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RESEARCH ARTICLE

BRIDGING USER ORGANIZATIONS: KNOWLEDGE BROKERING AND THE WORK OF INFORMATION TECHNOLOGY PROFESSIONALS¹

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Abstract

This interpretive case study examines knowledge brokering as an aspect of the work of information technology professionals. The purpose of this exploratory study is to understand knowledge brokering from the perspective of IT professionals as they reflect upon their work practice. As knowledge brokers, IT professionals see themselves as facilitating the flow of knowledge about both IT and business practices across the boundaries that separate work units within organizations. A qualitative analysis of interviews conducted with 23 IT professionals and business users in a large manufacturing and distribution company is summarized in a conceptual framework showing the conditions, practices, and consequences of knowledge brokering by IT professionals. The framework suggests that brokering practices are conditioned by structural conditions, including decentralization and a federated IT management organization, and by technical conditions, specifically shared IT systems that serve as boundary objects. Brokering practices include gaining permission to cross organizational boundaries, surfacing and challenging assumptions made by IT users, translation and interpretation, and relinquishing ownership of knowledge. Consequences of brokering are the transfer of both business and IT knowledge across units in the organization.

¹Michael Myers was the accepting senior editor for this paper.

Keywords: Boundary spanning, organizational communication, organizational learning, IS skill requirements, IT professionals, knowledge broker, internal knowledge transfer

Introduction

What these people don't necessarily realize is Information Resources sees across this organization. I see way across this organization. I don't have the boundaries of their department. In this company we're decentralized. We don't communicate well, and we work in silos. Information Resources has ultimate responsibility *and* the ability to communicate across those department boundaries....That's my responsibility. At least that's the way I see it. (*Manager, Information Systems Development—Informant #3*)

This comment introduces the research topic investigated in this paper: the role of information technology professionals as knowledge brokers in organizations. Knowledge brokers facilitate the transfer of knowledge among organizational units, thereby contributing to organizational learning. Although organizational learning, knowledge management, and knowledge transfer have become significant topics of academic discourse, IT professionals' roles in such activities have not been fully investigated. Typically, IT professionals are assumed to play a limited role by designing and maintaining technologies that promote knowledge transfer. Yet the comment above suggests a broader role. IT professionals may be positioned in an organization to broker organizational knowledge and may view this function as their responsibility. Moreover, their responsibilities increasingly include the design, implementation, and maintenance of information systems that are shared across enterprises. In a sense, such shared IT systems become *boundary objects* linking organizational units. The purpose of this research is to examine IT professionals' understanding of the

conditions, activities, and consequences of their role as knowledge brokers.

The benefits of internal knowledge transfer have been articulated from various perspectives. For example, transferring knowledge between organizational units potentially prevents units from turning *core competencies* into *core rigidities* (Leonard-Barton 1995), extends a firm's core competences by disseminating local knowledge to globally distributed sites (Cohendet et al. 1999), and generates organizational knowledge by creating new meanings, linguistic routines, and understandings (Boland and Tenkasi 1995). Cross-unit knowledge transfer can promote organizational learning by bringing different perspectives into juxtaposition, producing what Leonard-Barton (1995) called *creative abrasion*. Similarly, Brown and Duguid observed that the local perspectives of different organizational collectives can be modified by interchanges among them: "Out of this friction of competing ideas can come the sort of improvisational sparks necessary for igniting organizational innovation" (1991, p. 54). Internal knowledge transfer can also create new ideas by rearranging information already in use and by incorporating information that has been previously neglected (Isabella 1990; Macdonald 1995).

Research on internal knowledge transfer has also focused on its challenges. Szulanski (1996) found that the internal "stickiness" of knowledge was primarily due to three knowledge-related factors. First the recipient's inability to value, assimilate, and apply outside sources of knowledge reflects a lack of absorptive capacity (Cohen and Levinthal 1990; Zahra and George 2002). Second, Szulanski identified causal ambiguity as the inability to identify the precise reasons for success or failure in replicating a capability in a new setting. Difficulties in replication, for example, can emanate from a lack of understanding of what the factors of production are and how they interact to produce a capability (Lippman and Rummelt 1982) or imperfect understanding of the idiosyncratic features of the new context in which knowledge is put to use (Tyre and von Hippel 1997). Third, difficulty

of communication (e.g., laborious, distant) and lack of intimacy in the relationship between the source and recipient defines the arduousness of the relationship. The transfer of knowledge within an organization may be arduous partly because much of what must be transferred is tacit rather than explicit (Carlile 2002; Nonaka 1994; Spender 1996).

These benefits and challenges motivate our inquiry into the role that IT professionals might play in internal knowledge transfer, particularly their roles as knowledge brokers. Our central research questions are (1) *in what ways do the work practices of IT professionals reflect a knowledge broker role* and (2) *what are the conditions and consequences of knowledge brokering by IT professionals?*

Recent developments in the IT strategies of organizations suggest reasons why IT professionals might play a significant role in transferring knowledge within an organization. Beginning in the 1990s, two dominant aspects of the information systems strategies of organizations have been integration and standardization. The integration of isolated "islands" of systems and data (Tapscott and Caston 1993) is manifest in large-scale technology initiatives such as enterprise resource planning (ERP) systems and data warehouses (Davenport 2000). In addition, local versions of systems such as general ledger and human resources have been replaced by standard, enterprise-wide applications. As systems have increasingly crossed business unit boundaries, so also have the technology infrastructures upon which these systems are built. Consequently, both large and mid-sized organizations have standardized firm-wide data and communication networks, data management systems, and IT architectures (Broadbent et al. 1999). These shifts have not only transformed the landscape of systems, data, and supporting infrastructures, but have also created opportunities for changes in the work of IT professionals. Rather than merely fulfilling the needs of individual business areas, IT professionals potentially assume a larger role in an

enterprise's strategic and operational activities by transferring knowledge across the enterprise.

We investigate this phenomenon in an interpretive case study of IT professionals in a large, decentralized manufacturing and distribution company. Given the lack of prior research on the knowledge broker role, our primary purpose is to provide a detailed interpretation of brokering practices from the perspective of IT professionals. Those interpretations are reflected in the subjective accounts of IT professionals regarding their work practices and relationships with other organizational units. Our research, therefore, purposively privileges the subjective understandings that IT professionals have about their own roles. However, an investigation of social roles typically begins with actors' self-definition of their responsibilities and relationships (Turner 1968). In the absence of existing theory on broker roles in organizations, our analysis is guided by prior literature on boundary spanning roles and situated learning. The results are presented as a conceptual framework including the conditions, practices, and consequences associated with knowledge brokering by IT professionals.

Related Research

In the absence of a specific theory of knowledge brokering, we searched for related studies in organization science. As noted in our introduction, research on internal knowledge transfer helped to frame the opportunities and challenges involved in knowledge brokering by IT professionals. However, this literature is relatively silent on the description of roles and practices that contribute to effective knowledge transfer among organizational units. The literature on intraorganizational boundary spanning was judged to be more helpful in describing boundary spanning roles, yet a specific focus on the role of knowledge broker is missing in this stream of research. However, discussions of knowledge brokering do appear in theories of situated learning within communities of practice.

This literature also includes consideration of boundary objects.

Boundary Spanning

Based on an open systems view of organizations, the concept of boundary spanning describes activities that occur at organizational boundaries, including internal boundaries that separate organizational subunits. The literature identifies specific practices associated with boundary-spanning roles (Adams 1976, 1980; Katz and Kahn 1978). Boundary spanners provide the communicative linkages that organizational members maintain to "monitor, exchange with, or represent the organization to its environment" (Monge and Eisenberg 1987, p. 313). For example, Aldrich and Herker (1977) identified the search for and collection of external information as primary functions performed by boundary-spanning roles. Boundary spanners serve as both filters and facilitators in information transmittal between the organization and its environment (Adams 1980; Ancona and Caldwell 1988). Boundary spanners, therefore, play an important role in the diffusion of ideas within organizations (Schwab et al. 1985).

The boundary-spanning literature focuses on internal organizational boundaries and roles related to knowledge transfer across internal boundaries. For example, studies of the *gatekeeper* role in research and development teams highlight the importance of individuals who gather and translate information from other departments and disperse it to fellow team members (Katz and Allen 1985; Katz and Tushman 1981; Tushman and Katz 1980). Ancona and Caldwell (1988, 1990, 1992) articulate the additional boundary roles of *scout*, *ambassador*, *sentry*, and *guard*. Scouting involves bringing information and/or resources into a group; ambassadors engage in political activities such as lobbying for support and resources, impression management, and buffering a group from outside pressure; sentries police the boundary by controlling the information and resources that external agents send into the group; and guards monitor external requests for informa-

tion and resources and determine how the group will respond. In more recent research, Yan and Louis' (1999) typology of work unit boundary roles includes *spanning* (importing critical resources), *buffering* (protecting the unit from external disturbances), and *bringing up boundaries* (enabling perceptions of a common task and group climate).

The boundary spanning literature is helpful in identifying and understanding the experiences and challenges encountered by individuals in boundary spanning roles. For example, boundary spanners may face issues related to loyalty and trust because boundary spanning involves interactions with multiple constituencies (Adams 1976). Impression management is also an important issue, requiring boundary spanners to adhere to the (possibly conflicting) norms and expectations of multiple organizational units (Caldwell and O'Reilly 1982). As such, individuals in boundary spanning roles may experience role conflict and stress (Katz and Kahn 1978). Boundary spanning may also require special skills, such as bargaining and negotiation (Adams 1980). Boundary spanners in gatekeeper roles have the potential to acquire power and influence (Aldrich and Herker 1977; Tushman and Scanlan 1981).

Boundary-spanning activities have been identified as an important part of IT jobs, particularly in systems analysis and design (Farwell et al. 1992; Keen 1988). IS research on boundary-spanning has focused primarily on the degree to which IT professionals interact and communicate with people outside of the IT organization and the consequences of these activities for job satisfaction, organizational commitment, and career progression (e.g., Baroudi 1985; Igbaria and Chidambaram 1997; Igbaria et al. 1994). The literature also notes that increased participation of IT professionals in business units requires them to acquire business functional, interpersonal, and managerial skills in addition to technical skills (Byrd and Turner 2001; Lee et al. 1995; Peppard 2001; Rockart et al. 1996).

Although the boundary spanning literature defines many specific roles, it has not explicitly addressed the broker role. Considering Ancona and Cald-

well's (1988, 1992) role descriptions, it is likely that brokers perform an amalgam of roles, including those of scout and ambassador. Perhaps neglect of the broker role is due to the fact that brokers perform their roles not as members of a group but as external agents. Hence, a knowledge broker might simultaneously perform a variety of roles for different groups in an organization. Because brokers typically operate as third parties, rather than as members of source or recipient organizational units, their roles in knowledge transfer differ from those of boundary spanners within those units. Our search for further theoretical guidance in understanding the broker role led to an investigation of the literature on situated learning in communities of practice.

Situated Learning

Theories of situated learning in communities of practice (e.g., Brown and Duguid 1991; Lave and Wenger 1991; Wenger 1998) provide a second source of concepts for the investigation of knowledge brokering by IT professionals. Situated learning is philosophically based in the pragmatist's position that knowledge is defined in relation to specific social contexts rather than absolute (Dewey 1938). Lave and Wenger (1991) and Brown and Duguid (1991) conceptualized the social context of learning as a community of practice, defined as an informal aggregation of individuals engaged in common enterprise and distinguished by the manner in which its members interact and share interpretations (see also Wenger 1998). Within communities of practice, learning is viewed as a process of social participation in which members interact with more experienced members who convey both tacit and explicit knowledge through personal contact (Lave and Wenger 1991). Each community of practice develops a world view local to that particular community which reflects its shared knowledge, values, meanings, assumptions, beliefs, and practices (Brown and Duguid 1991; Dougherty 1992).

Although communities-of-practice theory emphasizes relationships within communities, it also

addresses relationships across communities. As Brown and Duguid observed, knowledge in organizations "is as divided as the labor that produced it. Moreover, what separates divided knowledge is not only its explicit content but the implicit shared practices and knowhow that help produce it" (1998, p. 99). Cross-boundary interactions can thus provide opportunities for learning to occur and "allow the organization to develop collective, coherent, synergistic organizational knowledge out of potentially separate, independent contributions of the individual communities" (Brown and Duguid 1998, p. 97). Three key concepts were drawn from situated learning theory and incorporated into the present inquiry: broker, translation, and boundary object.

In situated learning theory, *brokers* are defined as "individuals who provide connections between communities of practice, transfer elements of one practice into another, enable coordination, and through these activities can create new opportunities for learning" (Wenger 1998, p. 109). This conceptualization of broker differs from the word's common meaning as agent, middleman, or negotiator, although brokers may also engage in these types of activities. Brown and Duguid (1998) used the term *knowledge broker* to describe people who participated in multiple communities and facilitated the transfer of knowledge among them. Our use of the same term in this study is similar to Brown and Duguid's conceptualization, but we apply it across both formal work units and informal communities of practice. The importance of the knowledge broker role is reflected in Granovetter's (1973) argument for the strength of weak ties (see also Hansen 1999). Although knowledge brokers may be weakly linked to several communities at once (and full members of none), they are strategically positioned to facilitate knowledge flow across communities.

The process of *translation* involves framing the elements of one community's world view in terms of another community's world view. Because language is embedded in situated action, the meanings of particular words and forms of speech emerge continuously within communities of practice (Wenger 1998; Wittgenstein 1974). Thus,

words have shared meanings only within specific "communities of knowing" where those meanings are socially constructed (Boland and Tenkasi 1995). For local knowledge to become comprehensible to another community of knowing, its meaning must be translated or transformed (Bechky 2003). Thus, translation becomes a critical function of knowledge brokering because it allows members of two communities to understand each other's language.

A *boundary object* is any object that is relevant to the practices of multiple communities, but is used or viewed differently by each of them (Brown and Duguid 1998). Boundary objects may be "artifacts, documents, terms, concepts, and other forms of reification around which communities of practice can organize their interconnections" (Wenger 1998, p. 107). A crucial quality of boundary objects that facilitates sharing and coordination is their interpretive flexibility, which allows for multiple interpretations and uses by the multiple parties employing them (Henderson 1991; Star 1989; Star and Griesemer 1989). For example, an information system implicated in the work practices of multiple organizational units can become a boundary object. Although groups may relate to the system in entirely different ways, the system may facilitate coordination among the groups that share it. Thus, an ERP system that triggers production plans as soon as sales are closed serves as a boundary object between the sales and production units in an organization. Although sales and production use the ERP system differently, they coordinate their activities through the boundary object without the need to reconcile differences in their local practices. Characteristics enabling an ERP system to serve as a boundary object are modularity (sales and production can attend to specific portions of the system), abstraction (the perspectives of the two groups are served simultaneously by features specific to each unit's perspective), accommodation (the system lends itself to various activities), and standardization (information in the system is prespecified so that its local use does not vary) (Star 1989; Wenger 1998). In similar ways, purchase orders and other business documents have served as boundary objects connecting units within organizations

(Carlile 2002; Wenger 1998). Even tangible definitions that aid in the transformation of knowledge across communities may be considered as boundary objects (Bechky 2003).

In sum, we draw concepts selected from two related research areas relevant to our investigation. The literature on boundary spanning sensitizes us to different roles played by individuals who span boundaries between organizational units, and the literature on situated learning in communities of practice introduces the concepts of knowledge broker, translation, and boundary object. Neither area of prior research offers a complete theoretical model applicable to the investigation of IT professionals as knowledge brokers. Therefore, we designed an interpretive case study to learn about IT professionals' subjective understanding of their roles as knowledge brokers in a large corporation.

Method

Research Site

The research site, given the pseudonym ManDisCo, was a manufacturing and distribution company with 55,000 employees and more than 600 plants, mills, distribution centers, and other facilities throughout North America. Founded in the 1920s, ManDisCo had aggressively pursued growth through acquisitions. As a result of a merger in 1999, the year that the field portion of this research was conducted, ManDisCo assumed a position on the *Fortune* 100 list. The company was ranked in the top half of the *InformationWeek* 500 list of leading IT innovators that year and in *ComputerWorld's* top 100 places to work for IT professionals the following year. Although ManDisCo's businesses were concentrated in a single industry, they represented diverse products and customer markets. Some products were sold as raw material or partially finished components to other businesses, others were wholesaled to commercial customers for resale, and some were sold to retailers under ManDisCo's consumer brands.

The organizational structure of the company was decentralized into operating divisions based on major product lines, with a small centralized group providing basic corporate functions and support to the divisions. The company was vertically "siloeed," meaning that business units operated independently of each other and received minimal direction from corporate headquarters. Functions such as marketing and distribution were replicated within each business unit, and customers of more than one business unit were required to interact independently with each unit. Traditionally, there was little standardization of practices across business units, and very little information was shared across business unit boundaries.

ManDisCo's IT organization followed the federated governance model (Brown 1997; Sambamurthy and Zmud 1999). Each business unit had an IT group that reported to the unit's vice president. A central IT unit headed by a CIO provided support for enterprise-wide systems and IT infrastructures, such as networking services. The CIO had instituted three steering committees with representation from each of the business unit IT groups and the central IT organization. The *executive*, *senior-management*, and *technology* steering committees served as decision-making bodies for IT resource allocation, policies and standards, infrastructure planning, and other major issues. A federated IT organization represents an intermediate position between extensive centralization and extensive decentralization (King 1983). As such, the federated model implies a balance of power (possibly unsettled) regarding the control of computing resources. Historically, conflicts had occurred between the corporate and business unit IT groups, due partly to the preference of IT professionals in newly acquired business units to remain independent of corporate influence. However, those relationships had improved during the tenure of the current CIO. The IT steering committees had generated constructive dialog between corporate IT and the business unit IT groups. Although significant progress had been made, strengthening the relationships between corporate and business unit IT groups continued to receive corporate attention.

ManDisCo's applications portfolio included both custom-built information systems and commercial packages, some "off the shelf" and some highly tailored. The applications supported the manufacturing processes and a wide range of processes associated with traditional business functions. The implementation of enterprise-wide systems had been particularly difficult due to the decentralized, siloeed nature of the company. Although implementation of SAP's ERP software within individual divisions had been successful, an enterprise-wide SAP initiative sponsored by the previous CIO had been a costly failure. At the time of the study, two major applications had been installed enterprise-wide: a human resources (HR) system and a financial system (general ledger, accounts payable, accounts receivable, etc.). Both system projects had similar goals: to replace disparate and incompatible local systems with enterprise-wide applications. By 1999, approximately half of ManDisCo's employees were covered by the new SAP HR system, and the number of different financial systems in use had been reduced from 130 to two.

The primary criterion for selecting ManDisCo as the study site was its potential to support an investigation of knowledge brokering practices by IT professionals. ManDisCo was not selected as a typical or representative organization from which to generalize, but rather for its potential to generate understanding of the knowledge broker role. In other words, ManDisCo was chosen using the criterion of theoretical sampling (Mason 2002; Stake 1998; Yin 1994). In particular, because of its siloeed business units and federated IT structure, ManDisCo was expected to be an organizational context in which brokering potential existed. Moreover, the case provided ample opportunity to *disconfirm* our expectation that IT professionals could perform brokering activities (Dubé and Paré 2003; Markus 1989; Silverman 2001). That is, effecting knowledge transfer at ManDisCo was expected to be challenging due to the company's decentralized structure. Barriers to internal knowledge transfer are high in organizations where business units have been autonomous and independent (Carlile 2002). To the extent that partici-

pants practiced knowledge brokering, therefore, we expected their descriptions to provide a sufficiently rich and contextualized foundation for understanding the phenomenon.

Although such a disconfirmatory sampling strategy is primarily associated with positivist theory testing, its underlying principles also serve the interests of interpretive researchers. In interpretive research, phenomena such as knowledge transfer are construed as socially constructed within a local social context rather than as objective characteristics with universal application. Interpretive studies seek subjective understandings of the conditions, practices, and consequences of social action as expressed by participants in their particular social context. Like all qualitative research, interpretive studies aspire to reveal complexities, nuances, and details that are commonly omitted in quantitative studies (Klein and Myers 1999; Mason 2002). ManDisCo provided a theoretically relevant organizational context for studying knowledge brokering due to its decentralized structure and the presence of a corporate IT group involved in the design and support of information systems that were shared by relatively autonomous business divisions.

Data Collection

The primary data collection method was semi-structured interviews, which were conducted by the first author at ManDisCo's corporate headquarters. Entry was negotiated with the CIO, who authorized interviews to begin at the highest level and to proceed down the chain of command. Informants were selected by referral from those interviewed earlier. Interviews were approximately one hour in length and were tape-recorded. A list of topics drawn from the literature areas reviewed earlier was used as an interview guide (see Appendix A). Data collection continued until theoretical saturation was reached, that is, when the incremental insights provided by additional interviewing were judged to be insignificant. Because the objective of the study was to understand how IT professionals subjectively understood their work to include knowledge brokering, all except one of the

23 informants were IT professionals. The one non-IT respondent was the corporate vice president of Human Resources. The IT informants represented both the corporate and business unit IT groups, and levels of responsibility ranged from group directors with responsibility for several hundred IT professionals to business system consultants with no supervisory or management responsibility. Table 1 provides a summary of informants by organizational location and job title.

Analysis

Data analysis proceeded iteratively between examinations of data and development of theoretical interpretations. In this hermeneutic process, analysis of respondents' individual statements represented the *parts* while the evolving conceptual framework represented the *whole* (Klein and Myers 1999). In concert with the principle of dialogical reasoning (Klein and Myers 1999), prior research literature informed the analysis but a variety of other theoretical interpretations were considered as the analysis continued. Dialogical reasoning facilitated the emergence of new insights, which eventually coalesced into a set of coherent themes that were linked with, but not constrained by, prior theoretical frameworks. These themes comprised the elements of the conceptual framework that resulted from the analysis.

In accordance with recommended qualitative research practice (Mason 2002), data analysis was conducted in parallel with data collection, allowing each process to inform the other. The goals of the initial data analysis were to understand the participants' experiences and to discover categories, relationships, and patterns in the data. Analysis of interview data consisted of three steps. First, handwritten notes taken during interviews were reviewed immediately following each interview, and margin notes were added. Second, interview tapes were transcribed, and additional insights that occurred during transcription were noted. Third, interview transcripts were re-read and margin notes added to the printed transcripts. These steps provided multiple opportunities to reflect

Table 1. Informants by Job Title and Organizational Location

Job Title	Organizational Location
<i>Senior Executives</i>	8 IT Support—Corporate Systems
3 Group Director, Information Resources	7 IT Support—Business Units
1 Vice President, Human Resources	5 IT Support—Human Resources
<i>Senior Managers</i>	1 IT Strategy, Planning, and Design
7 Director, Information Resources	1 Y2K Projects
5 Senior Manager, Information Systems Development	1 Human Resources—Corporate
<i>First-Line Managers/Supervisors</i>	
3 Manager, Information Systems Development	
<i>Individual Contributors</i>	
2 Lead Analyst	
2 Business Systems Consultant	
<i>Total = 23 informants</i>	

upon the data, generating initial insights as part of a coarse-grained analysis. Subsequent interviews were conducted to follow up on those insights.

A more detailed coding of the interview data was undertaken following the completion of all interviews. First, interview data were coded to reflect constructs that were both drawn from the literature and surfaced as new constructs during the analysis. The latter, emergent constructs related primarily to the specific work practices of IT professionals. All interview transcripts were coded, tagging text segments as short as one sentence or as long as several paragraphs with one or more codes based on their content. Additional notes were added to the coded transcript document to record the rationale for the code assignment and to record new insights.

In the final steps of the analysis, notes from all previous steps were examined to identify a set of major themes (Patton 1990). These themes were combined as a conceptual framework for understanding the knowledge brokering process as practiced by IT professionals at ManDisCo.

Because the process of data analysis provided multiple opportunities to review the plausibility and consistency of the logic underlying our interpretations, the resulting framework meets established criteria for the credibility and authenticity of qualitative research (Miles and Huberman 1994).

Results

Table 2 lists the 12 themes resulting from data analysis, classified into four categories. The first category, position of IT professionals, includes five themes related to the positioning of IT professionals in relationship to user organizations. The second category, shared systems as boundary objects, includes a single theme that pertains to knowledge brokering associated with the support of shared information systems. The four themes in the third category, brokering practices, describe specific practices used by IT professionals in knowledge brokering. The fourth theme, consequences of brokering, identifies the effects of knowledge brokering in two organizational con-

Table 2. Themes Identified in the Data

<p>Position of IT Professionals</p> <ul style="list-style-type: none"> • Learning the work practices of IT users • Being heard: Earning a seat at the table in IT user organizations • Mobility across organizational boundaries • Forming partnerships with users • Breadth and depth of view
<p>Shared Systems as Boundary Objects</p> <ul style="list-style-type: none"> • Knowledge brokering related to shared system support
<p>Brokering Practices</p> <ul style="list-style-type: none"> • Crossing boundaries • Surfacing and challenging assumptions • Translation and interpretation • Relinquishing ownership: Maintaining the façade of objectivity
<p>Consequences of Knowledge Brokering</p> <ul style="list-style-type: none"> • Facilitating knowledge transfer between IT and user organizations • Facilitating knowledge transfer between and among user organizations

texts. Each of these themes is described in more detail below, along with supporting evidence from the interviews.

Position of IT Professionals

In order to broker knowledge, IT professionals explained that they positioned themselves in ways that enabled them to participate in the work units of their “customers,” that is, the users of IT. They learned about the work practices of the user communities by observing the work of IT users, an activity described as “shadowing” and as “spending a day in the life of your customer.” In addition, IT professionals actually performed tasks in a users’ department, described as “doing a chore of the department.” IT professionals were able to participate credibly in their users’ organizations because many IT position requirements included user domain knowledge. For example, several members of the corporate IT group supporting financial systems had accounting degrees in addition to their technical skills. IT professionals also took classes to learn skills

needed in users’ work, even including activities such as driving a forklift truck.

Systems projects provided IT professionals with opportunities to participate in users’ organizations, giving them direct access to system artifacts such as programs and user documentation. Attending regular user staff meetings was one of the most sought and valued learning experiences. As a director of corporate information resources explained,

We sit with our users. So every day is a knowledge transfer. I have people throughout this whole building, sitting there, knowing the business, being able to talk their language, to be able to interpret what they’re asking for. (Director, Information Resources—Informant #4)

The expression “earning a seat at the table” described the result of penetrating user organizations so that IT professionals could participate more effectively in users’ operations.

[The CIO] himself has only begun to learn the business within the last year or so—to put energy and time into learning the business. That's helped him get a voice and a seat with some of these divisional groups. (*Director, Information Resources—Informant #15*)

Another respondent stated that he had worked hard to gain acceptance as a participant in the IT user organization:

I try to really take a personal interest and personal stake in what the business is trying to do. And I get involved in a lot of stuff that in some cases has nothing to do with [Information Resources]. I attend all their sales meetings. When plant managers get together I attend the meeting with them. All the time helping do things—little things even. Just trying to help where I can. (*Senior Manager, Information Systems Development—Informant #18*)

He pointed with pride to a Chairman's Award plaque given to him by one of the business units that he supported, noting that he was the first IT manager to receive this type of award in that division.

IT professionals also had access to top management of the corporation.

Very few people get a chance to work with the CEO, to work with the CFO. I meet with the CFO on a regular basis.... I get to meet with 14 other officers. Very few people get to meet with that many officers on a regular basis. (*Group Director, Information Resources—Informant #7*)

The self-perception by IT professionals was corroborated by the observations of the vice president of Human Resources, the only non-IT person interviewed. Because the business units all required IT services, IT professionals were continuously involved in the work of the business units. In many cases, this involvement entailed

absorbing business knowledge and passing it on to others in the organization.

Yeah, because everyone has some sort of system they're using—so they're either using a computer system or need some type of training or something like that. (*Vice President, Human Resources—Informant #17*)

Although the majority of ManDisCo's IT professionals maintained membership in IT groups, some were directly assigned to user organizations where they were considered insiders rather than outsiders. In other cases, business unit employees moved across organizational boundaries into an IT group as part of their career paths. For example, it was common at ManDisCo for business unit members of ERP implementation teams to make career transitions into IT at the conclusion of the project. This practice allowed IT professionals to learn through participation in their users' organizations before joining the IT organization.

Not all IT professionals demonstrated a desire to participate in user communities. Some even opted out of participation by feigning ignorance of business practice.

The other side of it is an IT person who doesn't let on that they understand business. It just may be that they come in and out of the game when they like it. Because there's a lot of the "business game" that you have to play....and I think they play that game. I think when they don't like what's going on, they don't agree with something, they'll act like "I don't understand what's going on. That doesn't fit in my world." (*Director, Information Resources—Informant #13*)

Although participation was identified as a key activity of ManDisCo's IT professionals, their participation was not always welcomed by IT users, who sometimes limited or denied IT professionals' access to their organizations. For example, working with a group of internal auditors proved to be a challenge for the IT group.

When we first started working with them, you had to ask a lot of questions to figure out what they're doing....But they had a really hard time with that. And the auditors are very funny characters. They're not trusting at all. (*Manager, Information Systems Development—Informant #3*)

Despite such difficulties, IT professionals maintained that their position in the organization provided extensive access to knowledge from all of ManDisCo's divisions.

In sum, IT professionals at ManDisCo reported acquiring a position in the organization that provided credibility with users and opportunities to acquire and transfer business knowledge. Because ManDisCo's systems spanned organizational boundaries, strategic issues necessarily involved corporate IT. With their connections to IT professionals in the business units and their mobility to cross boundaries and rotate assignments, IT professionals saw themselves positioned advantageously to broker organizational knowledge.

Shared Systems as Boundary Objects

Knowledge brokering by IT professionals was facilitated by shared information systems, which served as boundary objects. Shared systems and related artifacts (e.g., system documentation, user training materials) served as boundary objects because they were shared by multiple user organizations. Thus, the shared system was situated in multiple work practices, where it played different roles and embodied different meanings. These boundary objects provided the technology conditions for IT professionals to interact with multiple work practices at ManDisCo. Users depended upon IT professionals for their knowledge of systems and their ability to identify the system implications of business decisions. A director of information resources observed that IT issues were common to all business decisions, thus making IT professionals' participation in meetings an important opportunity for knowledge brokering.

There's never been a business meeting that I'm aware of that didn't have some kind of system implication in some way, shape, or form. And invariably they call in the IT people to describe how this process and system work so that they can know how to proceed. (*Director, Information Resources—Informant #13*)

From the IT professionals' perspective, organizational knowledge was embedded into the systems shared by user communities. The IT staff, in effect, held the "keys to the kingdom" with their comprehensive access to information on pricing, manufacturing capacity, employee compensation, and so on. Although other organization members might be denied access to those kinds of data, it was available to IT professionals through their interaction with the information systems. In this position, IT professionals were sometimes asked by users to explain certain aspects of user operations as reflected in their information systems. A group director for information resources explained,

We are called upon by users to re-explain the business rules. Over time they become disconnected from how the systems function. People change in the business unit—turn over—so the knowledge of the business rules is lost or becomes distorted. Over time the knowledge diverges. The knowledge is more stable in the IR group because the ultimate holder of the knowledge is the system itself. We hold the knowledge. If we don't know the business rules, we can look them up in the programs. Every six months it seems we have to do a refresher course for the user. (*Group Director, Information Resources—Informant #15*)

In providing these reminders, brokers claimed not to explain to users how their businesses *should* be run. Rather, they purported to offer insights into how the businesses *did* run and "pushed back" when they sensed that users were abdicating their responsibilities.

What happens is we end up with the greatest, or the largest, common denominator of knowledge. And consistently they'll say, "Well, how is this report generated?" "How is this report calculated?" We have to constantly push back and say, "No, we don't tell you how to run the business. We make sure the system follows *your* business rules." We can tell you what it's doing today, but they should know how it's working for them. (*Director, Information Resources—Informant #7*)

The integration of systems and data created new interdependencies among user organizations, and the central position of corporate IT created new opportunities for brokering through boundary objects. For example, IT worked with both Accounting and Operations in gaining agreement to build an integrated manufacturing reporting system. A senior manager of information systems described the brokering process as follows:

I guess it's kind of like the two houses of Congress. Each one came out with their own bill, and then you got a bipartisan committee together to work it out. So we figured out what each group wanted and discussed the various alternatives with both. So we sat everybody down and said, "Okay, guys, here's kind of where we're still apart. Let's come to some mutual conclusion on that." They hammered it out and got agreement. (*Senior Manager, Information Systems Development—Informant #18*)

ManDisCo's environmental information system (EIS) illustrates how shared systems functioned as boundary objects. The system encompassed a variety of subsystems, such as air and water quality monitoring and reporting, tracking of hazardous materials used in manufacturing processes and products, and information related to environmental regulations and legislation. Each subsystem of the EIS was created as an independent information system, but they were later integrated through a single shared database. In their efforts to support the EIS, IT professionals

interacted with a variety of users in three departments and end users at 13 remote locations. These users—primarily engineers, lawyers, lobbyists, and auditors—were from different professional disciplines, and they only interacted with each other through their shared use of the EIS. A key issue for the IT professionals who supported the EIS was to learn the work practices of each user organization. Because each organization had specialized domain knowledge, learning entailed not only acquiring general knowledge of these domains but also its application in ManDisCo.

Brokering through the boundary object of a shared system required getting members of one user organization to understand and to accept changes in their practice necessitated by system changes needed by another user. The manager of the IT group supporting the EIS observed:

There have been occasions when changes have been made and requested by other groups that have impacted the audit system. And so typically I've got X who's the director over there [the legal department], and Y who's one of the auditors, and I've got Z who's an air engineer, and I've got to get them into the same room. And they don't talk the same language. They don't even like each other. This group has a hard time communicating anyway. And there are times when we go round and round. (*Manager, Information Systems Development—Informant #3*)

Thus, shared information systems provided the opportunity for IT professionals to engage in a variety of brokering practices, described in more detail next.

Brokering Practices

Four specific practices of knowledge brokering emerged as themes in the data analysis: *crossing boundaries, surfacing and challenging assumptions, translation and interpretation, and relin-*

quishing ownership. Collectively, these practices were seen by IT professionals as instrumental to their ability to transfer knowledge from one organizational context to another.

Crossing Boundaries

Traditionally, ManDisCo's business units functioned "almost as independent little companies," and boundary-crossing in general was a rare event that aroused suspicions. One respondent characterized the communication across divisions as follows:

If you're a person coming from another division unit, the first question is, "Why do you want me to know this? There must be something in it for *you* that you want me to do this." Culturally, I think that's probably the biggest barrier to knowledge transfer. (*Group Director, Information Resources—Informant #7*)

By contrast, IT professionals at ManDisCo viewed their own boundary-crossing as generally accepted and encouraged, and they routinely crossed boundaries, shared information and leveraged resources. They saw this as an important function of their role in the organization:

Information Resources has ultimate responsibility *and* the ability to communicate across those department boundaries....That's my responsibility. (*Manager, Information Systems Development—Informant #3*)

They've relied on us to leverage any business processes that are best practices, that may have been developed in one division, to bring those over into another division. (*Director, Information Resources—Informant #16*)

In explaining this freedom, IT professionals and others viewed IT as an issue common to all business units because business processes and information systems spanned organizational bound-

aries. The acceptance of boundary-crossing by IT professionals was explained from the perspective of a non-IT executive:

Our business units function almost as independent little companies....[If] you have IR groups supporting each of those, you could have some lost synergies because of the fact that they do operate so independently. You really have to make an effort as an IR community, or an HR community, to get together and say, "This is what's an issue in our organization. Is this an issue in yours?" (*Vice President, Human Resources—Informant #17*)

Thus, IT professionals exerted considerable effort in gaining permission from business units to cross organizational boundaries in ManDisCo that were closed to other groups.

Surfacing and Challenging Assumptions

Deliberately asking *why* was a tactic that IT professionals used to stimulate the examination of assumptions underlying work in ManDisCo's divisions. By surfacing assumptions, opportunities for improvements in work processes became more apparent. As one director of information resources explained,

We try to coach and build into our IR people that you ask *why*. Keep asking *why*. Not in a rude, challenging way, but say, "Explain to me *why* you need to do things that way—printing bills of lading a week ahead of time. *Why* can't you print a bill of lading when the truck arrives? Our systems can do that now." And you get the users starting to think, "Well, maybe I *can* change my processes." (*Director, Information Resources—Informant #16*)

Respondents mentioned several reasons why IT professionals were able to stimulate reflection and change. First, IT professionals had knowledge of

IT capabilities that users lacked, which could stimulate creative thinking about changes in users' business processes. Second, IT professionals had more time than users to reflect on the assumptions underlying daily routines. Third, IT professionals typically had a wider view of business processes than users because they could look beyond a particular division to see its operations in relation to other divisions. Because some business processes spanned multiple organizational units, IT professionals could challenge assumptions underlying a particular user's work practice based on how other divisions handled similar processes.

Translation and Interpretation

IT professionals at ManDisCo acted as translators, framing elements of the world view of one IT user group in terms of the perspective of another. This required them to be multilingual—conversant in the languages of multiple user organizations. A senior manager of information systems development described a case involving two departments that customarily used their own jargon.

Legal will explain things from a legal perspective and use a lot of legal acronyms, jargon, terminology. Risk Management may not fully understand that. It's a good idea to make sure that a translation is occurring. And then in some cases even come up with a third way of saying it so that translation isn't required—it's common English language. (*Senior Manager, Information Systems Development—Informant #12*)

The ability of IT professionals to provide translations was acknowledged by executives outside of the IT area, as reflected in the following comment from the vice president of Human Resources.

In looking at the IR professionals that I've worked with, I can see where they're having to translate. Especially the team leads or maybe the senior systems analysts who are working very closely

with business units—trying to absorb the business knowledge, and then translate that to somebody who is actually developing a system or program.

I think the Information Resources is a higher level of translation because you have people who are very technical—they're coding and keying trying to develop something. And you're translating from what the business is to a product. (*Vice President, Human Resources—Informant #17*)

IT professionals thus viewed themselves as both translators and interpreters—reframing, explaining, and clarifying information in the context of the work practice of a particular group. Because each group's meanings were situated in their own work context, IT professionals needed to be aware of the differences in meanings of the same words, or the same word used differently, and forms of speech used by different organizations. This allowed them to interpret the actions of one organization for the benefit of another, as the following example illustrates.

Just the other day Accounting came up with something that they wanted do, and they were just adamant that they wanted to do it. And I went to the Sales guys and said, "Do you understand what this means and how this is going to affect you?" Because Accounting had already run it by Sales...supposedly. And so when I sat down and really laid it out to them as to what that really meant, they said, "No, there's no way we're going to do that." (*Senior Manager, Information Systems Development—Informant #18*)

Their credibility as translators and interpreters required knowledge of the perspectives of each user group, the ability to situate the meaning and significance of information in its context, and the ability to communicate those meanings and their significance to other groups.

Translation and interpretation were also seen as important in bridging IT and user organizations.

Credibility and trust could be undermined if IT professionals used the specialized language (referred to as “techie-speak”) of their IT practice instead of the language of the user. Failure to speak the user’s language meant that an IT person was considered to be “just an IT person,” thereby losing the user’s respect and attention.

Although translation might be considered as an activity primarily involving lower level IT professionals involved in technical details, the number of comments made about translation by IT managers and lower level professionals was roughly proportional to the number of informants in the sample (15 managers to 7 professionals). This suggests that translation was seen as an activity that was basic to knowledge brokering throughout ManDisCo’s IT organization.

Relinquishing Ownership

Although IT professionals could introduce new ideas and propose projects, they lacked the autonomy to implement new IT capabilities without the approval and sponsorship of the organizational units they supported. User commitment was thus seen as critical to the success of IT initiatives. A challenge that IT professionals faced was promoting their proposed solutions to users’ problems while securing user ownership of those solutions. A strategy that IT professionals employed was to create the illusion that they were impartial and prepared to implement any solution requested by the user, even though they favored a particular outcome. As a senior manager of information systems development explained,

One of the philosophies I learned early on is I never want it perceived that IR is pushing a system...ever. (*Senior Manager, Information Systems Development—Informant #18*)

This façade of impartiality was not always easy to maintain, especially when IT professionals were truly passionate about particular technology solutions. In some instances, respondents revealed condescending attitudes toward users as

evidenced in remarks like “giving them what I think they need” and “how do I bring enlightenment to them?” When faced with users who needed more persuasion, IT professionals at ManDisCo built cases to generate support for their favored project proposals while ostensibly giving up ownership. As a group director of information resources explained,

I have to build a case whereby they should know this—why they should value it or why they need to know this. I’m building a business case for that knowledge transfer to happen. Find out what people need first. Find out what their personal agendas are. And then you can find out how to sell something to them. (*Group Director, Information Resources—Informant #7*)

IT professionals were especially sensitive to the need to appear impartial in situations involving multiple IT user organizations because they did not want to be seen as “taking sides.”

We even have to evaluate how we have to facilitate because we don’t want to step on anyone’s toes. We’ll just guide it from the sidelines. (*Senior Manager, Information Systems Development—Informant #12*)

Thus, although IT professionals acknowledged their own agendas, their goal was to be perceived as silent partners in initiatives led by IT users.

Consequences of Knowledge Brokering

As a result of their position in the organization, the presence of shared systems as boundary objects, and their specific brokering activities, IT professionals at ManDisCo saw themselves as moving knowledge from one part of the organization to another. This occurred in two different contexts. First, IT professionals engaged in knowledge transfer across the boundaries separating IT work

units from the users' work units. The knowledge transferred from IT to the user was often an IT solution initially provided for a different user group, thus leveraging IT solutions across the enterprise.

They [business units] have to make it, they have to ship it, they have to track it. They may be focusing on a different set of top 10 [IT application projects] than somebody else, so we just try to share it around.

For example, Business Unit A had some issue and discovered that there was a report on inventory on hand, but the way we were reporting didn't tell them when something was in transit. And when we are oversold, then...[it] is important to know where [each ton] is. So all of a sudden she said, "I need an 'in transit' report. I need to know what's in between because that's product that I can commit." So we put that together and said, "Oh, Business Unit B probably needs the same thing and just hasn't had the problems yet to request it." So then we'll tell Business Unit B, "There's this in-transit report we put out there. You might want to take a look at it." (*Director, Information Resources—Informant #8*)

Knowledge was also transferred from users to IT professionals. Understanding the practices of IT users was seen as critical to IT work, and some IT professionals were actively involved in transferring this knowledge to the IT community. For example, the position of "business technologist" was established to support the SAP HR system and to provide coordination between groups like Payroll and Benefits and the IT development group. This boundary spanning position formalized the role of knowledge transfer in corporate IT. ManDisCo's corporate IT strategy and planning organization played a similar boundary spanning role at the enterprise level, as described by the manager of that group.

So we really go from the business to the core of our technology, and facilitating

across that whole chain. We provide information to our business units which gets to our executives. Part of the staffing strategy for the group is to have senior people who know the business and who know technology—each one to varying levels – but can really work with senior management across the company as well as the IT folks to get things done. So there's a lot of business knowledge that gets transferred to the technical staffs, and technical knowledge that gets transferred to the business. (*Director, Information Resources—Informant #13*)

In the second context, IT professionals acted as brokers between two or more user organizations. A group director of information resources noted that, although Corporate IT supported multiple divisions that served different channels and manufactured different products, many of the problems they needed to solve were the same.

And given the size of our company, there are very few issues that we run into that one side hasn't addressed already or is in the process of addressing. (*Group Director, Information Resources—Informant #9*)

One way that IT professionals facilitated knowledge sharing was by connecting user organizations that were dealing with similar issues.

Many times I've been with one officer who's talking about something, only to find that there's another officer over here who's trying to do the same thing. I'll hook two officers together. If someone in Environmental is having problems with insurance policies, and someone in Risk is trying to do a model...a linear model on insurance policies, you hook the two together and they can provide resources to each other. (*Group Director, Information Resources—Informant #7*)

Initiatives to link user groups were also driven by opportunities to benefit the enterprise rather than support specific groups.

Divisions are so interested in accomplishing their goals, not necessarily interested in the other. Whereas IR, where we tend to be interested in accomplishing what [ManDisCo] needs to accomplish. So we do play a role there in bringing groups together. And because we're so interested in operating in projects, we'll bring unlike entities together and try to mesh them together for a common goal or a common reason. (Senior Manager, Information Systems Development—Informant #12)

Thus, as illustrated by these examples, brokering by IT professionals was understood to provide bridges between IT and its user departments and bridges among different user departments.

Discussion

The findings of this study provide a detailed account of the role that IT professionals play as brokers of organizational knowledge within the context of the case study organization. Within ManDisCo's federated governance structure, IT professionals were positioned as brokers between IT and user communities and among user communities. The primary activity through which IT professionals became brokers was participation in their user communities. By interacting with multiple communities, IT professionals were able to bridge traditional boundaries separating business units. The presence of shared information systems as boundary objects was centrally important to IT professionals' brokering of both IT and business knowledge. Specific brokering activities included gaining permission to cross organizational boundaries, surfacing and challenging assumptions behind users' current and proposed processes, translating and interpreting across business units, and relinquishing ownership of IT solutions to users. These work practices were seen as instrumental in the transfer of knowledge within ManDisCo's decentralized organization.

Figure 1 summarizes these results in the form of a conceptual framework showing the structural con-

ditions for knowledge brokering by IT professionals, the technical condition of shared information systems as boundary objects, the practices of knowledge brokering, and the consequences of knowledge brokering for the organization. As shown in the top part of Figure 1, brokering by IT professionals is conditioned by the organization's decentralization and its federated IT governance structure. We position shared IT systems as boundary objects within the level of structure to acknowledge the structural characteristics of information systems (Orlikowski 1992; Orlikowski and Robey 1991). By providing a common infrastructure for data and information processing, and by embedding business processes into technical infrastructures, shared systems as boundary objects provide "an infrastructure or process where current and more novel forms of knowledge can be jointly transformed, producing more shared knowledge" (Carlile 2002, p. 453). Indeed, without shared systems, IT professionals would have little opportunity for ongoing interaction with members of multiple business units.

The structural and technical conditions for knowledge brokering enable specific practices exercised by IT professionals, shown in the lower part of Figure 1. These practices are shown to affect the structural level by redistributing knowledge in the organization. The arrows in Figure 1 do not designate causal relationship in the sense of treating structural conditions as variables that cause brokering practices. Neither should brokering practices be interpreted as necessary and sufficient causes of knowledge transfer. Rather, structure and practice are mutually implicated in the social process of knowledge brokering.

The format for our conceptual framework is similar to those used in earlier research by Barley (1986), Orlikowski (1993), and Sahay and Robey (1996). The rendering of structural conditions and action in a reciprocal relationship is based in a perspective which conceives of social structure and human agency as interdependent constructs (for examples, see Orlikowski and Robey 1991; Reed 1997). Structure and agency are necessarily interdependent because structures can be reproduced or transformed only through agency, and

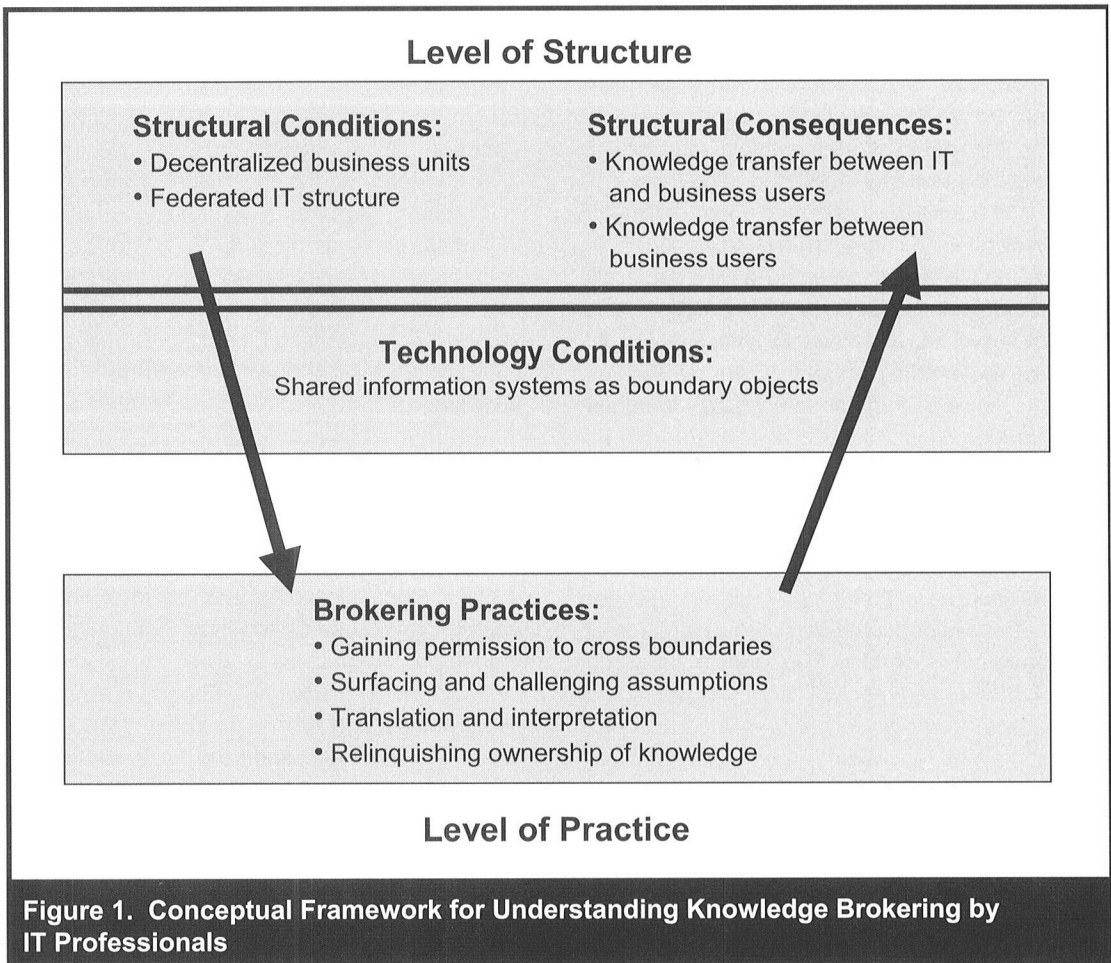


Figure 1. Conceptual Framework for Understanding Knowledge Brokering by IT Professionals

human agents are simultaneously enabled and constrained by social structure. Conceiving of structure and agency in this way shifts the focus away from each separately and emphasizes their interdependence without merging them into a single entity (Reed 1997). Thus, the brokering practice of crossing boundaries would make no sense without reference to the structural condition of organizational boundaries. Likewise, relinquishing ownership is a practice that is not interpretable without reference to the structurally distinct departments that might claim ownership. In sum, Figure 1 portrays an interpretation of knowledge brokering as a process that, while separated into components for the sake of analysis, implicates those components in a reciprocal relationship rather than as independent entities.

The framework sensitizes us to the conditions under which the brokering role might be assumed by IT professionals and gives insights into the kinds of activities that comprise the role. Surprisingly, the role of knowledge broker is largely missing from the literatures on intraorganizational knowledge transfer and boundary spanning, which focus upon roles such as ambassador and sentry that operate within organizational units. By contrast, our study focuses on the roles of intermediaries who, by virtue of their peripheral association and loose ties with multiple units, serve as brokers of knowledge across those units.

The framework also draws theoretical attention to the boundary objects in knowledge brokering. Although boundary objects have been identified as

interfaces between communities of practice (Wenger 1998), relatively few studies have investigated how they actually function in knowledge transfer. Our analysis considers boundary objects to be an important yet often overlooked technical condition for knowledge brokering. The shared IT systems at ManDisCo presented opportunities for IT professionals to interact with business units. In addition, those systems served as the technical structures that housed new knowledge and business practices as software routines that could be shared across the company. This interpretation supports views of boundary objects as infrastructures through which forms of knowledge can be transformed and shared (Bechky 2003; Carlile 2002).

Our results also extend Wenger's (1998) concept of *translation* as a brokering practice. Wenger defined translation as the framing of elements of one community's world view in terms of the world view of another community. Our findings suggest that brokering requires not only translation but also evaluating and explaining the relevance and significance of translations to the recipient's practice, thereby reducing causal ambiguity (Bechky 2003; Szulanski 1996). Evaluating and explaining require knowledge of the recipient's potential uses of knowledge, reinforcing the importance of participation in user communities. In our study, knowledge brokers sought to reduce causal ambiguity by explaining the relevance of knowledge acquired in one part of the organization to another's practice. This aided the ability of members of the receiving community to evaluate and assimilate outside knowledge, thereby increasing absorptive capacity (Cohen and Levinthal 1990). Knowledge brokers, therefore, contributed to knowledge transfer not only by translating knowledge but also by aiding in the interpretation of that knowledge.

The consequences of knowledge brokering by IT professionals is the transfer of knowledge between organizational units. The framework identifies two relevant contexts: the transfer of IT knowledge between IT and users, and the transfer of business knowledge among users in different business units. To date, the IS literature has recognized the

transfer of knowledge from IT departments to user departments. Indeed, relationships with users have been a primary interest of IS researchers seeking to understand systems development (McKeen et al. 1994b) and IT governance (Sambamurthy and Zmud 1999). However, few investigators have recognized the potential role of IT professionals as brokers of general business knowledge among business units. As the proliferation of shared systems continues, IT professionals will probably find themselves increasingly positioned to serve as brokers of organizational knowledge.

Evaluation

It has become accepted practice for authors of interpretive field studies to offer a self-evaluation of their conformance to established principles for evaluating their work (e.g., Davidson 2002). In conformance with Klein and Myers' (1999) principles, we have described the hermeneutic process of data analysis, which brought several theoretical perspectives into play and which resulted in an abstract and generalized conceptual framework. Moreover, the results of this study are grounded in the context of ManDisCo, whose structural features and systems are described in sufficient detail. We have also explained the relationship between the researchers and the case site: we entered the site as researchers seeking to learn from participants. We possessed no hidden agendas to surface contradictions in practice or reveal deeper issues than understanding the role that IT professionals play as knowledge brokers.

The study also provides a sufficient level of engagement with the IT artifact (Orlikowski and Iacono 2001). Although our investigation was not expressly about the design and use of complex systems, it is essential to understand the nature and scope of shared systems in a large decentralized organization. Through numerous examples, we have shown how shared systems serve as boundary objects, allowing IT professionals to perform their knowledge broker role. In contrast to isolated systems housed in divisional units, shared

systems cross organizational boundaries and help legitimize the presence of IT professionals in different user areas. Showing the importance of the IT artifact to knowledge brokering is a novel contribution of the present study.

Of Klein and Myers' principles for evaluating interpretive field studies, two remain as areas where the present study could perhaps be strengthened. First, the principle of suspicion prompts researchers to doubt respondent reports as superficial and to probe more deeply for underlying issues. As our results show, most of the respondents provided a favorable portrait of their activities as knowledge brokers, and most reports reinforced each other despite coming from various levels of managerial and professional ranks. The resulting impression is that ManDisCo's IT professionals were a homogeneous group eager to impress the researchers with positive accounts of their knowledge brokering activities.

Our suspicions in this regard were partially mitigated by careful examination of the interview transcripts for contradictory evidence, which we have reported in the results section. IT professionals did acknowledge that their efforts were sometimes insincere, as when erecting a façade of indifference regarding users' IT solutions. Some IT professionals revealed condescending attitudes toward users, which contradicted reports of serving user and corporate interests above self interests. Furthermore, IT professionals reported that they sometimes feigned ignorance of business issues to avoid becoming involved in them. These candid reports suggest that the reports in our interviews were not limited to a single, positive view of IT professionals' activities. After resolving our suspicions, our overall impression is that ManDisCo's IT professionals' views about brokering were uniform and shared across occupational groupings and levels of the IT organization.

Klein and Myers offer a principle of seeking input from multiple participants in an interpretive case study. Our research emphasizes the subjective understandings held by one primary group of participants (IT professionals). Interpretations by

IT professionals of their own activities, however, may differ from the interpretations of other members of the organization. For example, we have reported evidence that knowledge brokering was seen differently by ManDisCo's internal auditors, who did not see IT professionals as trustworthy. We have also reported evidence from the vice president of Human Resources that the activities of IT professionals were welcome. These divergent views are not surprising, yet they raise questions about the responses of other organizational units to IT's brokering activities. Future research might investigate knowledge brokering from the vantage point of the business units, to whom knowledge was purportedly transferred, rather than relying so heavily upon reports from IT professionals.

In sum, this research identifies the conditions, practices, and consequences surrounding the role of knowledge broker, as played by IT professionals. Our contributions are to explain how IT professionals may be positioned to perform this role, the relevance of information systems as boundary objects, the practices that comprise the knowledge broker role, and the consequences of knowledge brokering. Perhaps the most important development in the organizational uses of IT that conditions the role of IT professionals as knowledge brokers is the deployment of shared information systems. Shared systems provide the opportunity for IT professionals to enter multiple organizational units and to transfer both technical and business knowledge across an enterprise. Notably, it is the combination of the technical boundary object and the human brokering activity that achieves knowledge transfer. Neither technology nor human intervention alone would be likely to account for knowledge transfer.

Conclusion

The trends toward integration and standardization in corporate information systems have significantly changed the context for system support in organizations. As these trends continue, it is appropriate to reevaluate the role of IT professionals who

design, implement, and support shared systems. IT professionals have played a significant role in the knowledge management programs that became popular during the 1990s. However, their role has been restricted to building and maintaining tools for capturing and distributing organizational knowledge. Our findings suggest a broader role: IT professionals as brokers of organizational knowledge. The case study reported in this paper reveals how IT professionals in ManDisCo understood their roles as knowledge brokers. They were in a strategic position to transfer knowledge among user communities that were historically isolated from each other. The case portrays a multifaceted picture of brokering by IT professionals, in which shared information systems played key roles as boundary objects. By connecting isolated units with shared systems, IT professionals play a potentially key role in transferring knowledge across organizational boundaries.

Viewed in this way, brokering is a critical element in facilitating the ongoing *convergence* between shared systems and the practices that they connect. Star et al. defined convergence as "the double process by which information artifacts and social worlds are fitted to each other and come together...a process of mutual constitution" (1997, p. 4). Conversely, *divergence* between system and practice is viewed as movement away from fit and toward incompatibility. In the context of information systems shared by multiple units within an organization, brokering through boundary objects can be used to facilitate greater convergence between systems and practice.

The main limitation of this research is the restriction of the phenomenon studied to organizational contexts similar to ManDisCo. Because we studied only one organization, which experienced a particular history and regional location, we are unable to provide a wider understanding of the contexts under which brokering might occur. However, our findings are potentially generalizable to decentralized organizations in which IT professionals design and maintain shared systems in a federated IT structure. A secondary limitation is a necessary consequence of the epistemological

assumptions underlying our investigation. As interpretive researchers, we do not seek to provide evidence that organizational knowledge was actually transferred across units due to brokering activities. Nor do we offer evidence of the benefits of knowledge transfer. (Indeed, our philosophical position reflects skepticism about treating knowledge as an object that can be moved from one place to another.) Rather, our approach is to regard social roles and practices as socially constructed realities, which assumed central importance to the IT professionals interviewed. We limit our insights, therefore, to the subjective and detailed accounts of the broker role as provided by those who performed that role. As a final comment, then, concerning limits of the understandings provided by this study, it is also important to emphasize that a fuller understanding of the organizational challenges and opportunities of knowledge brokering by IT professionals will require the exploration of knowledge brokering from the perspectives of business users.

Although not directly based in the research evidence, several additional speculations can be posed to stimulate future research. First, the IT professionals at ManDisCo assumed their broker roles without the benefit of formal training or preparation. They recognized that learning user practice was an important aspect of their work in the context of shared system support, and over time this realization was shared within corporate IT. Learning the broker role, therefore, is itself an example of situated learning in the corporate IT community of practice (Lave and Wenger 1991). In addition to these informal efforts, it might be advantageous for IT managers to promote a so-called situated curriculum. In contrast to formal training, a situated curriculum is defined as a "pattern of learning opportunities related to newcomers in their encounter with a specific community inside a specific organization" (Gherardi et al. 1998, p. 281). Issues related to the development of a situated curriculum for learning user practice could be explored in future research. A related management issue is the challenge for leadership at the CIO level to recognize the potential importance of the knowledge broker role and to hold IT departments accountable for

development of the set of skills necessary to insure fulfillment of this role by their staff.

It would also be worthwhile to study the role of knowledge brokering by IT professionals in other contexts of IT governance. Governance of the IT function has been a topic of enduring interest to IS researchers (King 1983). ManDisCo adopted a federated structure that split IT into both centralized and decentralized locations (Brown 1997; Sambamurthy and Zmud 1999). Governance structure affects the choice of mechanisms to facilitate cross-unit collaboration, including steering committees (McKeen et al. 1994a), user liaisons (Zmud and Lind 1986), and probably knowledge brokering. The ManDisCo case provides empirical evidence regarding knowledge brokering within a federated governance structure, yet a broader study of other governance contexts would be valuable. Finally, in light of the continuing trend toward the outsourcing of IT services, including offshore outsourcing, investigation of the impacts of outsourcing arrangements and vendor relationships on knowledge brokering is also warranted.

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Appendix A

Interview Guide

1. Background Information
 - Please tell me about yourself—your professional background, and your role at *ManDisCo*.
2. Informant's Role as a Knowledge Broker
 - In your current position, do you find yourself providing connections between different areas of the organization—for example, facilitating the transfer of knowledge between groups or helping to coordinate or align the activities of different groups?
 - If so, can you describe some specific examples of how you have played this type of role?
3. IT Professionals as Brokers of Knowledge in the Organization
 - Is there anything in particular about the IT professionals at *ManDisCo* that may place them in a position to facilitate the transfer of knowledge between different groups in the organization?
4. Brokering Skills and Competencies
 - What are some of the skills and competencies that might enable IT professionals to transfer knowledge between different parts of the organization and to play other types of brokering roles?
5. Organizational Facilitators and Barriers of Brokering by IT Professionals
 - Is there anything about *ManDisCo* as an organization that either supports or inhibits knowledge sharing between different parts of the company?
 - Are there any facilitators or barriers specifically related to the transfer of knowledge by IT professionals at *ManDisCo*—that may help or hinder the types of activities that you have described?

6. Knowledge Brokering Strategies

- What types of strategies do you and other IT professionals at *ManDisCo* employ to address some of the challenges of knowledge transfer and other brokering activities?

7. Outcomes of Brokering

- What are some of the organizational consequences or outcomes of knowledge transfer and other brokering activities by IT professionals at *ManDisCo*?

8. Concluding Questions

- Is there anything else that came to mind as we talked today that you would like to add—anything that maybe I should have asked you that I didn't?
- Can you suggest other people in the company that I should also interview for this study?

Note: The interview guide provided an outline of the topics to be covered in the interviews, and examples of open-ended questions related to each topic. The questions were designed to elicit rich descriptions by the informants of their experiences and work practices related to knowledge brokering. Although the same set of topics was covered in each interview, the interview guide was not followed in a rigid manner, and the specific wording of the questions, the sequence in which topics were introduced, the follow-up questions that were asked, etc., varied from interview to interview.