expertise. Technicians then normally used a second heuristic to decide to

whom they should assign the task: One's availability. If both technicians under consideration had an equal load of pending tasks, the technician assigning tasks would give the work to the technician who they deemed to be more knowledgeable. However, if there was a workload imbalance such that a less knowledgeable technician could attend to the user's problem much quicker than a more knowledgeable technician, many assigners would assign the task to the less busy technician and would make a note in the ticket to let them know they could either ask the technician who was more knowledgeable about how to solve the problem or to refer to his/her documentation.

The actions of the technicians after the implementation of ShareIT demonstrate that the technology served as a form of communication among NETS members. By using the system, even merely in the completion of individual tasks, users were exposed to the entries of others. Because tasks were completed in isolation from others, the technology became a centralized form of communication among workers. However, it was not until the decision to use the information in ShareIT to assign tasks that individuals began to develop a deeper sense of who knew what on the team. Though the information was *available* to individuals prior to the task assignment decision, it required workers to go out of their way to browse tickets. Given the often ad-hoc ways that technicians encountered information in the system, the initial formation of a transactive memory system among technicians was weak and the team lacked a shared understanding of who knew what. Formalizing the use of the technology for task assignments made the material *visible* to every group member within the practice of work, and helped create a greater appearance of consensus regarding individual expertise.

4.3. Continued use of technology: strategic use of information entry for self-presentation

By mid-April, the practice of using the documentation in ShareIT as a basis for making decisions about whom to assign tasks had become routinized. A number of technicians, however, were growing frustrated that others often assigned them the same type of task over and over again. Thus, the considerable breadth of tasks that they enjoyed under the old project team structure had vanished and, in its place, technicians were becoming specialists on particular tasks. In the broadest sense, technicians who worked within a particular A&F division under the project team structure were considered experts by their team members (who did not deal with user-related problems) on "all things user-related," as one technician commented. This blanket of expertise was quite large and allowed each technician to perform many different kinds of tasks and still retain their status as the "user expert." Yet when grouped into a functional team with other technicians who performed the same work roles, everyone was an expert so long as expertise was defined as "fixing user-related problems." After the decision to start assigning tickets to different technicians, new images of expertise had begun to emerge. An expert under this new system was someone who appeared to have more domain knowledge than others about a specific set of software applications or about the schematics of certain hardware. Thus, technicians were no longer general "IT experts" within their groups. Now their expertise was associated with more specific domain knowledge (i.e. "printer expert," "server expert," "calendar software expert").

In some cases, technicians enjoyed being considered the expert in a specific topic area. In other cases, technicians did not revel in their newly ascribed expertise. In fact, they often felt pigeonholed to one specific type of task, which they believed was not necessarily reflective of their broader knowledge base. Most technicians were savvy enough to understand that others made determinations that someone was an "expert" in a particular area because that person had entered into ShareIT considerable and/or detailed documentation about a particular issue in the past. This initial documentation had resulted in someone assigning them a task, which they successfully completed and thoroughly documented, which in turn earned them more task assignments of the same type. The following exchange between technicians 3 and 7 illustrates this cycle:

Tech 3: Hey, I saw you assigned me a ticket with someone in Finance having some compatibility issues with data transfer?

Tech 7: Yeah, I saw you fixed some problems like this in Finance before.

Tech 3: I think Technician 4 has too.

Tech 7: Yeah, I saw that, but my read of your solutions was that you might have it figured out better.

Tech 3: So that's why you gave it to me?

Tech 7: Yeah, I just figured you could probably handle it easier.

By engaging in reactive interactions such as these, and by facing circumstances in which they themselves had to assign tickets to others, most technicians knew that one's understanding of what domains she had knowledge about and, hence, one's perception of their expertise was tied, in large part, to the quality and quantity of information that she entered to describe the resolution of a ticket. Because technicians passively sought information to make determinations of others' expertise rather than engaging in active search behaviors, ShareIT served as an important forum for expertise construal.

For those technicians who found themselves being considered "experts" in areas that they believed were boring or in areas in which they simply didn't want to be known as experts, providing detailed documentation in ShareIT proved problematic. They found that when they were considered experts in one domain, and thus, received more tasks in that domain, they had fewer opportunities to build domain knowledge and, hence, the reputation of having expertise in other areas. To combat a trend they saw as damaging to their own personal development, a number of technicians became strategic about the kind of information they entered into ShareIT. As one example, Technician 4 received the following email request for assistance from a user in the Facilities division:

Hi Technician 4:

My computer is acting up again. Every time I add a new appointment to my calendar [software program] it seems to take ok and is fine when I switch between different days. But when I shut the program down and open it back up I lose the appointment I added in. Please let me know when you can come by and take a look at it at your earliest convenience.

Thanks, Anne

Technician 4 knew, from reading previous documentations in ShareIT about the resolution of calendaring problems, that Technician 6 had the most knowledge about this particular software program, so he assigned him the task. Upon receiving the assignment, Technician 6 was noticeably annoyed. He commented:

I keep getting these kinds of assignment from everyone else on NETS. I'm starting to get kind of irked by it. It seems like calendaring stuff is all I do. I thought about telling everyone on the team not to send me calendaring stuff, but I know I'm not the only person who works on the issues, so that wouldn't be fair. But I guess most people think I know it the best. Well, look at this ticket [*he points to the ticket assigned to him by technician 4*]. I'm not sure exactly what the problem is, but I bet I can figure it out. But I saw that Technician 5 got assigned some problem with the configuration issue on the Travel server. I'd rather do that. So what I'll do is when I finish the calendaring problem I won't write a lot of information about it. I'll just say I fixed it, give a couple points, that way they won't be like "Oh, she knows so much about calendars." If I really want to clinch it I can write something about how this is just a temporary fix and I doubt it will last.

Technician 6's strategic entry of information into ShareIT was not a solitary act of defiance. We observed multiple technicians on various occasions strategically withhold detailed documentation of the steps they took to resolve a user problem so that they would not be seen by others to be experts on a particular issue.

Perhaps more startling were cases in which technicians gamed the system so as to appear to have more expertise about a technical matter than they actually did. In these cases, technicians would solve a relatively routine problem that did not require much skill or investigation, yet the nature of the problem was such that the technician wanted to learn more about it. However, because so many user help tickets

came in daily technicians did not have much free work time to explore these areas of interest further. The best way for an interested technician to learn about new and fascinating issues was to actually work on more user problems of a related nature. To be able to work on such problems, though, other technicians had to perceive that the interested technician was an expert in that area or they would not assign that technician the task.

At one point or another, all of the NETS technicians mentioned to us that they recognized that most of their colleagues used the length and complexity of documentation in a ticket as a proxy for one's domain knowledge and, therefore, to be perceived as experts in an area that they wanted to learn more about (an area in which that technician currently was not considered an expert) she had to enter documentation about a similar incident into ShareIT. Consider the following excerpt from field notes made during an observation of Technician 5:

11:15 AM — She opens ShareIT and visually scans the fields that she filled in earlier this morning. She places her cursor in the “comment” field and begins to type a summary of what she did to fix the “network security task” she just returned from. She types, erases the text, and retypes several words. She opens a web browser and types a term into a search engine. I cannot see what she is writing. She scrolls down the page, highlights some text with her mouse and copies it. She switches back to the open ticket and pastes the text into the “comment” field where she has been writing documentation. I ask her what she is doing:

Tech 5: Oh. Well I'm writing about that ticket. Well, I'm trying to put really good documentation in here.

Observer: Really good documentation?

Tech 5: Yeah. Well it wasn't that hard, what I fixed, but it's kind of an interesting topic that I want to learn more about. So, if I want to get more tasks like this to work on then I just have to do good documentation because people will look at this and then decide if they should assign me the task. So, you know, I just want the documentation to look really good — not simply like I didn't know what I was doing or that the problem was so easy that anyone could do it.

Observer: What did you copy from that search you did?

Tech 5: Just some, you know, more text to make the documentation a little meatier.

By entering more detailed documentation into ShareIT than was necessary, or perhaps by entering more information than an informant really had about how to solve the problem, technicians were anticipating that others would look at the length and quality of the documentation, use this data as a proxy for

Table 1
Changes in expertise attribution and strategic entry of information into technology.

Technician	Known as _____ expert in April	Wanted to be known as expert in this area	Information entered in technology strategically to change or maintain other's perceptions of expertise in 50% or more tickets	Known as _____ expert in October
1	Ghosting	No	Yes	Data mining
2	Hardware	Yes	No	Hardware
3	Data management	Yes	Yes	Data management
4	Productivity apps.	No	No	Productivity apps.
5	Printer	No	Yes	Network security
6	Calendaring	No	No	Calendaring
7	Operating system	No	Yes	Network admin
8	Server	Yes	No	Server

determining that technician's expertise and then assign future tasks of this nature to that technician. Task assignment would ensure that the technician could work on these types of problems in the future and, in so doing, improve his or her own domain knowledge in the related area. In short, although the technician was not an expert at the given topic, leading others to believe he was would help him gain more tasks in this area, which would allow him to actually develop the knowledge necessary to become an expert.

In October of 2003, five months after we finished observational data collection, we emailed all of the NETS members and asked them to “fill-in the blank” in the following sentence: *Today, other members of NETS consider me the _____ [fill in the blank] expert on the team.* Technicians' responses are presented in the fifth column of Table 1. To assess whether informants felt that others' perceptions of their expertise had changed with continued use of ShareIT, we extracted from our interview transcripts from April their responses to a question similar to the one we asked via email in October. Informants' answers from April are presented in the second column of Table 1 along with an indication (in column 3) of whether or not the informant wanted to be known as the expert in this domain. We also culled from the field notes taken during May each instance in which a technician entered information about a completed task into ShareIT. We coded each of these 54 instances to indicate whether the technician was strategic about how he/she entered information into the technology (either to present his/herself as knowledgeable on the specific topic or not), or whether he/she simply entered information detailing exactly the steps taken to solve the user's problem. The fourth column in Table 1 summarizes the results of this coding effort, indicating which technicians entered information strategically into ShareIT in at least 50% of the instances we observed.

Overall, the table indicates that five of the eight technicians were dissatisfied with the areas in which their teammates considered them experts in April. Of these five, only Technician 6 did not enter information into ShareIT strategically in an attempt to alter the attributions others made about his area of expertise. In October, Technician 6 still felt that others believed he was the “calendar” expert even though he did not wish to be perceived as such. By contrast, it appears that by October the remaining four technicians (1, 4, 5, and 7) felt successful in altering others' perceptions about their area of expertise. Technician 3, who was happy to be considered the “data management” expert, and wanted to continue to have others perceive her as such, engaged in strategic data entry tactics to maintain her status as the expert in this area. Technicians 2 and 8 who were satisfied with others' perceptions of their expertise in April did not engage in strategic self-presentations and maintained their expert status in October. The following email note received in October from Technician 5 suggests that the strategic entry of information into ShareIT did more than just alter others' perception of who was expert at what; it provided the actor the opportunity to actually develop knowledge in this new area:

I know the other NETS members think I'm the expert in network security, but I think I'm really becoming an expert in this area. I keep getting assigned more tasks for network security problems so I actually have more time to work on those issues and develop competency in this area. I actually do know more in that area now, which is what I wanted.

Through the strategic presentation of information in ShareIT, savvy technicians were able to shape the kinds of attributions that other NETS members formed about the nature of their expertise. As we saw earlier, when team members perceived that someone was an expert in a certain domain that person assigned her expert tasks relevant to her knowledge set. The allocation of task responsibilities to perceived experts represents the presence of a more developed transactive memory system after the group's decision to actively view entries in the technology. Contributions served as communal, visible representations of knowledge, and formed a defacto directory of expertise for the group. However, it appears that by strategically manipulating the kind of information they presented through the use of ShareIT, technicians were able to work on problems in which they were interested and, in so doing, build actual knowledge and skills in that area.

5. Discussion

The findings of this ethnographic research study question the idea that knowledge management technologies can be used to correctly identify expertise in organizational teams. In our empirical context, all

team members freely entered information about the tasks they completed into the technology, thus the widely-discussed issue of how to entice people to enter information into a shared repository (Fulk et al., 2004; Hollingshead et al., 2002; Jackson & Klobas, 2008; Wasko & Faraj, 2005) was of little concern here. But our findings show an important phenomena that has received little attention in the literature on expertise integration in organizations – how the information visibility enabled by the use of a knowledge management system, coupled with a material context that obscures communicative acts among workers, can influence the social construction of expertise. Because workers completed tasks largely in isolation, but shared information about task completion communally, workers were motivated and able to strategically enter information that may not have truly reflected their actual knowledge or skills. Unlike previous work that has explored the development of TMSs as a process through which individuals use knowledge management systems to *identify* or *recognize* expertise, the findings emerging from this study suggest that knowledge management technologies can be used as stages upon which expertise is *performed* and *constructed*. In this section we examine the findings in relation to each of the research questions and discuss the implications of these findings for transactive memory systems theory and theories of knowledge management systems.

5.1. Monitoring and pressures toward strategic self-presentation

Our first research question asked about the conditions under which users felt compelled to enter inaccurate or incomplete information into a knowledge management technology. Our research at SkyLabs showed that technicians first became aware of others' perceptions of their expertise when colleagues began to assign them new tasks to conduct. Upon receiving these task assignments, technicians started to realize, as one informant commented, "that's what people think I'm good at." These findings suggest that it was the use of the technology for relative displays of information, and not the mere presence of the knowledge management tool, that motivated strategic self-presentation behaviors. Technicians in our study used the knowledge management technology for entry of information about their tasks for nearly three months before we found evidence that they began to doctor this information to shape whether and how others viewed them as experts. It was not until the NETS team made a collective decision to use the information entered into the technology over those three months as the basis for determining who would be assigned particular tasks that strategic self-presentations through entry of inaccurate or incomplete information began. In other words, the communal features of the knowledge management technology did not *cause* individual concern for self-presentation, but when job assignments altered the consequences and motivations of entries they shared, visible nature of the information entered into the technology *afforded* users an efficient way to monitor presentations, and alter respective contributions accordingly.

Additionally, our findings support arguments that studies of expertise sharing in organizations and use of a TMS should consider potentially selfish motives by workers (Jarvenpaa & Majchrzak, 2008). Much of the early research on TMS focused on close interpersonal relationships (Hollingshead, 1998; Wegner et al., 1991) or ad hoc teams in laboratory settings, contexts where individuals were artificially motivated to increase the collective knowledge of the group (Hollingshead, 2000). In real organizational contexts, individuals are often personally-motivated to provide, withhold, misrepresent, or "spin" information to others to help facilitate the accomplishment of individual goals (Wittenbaum, Hollingshead, & Botero, 2004). Strategic presentations of expertise are especially likely to be common in situations where individuals believe their personal motivations are more important than, or out of alignment with, the goals of the team (Jarvenpaa & Majchrzak, 2008). In this study, the technicians were placed in a novel situation in which they were both unsure of their standing in the group, and aware that performances of knowledge were explicitly tied to assignments of tasks. The subsequent self-motivated contributions by NETS team members resulted in a group-level system that supported efficient knowledge allocation and retrieval, but provided few mechanisms for communication to validate the expertise it presumably held.

Buoyed by mounting empirical evidence regarding the positive relationship between TMS development and group performance (Austin, 2003; Lewis, 2003; Moreland & Myaskovsky, 2000) research has recently focused on ways information technology can facilitate directories of organizational expertise to support the identification of expertise (Jackson & Klobas, 2008; Yuan, Fulk, Monge, & Contractor, 2010). However, these perspectives often take for granted that individuals will make the contributions needed to populate knowledge directories. Even studies that view contributions to knowledge directories as a collective action problem

see the main organizational challenge as inciting individuals to use the system (Hollingshead et al., 2002; Yuan et al., 2005). Furthermore, these studies are concerned with motivating contributions and treat participation as both a binary variable (either one participates or does not) and an organizational good.

The findings of this study suggest that many current TMS studies may privilege the “transactional” aspect of transactive memory systems at the expense of considering the underlying communicative processes that influence how and why people make particular knowledge contributions. By viewing elements of knowledge (differentiation, identification, allocation) as independent variables studies TMS studies often confine themselves to a fairly static view of expertise of organizations. Empirical work in the TMS literature commonly relies on a snapshot of how teams coordinate expertise at one point in time (Lewis, 2003). Wittenbaum (2003) refers to this static conceptualization of expertise coordination as the “input–output mindset.” The findings of our longitudinal study show that the social construction of expertise is a dynamic process that proceeds through periods of inertia and change. Periods of inertia may be either vicious (people don’t know what others know so they don’t integrate areas of expertise) or virtuous (tasks are conducted by people who have expert knowledge to conduct them). These cycles of inertia are punctuated by strategic change events such as an organizational restructuring or the implementation of a new technology, which upset existing dynamics and provide the occasion and the capabilities for people to either hide or make public information about what things they know. Thus, perceptions about who knows what on a team and people’s ability to engage in actions that actually enhance their expertise may evolve over time. For this reason, we concur with scholars who have recently called for research to examine the dynamic nature of expertise integration in organizational teams (Brandon & Hollingshead, 2004; Jarvenpaa & Majchrzak, 2008; Palazzolo, Serb, She, Su, & Contractor, 2006).

5.2. Effectiveness of technology for strategic self-presentation and expertise construal

Our second research question asked how technologies might be effective in enabling strategic self-presentations. The use of ShareIT by individuals to carefully enter specific task information (regardless of whether it accurately reflected the individual’s work) supports previous arguments regarding how the material features of mediated communication technologies can facilitate self-presentation (Walther, 2007). However, Walther’s analysis of the affordances of mediated technology was largely concerned with how the technology itself affords an actor greater control of self-presentation in interpersonal settings. Our findings suggest three additional sociomaterial elements of knowledge management technology that are a product of ongoing organizational practice, and aid effective self-presentation. The first is that by making information visible to others in the course of work, knowledge management technologies reduce the cost for individuals to offer displays of expertise. Goffman (1959) suggested that individuals must often “dramatize” their work to make it visible to others, noting, “While in the presence of others, the individual typically infuses his activity with signs which dramatically highlight and portray confirmatory factors that might otherwise remain unapparent or obscure” (p. 33). This insight suggests that when information visibility is low, individuals are subject to a paradox of expertise presentation whereby people who take the time to conduct tasks well may not, because of this, have the time to communicate to others that they are conducting those tasks well. As a consequence of this paradox, many workers do not take steps to make their behaviors public and, therefore, they do not actively engage in self-presentation (Gardner, 1992; Gioia, 1989).

Integrating the use of ShareIT into the existing work routine made it both necessary, and easy, for people to present information about their work to others. In lieu of relying on the technology to share knowledge NETS members could have talked with one another at length about the tasks they worked on and the solutions they devised or written documentation of problems onto pieces of paper that were hung in common areas. Each of these “low-tech” solutions could have, in theory, made information about what one knows visible. But these solutions would have required action in addition to one’s normal work practices. When using ShareIT individuals did not need to actively communicate with others – they could passively inform others about actions they took to solve a problem.

In addition to integrating mediated knowledge sharing into active work practices, ShareIT also provided a permanent record of activity that influenced expertise attribution and the likelihood of self-presentation behaviors. There are a number of ways in which the permanence of knowledge sharing can aid in self-presentation efforts. First, the permanence of information contributed means that workers do not have to continually recreate or defend performances of knowledge. Once entered into the technology, the process by which the information was produced and recorded may be “black boxed” and become reified as knowledge

over time (Latour, 1987). In addition, the permanence of content in the technology allows individuals to more easily compare active performances of knowledge. The behavior of the NETS workers supported findings that individuals in a transactive memory system consider what knowledge is already claimed by others and then choose to take on complementary domains (Hollingshead, 2000). By indexing entries over time, workers can more easily track what knowledge already resides in the system and adjust contributions accordingly.

Lastly, because the technology affords permanence the amount of information entered into a knowledge management system will grow making it more difficult for people in the organization to learn about what other people know simply by browsing — there is simply too much information to wade through. Research suggests as the volume of information contained in electronic knowledge repositories grows, users stop browsing and begin to actively search for explicit pieces of information (Jansen, Booth, & Spink, 2008). In these environments, individuals who flagrantly self-promote by entering explicit information into the technology that will appear in the results of one's directed search may be most successful in acquiring the attributions of expertise they seek. Thus as entries into the system increase, individuals face the risk that each presentation of knowledge becomes relatively less visible — that the stage of knowledge performances becomes more crowded. As the volume of contributions in the technology increases success in obtaining desired perceptions will be tied to the ability to recognize and appropriate the technological features that privilege particular displays. And because the end result of self-promotion behaviors is mediated through the technology use of another, search results are less likely to be perceived as the manipulation of a strategic presenter, and more likely to be viewed as an objective display of relevant information. Thus, we suspect that strategic self-presentation through the use of knowledge management technologies may be more likely not simply because the technology provides the space for deception to go unnoticed, but because also it makes the act of “dramatizing” one's work easy and commonplace.

5.3. Systemic effects of strategic self-presentation through technology

Our third research question asked what effects strategic self-presentation and resultant perceptions of expertise made through use of a knowledge management technology have on the system of relations through which work gets done in the organization. What we found most surprising was that informants who were quite happy about how others perceived their expertise also felt compelled to engage in strategic self-presentation behaviors and enter inaccurate or incomplete information into the technology. They wanted to do so because others' strategic actions threatened their expert standing. If a person's colleagues engage in strategic self-presentation behaviors such that they are now considered to have more knowledge than that person, he or she will no longer be considered the expert. That person learns that his or her position is in jeopardy because the technology makes visible what information others have entered into it and who is assigned certain tasks. Because the group developed a stronger transactive memory system over time, attributions of expertise and the associated tasks allocated to experts were both interdependent and largely zero-sum, meaning that if someone else was an expert in a certain area others were not. Thus, even those who are happy with how others perceive them may be pulled into strategic performances if they wish to maintain their expert standing. This suggests a possible distinction between proactive and reactive self-presentation behaviors. Proactive decisions were only made, at least initially, by a subset of informants. The rest of the informants felt dragged into strategic behaviors because the actions of these early few directly affected what others thought of them.

If, as our findings suggests, we treat self-presentations as taking place in a system of relations where one's decisions to be strategic has secondary effects on the perceptions of expertise made about others, we might cast such self-presentations as reactive as opposed to proactive. Although our ethnographic exploration cannot make predictions about the quantity or prevalence of such behaviors, our findings do suggest that if even a small cohort takes advantage of the technology's affordances to proactively enter information that does not truly represent their expertise, other actors may also feel that they should do the same, but reactively, such that deceptive use quickly snowballs throughout the organization.

Of course, not all strategic-self presentations (proactive or reactive) are bad. For example, although inaccurate/incomplete information was entered into ShareIT, the outcomes of this behavior for the NETS teams were somewhat positive. Using the system in this way facilitated a smooth transition from “generalist” to “specialist” roles in the team and the development of a strong TMS. This type of organizational change can be very difficult to orchestrate, but the technicians' strategic use of the system accomplished

in an undirected, emergent fashion what the previous reorganization had failed to do. Moreover, the changes seemed to evolve fairly rapidly and without major problems. NETS technicians self-selected targeted areas of expertise and created opportunities for themselves for deeper learning. Even technicians who actively used the technology for self-presentation did so largely in an effort to secure jobs they felt capable of doing. Recently, research on social media has supported the idea that communal communication technologies afford individuals new means for impression management in organizations (Muller, Ehrlich, & Farrell, 2006). However, far from viewing this activity as subversive the authors note that these behaviors can be a powerful means to signal the presence of organizational knowledge and available resources.

It is impossible to discern, before implementation of a technology for knowledge sharing, whether the effects of strategic self-presentation will enable vicious or virtuous cycles. But the findings of this study do suggest that strategic self-presentation behaviors conducted via networked information technologies may be more systemic than previously thought.

6. Conclusion

At first glance the finding that under certain conditions workers may feel that it is in their best interest to enter inaccurate or incomplete information into a knowledge management technology may be troubling for managers of organizations. Indeed, the dynamics displayed among the technicians at SkyLabs could lead to vicious cycles in which individuals are perceived as knowledgeable in areas they are not, and therefore given tasks that could be performed better by others. Following this view, the same dynamics of transactive memory that are celebrated as facilitating optimal organizational knowledge use – knowledge specialization, signaling of expertise, allocation of tasks to perceived experts – could negatively affect organizational performance.

We hope that researchers who study the use of knowledge management technologies to capture, store, and share information will use the findings of this study to recognize that developing structures that incentivize people to enter their knowledge into a technology does not guarantee that people are entering information about what they truly know (Wasko & Faraj, 2005), and that if people do enter inaccurate or incomplete information into a technology it may not be a simple error or mistake (Hollingshead, Brandon, Yoon, & Gupta, 2010). Instead the proliferation and use of knowledge management technologies for information sharing and task assignment in organizations may compel users to become experts at being seen as experts, regardless of the cost that such actions have for the organization.

References

- Agnew, N. M., Ford, K. N., & Hayes, P. J. (1997). Expertise in context: Personally constructed, socially selected and reality-relevant? In P. J. Feltoich, K. M. Ford, & R. R. Hoffman (Eds.), *Expertise in context* (pp. 219–244). Menlo Park, CA: AAAI Press.
- Anand, V., Manz, C. C., & Glick, W. H. (1998). An organizational memory approach to information management. *The Academy of Management Review*, 23, 796–809.
- Austin, J. R. (2003). Transactive memory in organizational groups: The effects of content, consensus, specialization, and accuracy on group performance. *Journal of Applied Psychology*, 88, 866–878. [10.1037/0021-9010.88.5.866](https://doi.org/10.1037/0021-9010.88.5.866).
- Bozeman, D. P., & Kacmar, K. M. (1997). A cybernetic model of impression management processes in organizations. *Organizational Behavior and Human Decision Processes*, 69, 9–30. [10.1006/obhd.1996.2669](https://doi.org/10.1006/obhd.1996.2669).
- Brandon, D. P., & Hollingshead, A. B. (2004). Transactive memory systems in organizations: Matching tasks, expertise, and people. *Organization Science*, 15, 633–644. [doi:10.1287/orsc.1040.0069](https://doi.org/10.1287/orsc.1040.0069).
- Bunderson, S. J. (2003). Recognizing and utilizing expertise in work groups: A status characteristics perspective. *Administrative Science Quarterly*, 48, 557–591. [doi:10.2307/3556637](https://doi.org/10.2307/3556637).
- Cabrera, A., & Cabrera, E. F. (2002). Knowledge-sharing dilemmas. *Organization Studies*, 23, 687–710. [doi:10.1177/0170840602235001](https://doi.org/10.1177/0170840602235001).
- Carlson, J. R., George, J. F., Burgoon, J. K., Adkins, M., & White, C. H. (2004). Deception in computer-mediated communication. *Group Decision and Negotiation*, 13, 5–28. [doi:10.1023/B:GRUP.0000011942.31158.d8](https://doi.org/10.1023/B:GRUP.0000011942.31158.d8).
- Child, J. T., & Shumate, M. (2007). The impact of communal knowledge repositories and people-based knowledge management on perceptions of team effectiveness. *Management Communication Quarterly*, 21, 29–54. [doi:10.1177/0893318907301987](https://doi.org/10.1177/0893318907301987).
- Choi, S. Y., Lee, H., & Yoo, Y. (2010). The impact of information technology and transactive memory systems on knowledge sharing, application, and team performance: A field study. *MIS Quarterly*, 34, 855–870.
- Collins, H., & Evans, R. (2007). *Rethinking expertise*. Chicago, IL: The University of Chicago Press.
- Cress, U., Kimmerle, J., & Hesse, F. W. (2006). Information exchange with shared databases as a social dilemma: The effect of meta-knowledge, bonus systems, and costs. *Communication Research*, 33, 370–390. [doi:10.1177/0093650206291481](https://doi.org/10.1177/0093650206291481).
- Cross, R., Borgatti, S. P., & Parker, G. (2003). Making invisible work visible: Using social network analysis to support strategic collaboration. *California Management Review*, 44, 25–46.
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice Hall.

- Dreyfus, H. L., & Dreyfus, S. E. (2005). Peripheral vision: Expertise in real world contexts. *Organization Studies*, 26, 779–792, doi:10.1177/0170840605053102.
- Evans, R. (2008). The sociology of expertise: The distribution of social fluency. *Sociology Compass*, 2, 281–298, doi:10.1111/j.1751-9020.2007.00062.x.
- Flanagin, A. J., Pearce, K., & Bondad-Brown, B. (2009). The destructive potential of electronic communication technologies in organizations. In P. Lutgen-Sandvik, & B. Davenport-Sypher (Eds.), *The destructive side of organizational communication: Processes, consequences, and constructive ways of organizing* (pp. 229–251). Mahwah, NJ: Routledge.
- Fulk, J., Heino, R., Flanagin, A. J., Monge, P. R., & Bar, F. (2004). A test of the individual action model for organizational information commons. *Organization Science*, 15, 569–585, doi:10.1287/orsc.1040.0081.
- Gardner, W. L. (1992). Lessons in organizational dramaturgy: The art of impression management. *Organizational Dynamics*, 21, 33–46, doi:10.1016/0090-2616(92)90084-z.
- Giacalone, R. A., & Rosenfeld, P. (1991). *Applied impression management: How image making affects managerial decisions*. Newbury Park, CA: Sage.
- Gioia, D. A. (1989). Self-serving bias as a self-sensemaking strategy: Explicit vs. Tacit impression management. In R. A. Giacalone, & P. Rosenfeld (Eds.), *Impression management in the organization* (pp. 219–234). Hillsdale, NJ: Lawrence Erlbaum.
- Glaser, B. (1978). *Theoretical sensitivity*. Mill Valley, CA: The Sociological Press.
- Goffman, E. (1959). *The presentation of self in everyday life*. Garden City, NY: Doubleday Anchor.
- Hancock, J. T. (2007). Digital deception: When, where and how people lie online. In K. McKenna, T. Postmes, U. Reips, & A. N. Joinson (Eds.), *Oxford handbook of internet psychology* (pp. 287–301). Oxford, UK: Oxford University Press.
- Heinz, M., & Rice, R. E. (2009). An integrated model of knowledge sharing in contemporary communication environments. In C. S. Beck (Ed.), *Communication Yearbook, Vol. 33*. (pp. 134–175). New York, NY: Routledge.
- Hollingshead, A. B. (1998). Communication, learning, and retrieval in transactive memory systems. *Journal of Experimental Social Psychology*, 34, 423–442, doi:10.1006/jesp.1998.1358.
- Hollingshead, A. B. (2000). Perceptions of expertise and transactive memory in work relationships. *Group Processes Intergroup Relations*, 3, 257–267, doi:10.1177/1368430200033002.
- Hollingshead, A. B., & Brandon, D. P. (2003). Potential benefits of communication in transactive memory systems. *Human Communication Research*, 29, 607–615, doi:10.1111/j.1468-2958.2003.tb00859.x.
- Hollingshead, A. B., Brandon, D. P., Yoon, K., & Gupta, N. (2010). Communication and knowledge-sharing errors in groups: A transactive memory perspective. In H. E. Canary, & R. D. McPhee (Eds.), *Communication and organizational knowledge: Contemporary issues for theory and practice* (pp. 133–150). New York, NY: Routledge.
- Hollingshead, A. B., Fulk, J., & Monge, P. (2002). Fostering intranet knowledge-sharing: An integration of transactive memory and public goods approaches. In P. J. Hinds, & S. Kiesler (Eds.), *Distributed work: New research on working across distance using technology* (pp. 335–335). Cambridge, MA: MIT Press.
- Jackson, P., & Klobas, J. (2008). Transactive memory systems in organizations: Implications for knowledge directories. *Decision Support Systems*, 44, 409–424, doi:10.1016/j.dss.2007.05.001.
- Jansen, B. J., Booth, D. L., & Spink, A. (2008). Determining the informational, navigational, and transactional intent of web queries. *Information Processing and Management*, 44, 1251–1266, doi:10.1016/j.ipm.2007.07.015.
- Jarvenpaa, S. L., & Majchrzak, A. (2008). Knowledge collaboration among professionals protecting nation security: Role of transactive memories in ego-centered knowledge networks. *Organization Science*, 19, 260–276, doi:10.1287/orsc.1070.0315.
- Kuhn, T., & Jackson, M. H. (2008). Accomplishing knowledge: A framework for investigating knowing in organizations. *Management Communication Quarterly*, 21, 454–485, doi:10.1177/0893318907313710.
- Kvale, S. (1996). *Interviews: An introduction to qualitative research interviewing*. Thousand Oaks, CA: Sage.
- Latour, B. (1987). *Science in action*. Cambridge, MA: Harvard University Press.
- Leonardi, P. M. (2007). Activating the informational capabilities of information technology for organizational change. *Organization Science*, 18, 813–831, doi:10.1287/orsc.1070.0284.
- Lewis, K. (2003). Measuring transactive memory systems in the field: Scale development and validation. *Journal of Applied Psychology*, 88, 587–604, doi:10.1037/0021-9010.88.4.587.
- Liang-Rulke, D., & Rau, D. (2000). Investigating the encoding process of transactive memory development in group training. *Group & Organization Management*, 25, 373–396, doi:10.1177/1059601100254004.
- Littlepage, G. E., Hollingshead, A. B., Drake, L. R., & Littlepage, A. M. (2008). Transactive memory and performance in work groups: Specificity, communication, ability differences, and work allocation. *Group Dynamics*, 12, 223–241, doi:10.1037/1089-2699.12.3.223.
- Majchrzak, A., & Malhotra, A. (2004). *Virtual workspace technology use and knowledge-sharing effectiveness in distributed teams: The influence of team's transactive memory*. Working paper. Los Angeles, CA: University of Southern California, Marshall School of Business.
- Malhotra, Y. (2002). Why knowledge management systems fail? Enablers and constraints of knowledge management in human enterprises. In M. E. D. Koenig & T. K. Srikantaiah (Eds.), *Knowledge management lessons learned: What works and what doesn't* (pp. 87–112). Medford, NJ: American Society for Information Science and Technology.
- Moreland, R. L., & Myaskovsky, L. (2000). Exploring the performance benefits of group training: Transactive memory or improved communication? *Organizational Behavior and Human Decision Processes*, 82, 117–133, doi:10.1006/obhd.2000.2891.
- Muller, M. J., Ehrlich, K., & Farrell, S. (2006). Social tagging and self-tagging for impression management. *Technical Report No. 06-02*. Cambridge, MA: IBM Watson Research Center.
- Nardi, B. A., & Engstrom, Y. (1999). A web on the wind: The structure of invisible work. *Computer Supported Cooperative Work*, 8, 1–8.
- Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Cambridge, MA: Belknap Press.
- Nevo, D., & Wand, Y. (2005). Organizational memory information systems: A transactive memory approach. *Decision Support Systems*, 39, 549–562, doi:10.1016/j.dss.2004.03.002.
- Orlikowski, W. J. (1996). Improvising organizational transformation over time: A situated change perspective. *Information Systems Research*, 7, 63–92, doi:10.1287/isre.7.1.63.
- Palazzolo, E. T. (2005). Organizing for information retrieval in transactive memory systems. *Communication Research*, 32, 726–761, doi:10.1177/0093650205281056.

- Palazzolo, E. T., Serb, D. A., She, Y. C., Su, C. K., & Contractor, N. S. (2006). Coevolution of communication and knowledge networks in transactive memory systems: Using computational models for theoretical development. *Communication Theory*, 16, 223–250, doi:10.1111/j.1468-2885.2006.00269.x.
- Pentland, B. T. (1992). Organizing moves in software support hot lines. *Administrative Science Quarterly*, 37, 527–548, doi:10.2307/2393471.
- Pipek, V., Hinrichs, J., & Wulf, V. (2003). Sharing expertise: Challenges for technical support. In M. Ackerman, V. Pipek, & V. Wulf (Eds.), *Sharing expertise: Beyond knowledge management* (pp. 111–136). Cambridge, MA: MIT Press.
- Pollock, N., Williams, R., D'Adderio, L., & Grimm, C. (2009). Post local forms of repair: The (extended) situation of virtualised technical support. *Information and Organization*, 19, 253–276, doi:10.1016/j.infoandorg.2009.08.001.
- Roberts, L. M. (2005). Changing faces: Professional image construction in diverse organizational settings. *Academy of Management Review*, 30, 685–711.
- Schneider, D. (1981). Tactical self-presentations: Toward a broader conception. In J. T. Tedeschi (Ed.), *Impression management theory and social psychological research* (pp. 23–40). New York, NY: Academic Press.
- Schultze, U., & Boland, R. J. (2000). Knowledge management technology and the reproduction of knowledge work practices. *The Journal of Strategic Information Systems*, 9, 193–212, doi:10.1016/S0963-8687(00)00043-3.
- Schultze, U., & Boland, R. J. (2000). Place, space and knowledge work: A study of outsourced computer systems administrators. *Accounting, Management and Information Technologies*, 10, 187–219, doi:10.1016/S0959-8022(00)00006-0.
- Vaast, E., & Walsham, G. (2005). Representations and actions: The transformation of work practices with IT use. *Information and Organization*, 15, 65–89.
- Van Maanen, J. (1988). *Tales of the field: On writing ethnography*. Chicago, IL: University of Chicago Press.
- Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23, 3–43, doi:10.1177/009365096023001001.
- Walther, J. B. (2007). Selective self-presentation in computer-mediated communication: Hyperpersonal dimensions of technology, language, and cognition. *Computers in Human Behavior*, 23, 2528–2557, doi:10.1016/j.chb.2006.05.002.
- Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly*, 29, 35–57.
- Wegner, D. M. (1987). Transactive memory: A contemporary analysis of group mind. In B. Mullen, & G. Goethals (Eds.), *Theories of group behavior* (pp. 185–208). New York, NY: Springer-Verlag.
- Wegner, D. M. (1995). A computer network model of human transactive memory. *Social Cognition*, 13, 319–339.
- Wegner, D. M., Erber, R., & Raymond, P. (1991). Transactive memory in close relationships. *Journal of Personality and Social Psychology*, 61, 923–929, doi:10.1037/0022-3514.61.6.923.
- Wegner, D. M., Giuliano, T., & Hertel, P. (1985). Cognitive interdependence in close relationships. In W. J. Ickes (Ed.), *Compatible and incompatible relationships* (pp. 253–276). New York, NY: Springer-Verlag.
- Wittenbaum, G. M. (2003). Putting communication into the study of group memory. *Human Communication Research*, 29, 616–623, doi:10.1111/j.1468-2958.2003.tb00860.x.
- Wittenbaum, G. M., Hollingshead, A. B., & Botero, I. C. (2004). From cooperative to motivated information sharing in groups: Moving beyond the hidden profile paradigm. *Communication Monographs*, 71, 286–310, doi:10.1080/0363452042000299894.
- Yoo, Y., & Ifvarsson, C. (2001). Knowledge dynamics in organizations: Toward a theoretical framework. In E. Coakes, D. Willis, & S. Clarke (Eds.), *Knowledge management in the sociotechnical world: The graffiti continues* (pp. 52–64). London, England: Springer-Verlag.
- Yuan, Y. C., Fulk, J., & Monge, P. R. (2007). Access to information in connective and communal transactive memory systems. *Communication Research*, 34, 131–155, doi:10.1177/0093650206298067.
- Yuan, Y. C., Fulk, J., Monge, P. R., & Contractor, N. (2010). Expertise directory development, shared task interdependence, and strength of communication network ties as multilevel predictors of expertise exchange in transactive memory work groups. *Communication Research*, 37, 20–47, doi:10.1177/0093650209351469.
- Yuan, Y. C., Fulk, J., Shumate, M., Monge, P. R., Bryant, J. A., & Matsaganis, M. (2005). Individual participation in organizational information commons: The impact of team level social influence and technology-specific competence. *Human Communication Research*, 31, 212–240, doi:10.1111/j.1468-2958.2005.tb00870.x.
- Zuboff, S. (1988). *In the age of the smart machine*. New York, NY: Basic Books.