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THE EMERGENCE OF BOUNDARY SPANNING COMPETENCE IN PRACTICE: IMPLICATIONS FOR IMPLEMENTATION AND USE OF INFORMATION SYSTEMS[1]

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Abstract

This paper investigates how an organizational competence in boundary spanning emerges in practice by drawing on the concepts of boundary spanner and boundary object. Using data from two qualitative field studies, we argue that in order for boundary spanning to emerge a new joint field of practice must be produced. Our data illustrate that some agents partially transform their practices in local settings so as to accommodate the interests of their counterparts. While negotiating the new joint field, these agents become what we call ***boundary spanners-in-practice*** *who produce and use objects which become locally useful and which acquire a common identity—hence,* ***boundary objects-in-use****. Moreover, we show how boundary spanners-in-practice use various organizational and professional resources including the influence that comes with being nominated to boundary spanners' roles to create the new joint field. The conditions necessary for boundary spanners-in-practice to emerge are outlined and discussed, as are important implications for IS implementation and use.*

Keywords: Boundary spanning, boundary objects, boundary spanners, boundaries, practice theory, Bourdieu, knowledge management, organizational learning, IS implementation, IS use, client-consultant relationship, intranet, roles

[1]V. Sambamurthy and Mani Subramani were the accepting senior editors for this paper. The authors have contributed equally to the paper.

Introduction

The ability of an organization to build practices that draw on diverse bases of expertise constitutes one of the key organizational competencies in knowledge management (KM). According to the knowledge-based view of the firm, integrating various sources of expertise requires overcoming obstacles associated with knowledge embeddedness and tacitness. Nevertheless, doing so—and doing so *better* than the competition—can become a source of sustained competitive advantage (Dyer and Singh 1998; Grant 1996; Kogut and Zander 1992; Nahapiet and Ghoshal 1998; Tsoukas 1996). Recent studies of organizations, including IDEO, General Electric, and NASA's Jet Propulsion Laboratory, for example, have suggested that the success of these organizations is due, in large part, to their ability to effectively engage their members in practices that allow them to span the boundaries of diverse settings (Carlile 2004; Cross and Parker 2004; Hargadon 2003; Majchrzak et al. 2004; Orlikowski 2002).

Spectacular successes aside, there are also examples of ill-famed failure. NASA's recent Columbia shuttle disaster is a case in point wherein a manager in charge of the flight ignored investigation requests from engineers from another division who did not proceed through the appropriate channels of communication (Verton 2003). The manager's failure to span organizational unit boundaries contributed, in part, to the disaster. Information technology, which NASA uses extensively, was of little help: NASA employees could have used problem tracking and "lessons learned" information systems to span boundaries in real time but, instead, chose to use these systems for post-incident analyses only (Verton 2003).

These and other examples of organizational failures lead to the following question: How does boundary spanning competence emerge in practice? How do individuals, such as NASA's manager, actually come to fulfill their boundary-spanner roles and how do information systems become used in a way that facilitates boundary spanning? To understand boundary spanning in practice (i.e., in what people do) as opposed to in theory (i.e., what people aspire to do), this paper uses and extends upon a practice-based view on KM (Carlile 2004; Orlikowski 2002) and data from two qualitative field studies. It contributes to KM literature by developing a dynamic (Griffith et al. 2003) and dialogic (Schultze and Leidner 2002) perspective on the emergence of boundary spanning competence in practice.

The paper is organized as follows: first, we review and extend a practice-based perspective on KM in organizations and then tie this perspective to the existing literature on boundary spanners and boundary objects. Second, we present our empirical approach and our analysis of the two field studies. The discussion section then analyzes the processes involved in the emergence of an organizational competence in boundary spanning. Finally, we draw implications from our newly developed understanding for IT implementation and use.

Theoretical Development: A Practice-Based Perspective on Boundary Spanning in Organizations

The proposition that spanning boundaries of diverse professional and organizational settings can become a key organizational competence has received extensive theoretical support (Grant 1996; Kogut and Zander 1992; Nonaka 1994; von Hippel 1988). More recently, researchers have investigated the kinds of organizational practices that actually allow firms to claim such competence (Carlile 2002; Orlikowski 2002). We draw on these recent developments in the KM literature while borrowing original ideas from Bourdieu's theory of practice (Bourdieu and Wacquant 1992) in order to understand how such practices emerge.

A Practice-Based Perspective on Knowledge Management in Organizations

Sociologists use the concept of practice to understand the dynamics of societies based on what people do (Bourdieu 1977; Certeau 1984; Giddens 1984). Practice is a "recurrent, materially bounded and situated action engaged in by members of a community" (Orlikowski 2002, p. 256). Through practice, reflexive agents engage in producing, reproducing, or transforming structures which, in turn, enable and constrain their actions (Bourdieu 1977; Giddens 1984). In relation to KM, this perspective emphasizes *knowing* as "an ongoing social accomplishment, constituted and reconstituted in everyday practice" (Orlikowski 2002, p. 252).

This perspective allows us to understand the nature of boundaries in practice. As agents develop a continuity in their local practices, it allows them to act knowledgeably in a given material, historical, and social context (Lave 1988; Suchman 1987). At the same time, however, they are also distinguished from others who do not practice in a similar fashion (Wenger 1998, p. 103). Practice theorists have conceptualized this phenomenon as the emergence of *fields* (Bourdieu and Wacquant 1992, pp. 96-120).[2] By engaging in fields, agents pursue a joint *interest* (an inclination and ability to succeed in a given endeavor), but also differentiate themselves from outsiders who do not do the same. At any given time, agents are engaged in multiple, nested fields. Within each field, agents are also distinguished on the basis of the differential attainment of stakes offered by this field (into "haves" and "have-nots") (Bourdieu and Wacquant 1992).

Through their engagement in fields, agents produce different kinds of resources (*capital*) which they can accumulate and use as bases of power in any given field. Bourdieu distinguishes four key species of capital: economic capital (e.g., money, time, technology), cultural capital (e.g., professional expertise, education, ownership of information), social capital (which social networks an agent can draw on), and symbolic capital (the ability to name any other resource as valuable, the power to name and classify things). Agents in every field are engaged in producing a unique subspecies of either the economic, cultural, or social capital (Bourdieu and Wacquant 1992, p. 119).

Discontinuities in practice (*boundaries of fields*) create opportunities for organizations to develop a knowledge-based competitive advantage. For example, as engineers engage in their professional practice, a boundary simultaneously emerges and grows between them and, for example, the field of practice occupied by those in marketing. Organizations that successfully engage engineers and marketing specialists in relating practices of these fields (which we will refer to as *boundary spanning*) develop a knowledge-based competence in product development (Carlile 2002; Dougherty 1992). In addition to spanning the boundaries of professional fields, organizations may develop competencies in spanning the boundaries with other organizations (Dyer and Singh 1998; Powell 1990) and with academic research fields (Liebeskind et al. 1996).

According to Orlikowski (2002, p. 267), such a competence is, again, embedded in the practices of organizational members. Yet these practices must be sufficiently different from practices within the specific fields that contributed to the production of the boundary in question, otherwise agents will continuously reproduce *that* boundary. At the same time, these practices are not produced in a social vacuum. Rather, they are produced in the context of prior actions and relationships and in pursuit of a common interest, that is, in the context of a new field.

Here we propose that the emergence of a boundary spanning competence in practice is associated with the emergence of a *new joint field* which unites agents in their pursuit of a common organizational interests while, at the same time, distinguishing them from others who are not engaged in a similar pursuit. In practice theory terms, devel-

[2]We rely on the concept of *fields* instead of *communities of practice* (Lave and Wenger 1991) because the latter is limited in addressing the power dynamics involved in boundary spanning (Contu and Willmott 2003).

oping an organizational competence in boundary spanning means producing a specific type of organizational capital ("social capital" according to Nahapiet and Ghoshal 1998) by using and relating capital produced in other fields.

For instance, new product development involves agents coming from various professional fields (e.g., styling, engineering, safety, and marketing) using and transforming part of their practices (Carlile 2004) so as to create a new joint field in which a new engineering product is developed. In doing so, these agents also relate diverse species of professional capital (subspecies of the cultural capital) so as to produce a unique capital in the new joint field. Agents' position and capital in the new field depend on how they relate the capital in the original professional fields to to the capital in the *new* field (Bourdieu 1996).

The concepts of field and capital allow us to engage in a dialogical discourse on KM by offering a way of "tracing power and domination to claims of expertise" (Schultze and Leidner 2002, p. 217). While Orlikowski's (2002) work has demonstrated that an organizational competence in spanning boundaries is embedded in the everyday practice of its members, our interest is in investigating how a new joint field, where such practices are produced, emerges.

To achieve this, we draw on two prominent concepts in the organizational literature on KM: boundary spanners and boundary objects. We argue that, currently, the literature has developed a rather static view of these concepts, focusing on either what these mechanisms are supposed to achieve in theory, or on what actually happens in practice. What is missing is an understanding of how boundary spanning mechanisms *become* or *do not become* enacted in practice.

Boundary Spanners in Theory and in Practice

The literature on KM has emphasized the importance of relying on individuals to perform boundary spanning roles (Cross and Parker 2004; Davenport and Prusak 1998; Hargadon and Sutton 1997; Pawlowski and Robey 2004; Swan and Scarbrough 2001). Cross and Parker (2004), for example, characterized boundary spanners as vital individuals who facilitate the sharing of expertise by linking two or more groups of people separated by location, hierarchy, or function. Managers of research and development groups, sales representatives, human resource specialists, and IT professionals are prime examples of professionals who are expected to span inter- and intra-organizational boundaries (Allen and Cohen 1969; Pawlowski and Robey 2004; Tushman 1977; Wenger 1998).

The literature on boundary spanners highlights the importance of designating boundary spanners' *roles* as a means of cultivating the organizational ability to deal with the challenges of managing across boundaries. Numerous research studies have identified and classified the roles boundary spanners are expected to perform (e.g., Aldrich and Herker 1977; Ancona and Caldwell 1992; Cross and Parker 2004; Friedman and Podolny 1992; Leifer and Delbecq 1978; Tushman and Scanlan 1981). For example, the boundary spanner's roles have been classified according to representative versus gatekeeper, advice versus trust broker (Friedman and Podolny 1992) as well as scout, ambassador, sentry, and guard (Ancona and Caldwell 1992).

In practice, however, multiple roles of boundary spanners often come into conflict, thereby leading to stress and burnout (e.g., Baroudi 1985; Dubinsky et al. 1992; Lysonski 1985; Singh et al. 1996). Moreover, it is often hard to find individuals willing to perform these roles as they are expected to be both sensitive to social cues (Caldwell and O'Reilly 1982) and competent in multiple domains (Nochur and Allen 1992). Qualified individuals may choose to avoid the uncomfortable (and often conflicting) feelings that arise when spanning more than one field, not to mention the potential for marginalization within each of the fields spanned (Bourdieu 1977; Tajfel 1978). Indeed, some may opt for one side over the other rather than endure the discomfort of spanning both (Wiesenfeld and Hewlin 2003).

One of the recommendations put forth in the literature is to assign different boundary spanning roles to different individuals, thus preventing role conflict (Friedman and Podolny 1992). In organizational practice, however, boundary spanners tend to occupy managerial positions (Wiesenfeld and Hewlin 2003) and may be reluctant to part with any of their roles, especially when the information and social capital already accumulated can be used to their personal advantage (e.g., Baroudi 1985; Katz et al. 1995; Keller and Holland 1975). What is more, some agents who have not *officially* been nominated to perform these roles may act as boundary spanners (Nochur and Allen 1992). In short, evidence suggests that the expectations of these roles and practices of boundary spanning often do not coincide. Therefore, we need to improve our understanding of the processes through which individuals become boundary spanners in practice.

In order to achieve this, we introduce a distinction between *nominated boundary spanners* and *boundary spanners-in-practice*.[3] According to Bourdieu's practice theory, through the process of *nomination* (or *designation by name*), agents who occupy dominant positions in a field, such as top leadership or KM groups in organizations, use the symbolic capital of their own positions to appoint themselves or others to various positions endowed with symbolic capital (Bourdieu 1998, p. 51). Through this nomination process, organizational leaders try to foster the emergence of a new joint field across a particular boundary. Figure 1a illustrates the lack of boundary spanning-in-practice when only nominated boundary spanners are present.

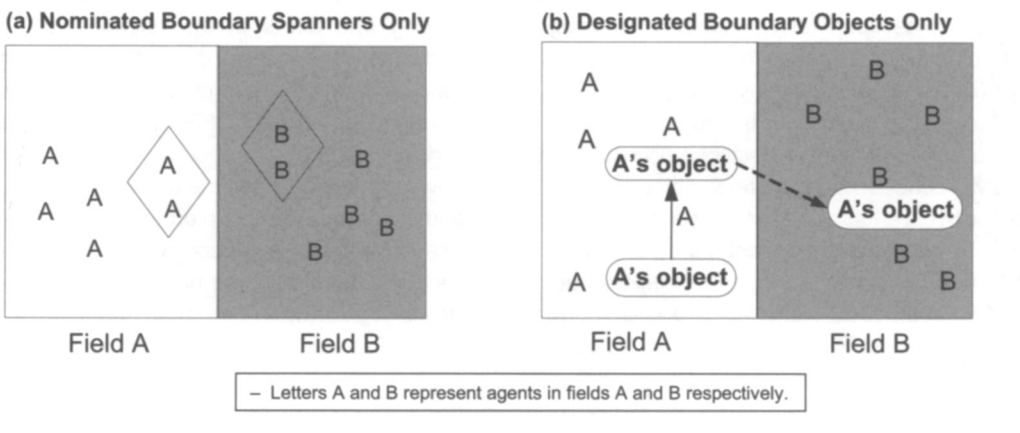
However, formal structures may not coincide with actual practice that involves diverse interests and in which actions (e.g., nomination) have unexpected consequences (Wenger 1998, p. 80). In contrast to nominated boundary spanners, however, boundary spanners-in-practice must actually engage in boundary spanning, relating practices in one field to practices in another by negotiating the meaning and terms of the relationship. This requirement is evident in the cases of successful boundary spanning described in the recent literature (e.g., Maguire et al. 2004; Volkoff et al. 2004). Boundary spanners-in-practice engage in building a new joint field between the two fields. To understand the emergence of an organizational competence in boundary spanning, we need to investigate how agents become boundary spanners-in-practice by drawing on their nomination or, possibly, independently from their expected roles.

Boundary Objects in Theory and in Use

Star and Griesemer (1989) introduced the concept of *boundary object* to address the limitations implied by the reliance on boundary spanners who, in practice, may advance self-interest, have a limited social network, or face temporal and physical constraints. Examples of boundary objects include physical prototypes (Bechky 2003; Carlile 2002), design drawings (Bødker 1998), use scenarios (Bødker 2000), engineering sketches (Bechky 1999; Henderson 1991), accounting ledgers (Briers and Chua 2001), and standardized reporting forms (Bowker and Star 1994; Bowker et al. 1996; Star and Griesemer 1989). The term *boundary object* thus refers to a broad range of artifacts that "are plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" (Star 1989, p. 393). This concept is useful in understanding how IT-based artifacts can support the development of boundary spanning competence. The IS literature provides many examples of boundary objects, from document archives to enterprise resource planning systems (Ackerman and Halverson 1999; Briers and Chua 2001; Pawlowski and Robey 2004).

Researchers in this tradition have focused more on practices than their counterparts studying boundary spanners. Studies have identified not only diverse types of boundary objects, but their properties as well, including modularity, abstraction,

[3]This distinction was inspired by the practice theory-based distinction between a technological artifact and a technology-in-practice (Orlikowski 2000, p. 403).



a) Nominated boundary spanners, marked by diamonds, are symbolically distinguished from the rest of the field agents, but are not engaged in boundary spanning.

b) Agents pass designated boundary objects produced in one field to another field without relating them to practices in a different field or establishing a common identity for them.

Figure 1. Lack of Boundary Spanning in Practice

accommodation, and standardization (Pawlowski and Robey 2004; Star 1989; Star and Griesemer 1989; Wenger 1998). Researchers have suggested that effective boundary objects are those which are tangible (Carlile 1997), concrete (Bechky 2003; Carlile 2002; Henderson 1991), accessible, and up-to-date (Carlile 1997).

Lists of characteristics are useful for *recognizing* potential boundary objects in practice, but are of little help when trying to identify whether an organizational competence in boundary spanning actually emerges from the use of these objects. In many cases, objects deemed useful for boundary spanning and that possess desired characteristics remained entirely unused or used in superficial ways (Levina 2001). Moreover, there are many examples where information systems were intended to support boundary spanning, but were actually used to guard and reinforce existing boundaries (Goodman and Darr 1998; Newell et al. 2001; Schultze and Boland 2000).

Drawing on recent theorizing about artifacts in practice, we argue that, outside of its use, it is impossible to determine whether an artifact has, or will ever, acquire a common identity or whether it will satisfy varied local needs. It is the ongoing use of an artifact by agents within a specific social context that generates the artifact's social characteristics and gives it meaning (Orlikowski 2000). By "use" here we do not mean the time spent by agents in working with an artifact like an IT application. Rather, to use an artifact means to symbolically incorporate it into the ongoing dialogue about the practice—a constant, reflexive, reaffirmation of what the object means in the given context (e.g., future users may discuss a KM application as a "savior" or as an "imposed piece of junk"). Recent practice-based accounts of boundary objects have supported our claim that boundary objects' characteristics and performances are embedded in the situated practices of the agents who use them (Bechky 2003; Carlile 2002). Yet, these accounts do not examine how artifacts emerge as boundary objects in practice.

To further understand this process of emergence, we distinguish between *designated boundary objects* and *boundary objects-in-use* (see Figure 1b).

In a way that is similar to nominating boundary spanners, agents who hold positions of power in relevant fields designate certain objects as valuable for boundary spanning. They do so by using their own symbolic capital to name an artifact as symbolically valuable. These designated boundary objects may not, however, become boundary objects-in-use. Following Star's (1989) original definition, to become boundary objects-in-use, artifacts have to be locally useful (i.e., be meaningfully and usefully incorporated into practices of diverse fields) and must have a common identity across fields. In this case, a common identity refers to having a symbolic structure that "is common enough to more than one world to make them recognizable" (Star and Griesemer 1989, p. 393). A common symbolic structure can only be acquired in the context of a joint practice. Thus, the emergence of boundary objects-in-use is intricately tied to the emergence of a new joint field.

We summarize the differences between the nominated boundary spanners and designated boundary objects and boundary spanners-in-practice and boundary objects-in-use in Table 1.

The distinction between the four concepts, as outlined in Table 1, helps clarify the differences between boundary spanning in theory and boundary spanning in practice. The purpose of our fieldwork and data analysis was to understand the dynamics through which agents and artifacts become boundary spanners-in-practice and boundary objects-in-use. This can help us address the question as to why, in certain cases, IT-based artifacts become boundary objects-in-use while, in other cases, they do not.

Methodology

Drawing on practice theory, we analyzed and interpreted data from two empirical cases. Prior works (Barley 1986; Orlikowski 1992, 2002; Schultze and Boland 2000) have demonstrated how practice theory can be used in data analysis to understand the dynamics of organizational life. Following the same tradition, our investigation also relied on direct empirical observations of what people did and on interviews with key participants regarding their intentions and perceptions of practice.

In order to address our research questions, we compared two qualitative, longitudinal case studies. Following Bourdieu (1998, p. 2), the cases were conceptualized as specific instances of several fields-of-practice. We used grounded theory techniques (Glaser and Strauss 1967; Strauss and Corbin 1998). The conclusions presented in this paper were based on the comparative analysis of practices within cases (longitudinal analysis) and across cases (cross-case analysis).

Each of us separately collected data on one of the cases. One case focused on the emergence of practices supporting boundary spanning associated with the implementation of intranet applications in an insurance company—Insura.[4] Because the objective behind the intranet implementation at Insura was to improve knowledge sharing between Insura's headquarters and its geographically distributed sales agents, as well as among sales agents, the organization proved to be an ideal research setting.

The second case focused on the emergence of practices supporting boundary spanning in an interorganizational IS development project conducted by an Internet consulting firm, Eserve, and its client, Pubco. This case was particularly relevant because Eserve managers insisted that the strength of their organization was in integrating diverse professional expertise (in strategy, technology, and graphic design) as well as their clients' business expertise on project teams. Their client, Pubco, was chosen because its managers expressed an interest in improving communication with consultants. Both Insura and the Eserve-Pubco project granted us the necessary access for

[4]Names of organizations, their members, and specific practices are disguised. These cases have no relationship to similarly named, real-world companies.

Table 1. Nomination/Designation versus Boundary Spanning-in-Practice

Nomination and Designation	In Practice
Nominated Boundary Spanners: Refers to agents who were assigned by the empowered agents in a field to perform certain roles in spanning boundaries of diverse fields.	**Boundary Spanners-in-Practice**: Refers to agents who, with or without nomination, engage in spanning (navigating and negotiating) boundaries of diverse fields.
Designated Boundary Objects: Refers to artifacts that, due to their design and properties, were named as valuable in spanning boundaries of diverse fields.	**Boundary Objects-in-Use:** Refers to artifacts that, with or without designation, are not only usefully incorporated in the practices of diverse fields, but also acquire a common identity in joint practices.

Table 2. Cross-Study Comparison of Methods

Methods	Insura	Eserve-Pubco
Field observation	4 months, 3 days a week Insura's headquarters and local sales teams	9 months, 4-5 days a week Mostly at Eserve, but some at Pubco
Access to the field	Negotiated access through headquarters	Negotiated access through Eserve
Semi-structured interviews	31—recorded and transcribed	41 (23 Pubco, 19 Eserve) recorded and transcribed
Informal contacts	Yes	Yes
Follow up visits	Yes	Yes
Documents and archives	Yes	Yes
Other data collection methods	• 3 focus groups of 5 sales reps • Statistics of use of the intranet	• Coding of email archives and records in Eserve's HR System
Key boundaries	1) Professionals in departments at headquarters—sales reps 2) Among geographically distributed sales teams	1) Consulting firm—business clients 2) Requirements team—graphic designers, technologists
Key technologies	E-mail, telephone, intranet	E-mail, telephone, intranet

conducting sustained, on-site observations, interviews, and archival data analysis. Table 2 outlines how each researcher independently collected data.

While the integration of concepts and ideas derived from field studies conducted by different researchers separately is somewhat unusual in the IS literature, it has been fruitfully deployed for inductive theory development in the organizational literature (e.g., Staudenmayer et al. 2002; Tyre and Orlikowski 1994). In our case, although we conducted our ethnographic work separately, we both used Bourdieu's theoretical and methodological guidelines (Bourdieu and Wacquant 1992) and observed the same unit of analysis—specifically, an organizational practice targeted at boundary spanning.

Interestingly, we emerged from the field with different understandings of key concepts: one of us observed how a nominated boundary spanner was crucial in fostering the emergence of a boundary spanning competence, while the other concluded that the nomination of people to boundary spanning roles only created obstacles. We then engaged in developing a common viewpoint that adequately captured the dynamics of both settings. The steps we took are outlined in Appendix A.

Boundary Spanning-in-Practice: Two Cases

We identified three stages in the evolution of each case based on important shifts in boundary spanning practices. Each case description is presented separately and followed by an analytical overview.

Insura Case

Insura was an autonomous arm of a French insurance company that sold financial services to households. Insura's four thousand employees worked in the headquarters or in local sales teams. The 400 people at headquarters created and updated financial services and also worked on the company's marketing strategy. About 20 sales agents and 1 manager comprised each local team. A substantial part of the sales agents' work consisted of scheduling and preparing visits using clients' files, gathering information on various services and markets, and developing each team's marketing and advertising strategies. When a new sale prospect had been contracted, agents keyed their sales information into the reporting system on their laptops; the human resources department would then issue them paychecks. As their tasks were geographically spread out, sales agents from different teams rarely engaged in direct social interaction.

Traditionally, there had been a lack of mutual understanding between local sales teams and those working at headquarters. The staff at headquarters complained that, while their work was intended to help sales agents, the latter did not value the tools being provided to them. For instance, members of the marketing department created posters advertising new products and subsequently visited local offices to promote their use. The marketing staff was aware, however, that these posters had not been integrated into existing sales practices. The following excerpt from our field notes illustrates this point:

> Marie works in the marketing department. She shows her peers her new promotional poster. As her colleagues congratulate her on the poster, she comments, ironically, "Well, yes, it [the poster] is good. Too bad they [sales agents] will not have the same opinion about it. And next week, I have to go defend the poster. I will be lucky if they do not throw tomatoes at me!"

Members of the local sales teams, on the other hand, maintained that headquarters' policies and recommendations were not suitable for the realities of their trade. Moreover, they argued that the posters were too abstract so as to be persuasive. Members of local sales teams subsequently created their *own* posters so as to address what they considered to be their clients' specific needs.

Stage 1: Limited Joint Field Production between Local Sales Teams and Headquarters

Insura's general manager wanted to foster relationships between local sales teams and headquarters in order to improve Insura's overall performance. He decided to develop various intranet-based applications that would be shared by the parties involved. The general manager nominated Dominique to lead the project, making him the future Web master. It was a logical choice given that Dominique had a unique background that combined 20 years as a sales agent and team manager with 5 years as an IT specialist in the MIS department at headquarters. In addition, being nominated project manager and Web master represented a substantial leap in Dominique's career. If the project was successful, he would become a serious candidate for future appointment as assistant chief technology officer for Insura.

Assisted by a small team of IT professionals, Dominique designed and implemented various intranet applications in 6 months. During this period, he did not consult his former colleagues in local sales teams about the project, relying instead on input from the marketing, human resources, and legal departments at headquarters. Dominique explained, "I did not ask local sales teams what they thought about the future intranet, because I knew they would not think anything about it. So I designed the intranet in-house." Implemented in December 1999, the intranet became available to all members at headquarters and local sales teams. It included applications such as an interface to the sales reporting system, a personnel directory, and official documentation on services. In addition, a folder entitled "commercial initiatives" allowed agents to share best practices. Sales agents could access the intranet from their laptops or from their local offices.

During the first 6 months of its availability, however, the sales agents rarely used the intranet beyond its capacity to access the sales reporting system. Agents' lack of competence with the technology itself only partially explained its limited usage, however. A more frequent explanation had to do with a perceived lack of understanding on the part of headquarters with respect to sales agents' needs. One sales agent commented,

> Why use the intranet? There is nothing much in it that is of real use to what is truly important to me, that is to say, dealing with clients on a daily basis. It's incredible, we are working for the whole Insura, but they [at headquarters] do not seem to be aware of it.

Stage 2: The Nominated Boundary Spanner Becomes a Boundary Spanner-in-Practice

By accessing Web logs, Dominique became aware that sales agents seldom used the intranet. Seeing that his project was failing, Dominique embarked on what he called his "Tour de France," which consisted of visiting about 40 local sales teams. During these visits, he explained to the agents how to use the intranet so as to address the direct needs of their clients (e.g., check the latest pricing policies online). Dominique's visits allowed sales agents to see that members of headquarters were paying attention to their practices and that they were, in fact, providing tools of value for their work. Sales agents' attitudes subsequently changed. For example, one sales agent commented: "The intranet...was launched by [headquarters] and it really shows that they care about how we deal with clients."

Moreover, as Dominique talked to sales agents, he learned how to improve the intranet's functionality. Sales agents disclosed issues freely to Dominique because they considered him to be "one of them," especially given that his prior fame as a successful sales agent was still fresh in people's minds. Some told Dominique that the intranet did not provide them with specific answers to some of their daily concerns, including answers to the legal questions that clients sometimes asked them. In response, Dominique introduced a new frequently asked questions (FAQ) application which permitted agents to ask questions (related to legal matters or to human resources) and to obtain specific answers from headquarters. The heads of the

concerned departments—legal affairs and human resources—and Dominique assigned six headquarters' members to answer these questions as part of their jobs.

Moreover, during this period, Dominique asked (mostly though e-mail and phone calls) some of his closest colleagues from various local sales teams to contribute to the commercial initiatives folder by sharing some of their best practices. Dominique remembered that sales agents often sought peer recognition. Indeed, their actions (e.g., active involvement in the sales competitions), besides monetary rewards, were often motivated by a desire to be recognized for their successful sales practices. In order to capitalize on this value system, Dominique posted the pictures of the contributing agents on the intranet homepage.

Stage 3: Intranet Applications Become Boundary Objects-in-Use

During the late fall of 2000, Dominique returned to the company headquarters and scaled back his direct involvement in the relationships between local sales teams and headquarters. Sales agents and members of headquarters made substantial and active use of the FAQ applications. Members of local sales teams used the FAQ to ask questions that really mattered to them. The designated members of headquarters responded to these questions by following two rules that Dominique had decreed: (1) the answer had to be short (two paragraphs) and (2) the answer had to be put online within 24 hours, thereby forcing staff at headquarters to take into consideration sales agents' need for straightforward, timely answers.

Moreover, sales agents started putting their best practices online in the commercial initiatives folder. Traditionally among sales agents the best professionals were considered to be the ones who were the most successful at selling financial services, as identified by the sales competition's volume rankings published in a newsletter. When the intranet commercial initiatives feature became available, at first sales agents were reluctant to share their best practices; doing so was like giving away the source of their competitiveness. Later, when Dominique recognized contributions by putting authors' pictures online, the situation had changed largely because of the importance of peer recognition among agents. One sales agent remarked,

> The commercial initiatives folder, for sure, I use very often. Just to tell you, there was a colleague of mine who has posted a way of treating new clients. You can see his picture on the site! This is fame! More seriously, it is very useful, because one has the occasion of knowing what the others do—others that we do not know but who deal with the same issues as we do. Before the intranet, we did not do that.

Sales agents became gradually more willing to contribute to the folder. Dominique received potential contributions via e-mail, and usually contacted the author to add further details about the story (e.g., the methods for identifying prospects) or to get rid of unnecessary details (e.g., names of clients) before posting them online. Now being a good professional *at Insura* included not only being able to sell a lot of contracts, but also being able to contribute to the commercial initiatives folder.

Analytical Overview

Agents at Insura engaged in creating a unique subspecies of cultural capital, namely and organizational competence in the development and distribution of financial products to clients. They did so by combining and transforming different subspecies of cultural capital from different professional fields such as human resource management, legal practice, finance, and sales. Sales agents simultaneously belonged to the field of professional sales practice which produced a unique cultural capital: a competence in selling products. The headquarters' leadership within the Insura field held the power of "nominating" agents to specific officially acknowledged roles.

The first stage of the case revealed limited boundary spanning in practice. Headquarters' marketing agents were nominated boundary

spanners, but were not boundary spanners-in-practice. They engaged in the practices of their own professional fields, but were not engaged in negotiating the meaning and/or terms of the relationship of their field to the field of sales agents' practice. Not surprisingly, the posters they produced remained designated boundary objects. Insura's general manager then nominated Dominique to develop intranet-based applications that would serve as boundary objects between local sales teams and various departments at headquarters. During the developmental stage, and during the first 6 months after launch, Dominique remained a nominated boundary spanner while, at the same time, various intranet applications remained designated boundary objects.

Dominique became concerned with this situation as it threatened his position at headquarters: if the project failed, others would blame him. To avoid this, he took actions that ultimately led to him becoming a boundary spanner-in-practice. During his "Tour de France," he engaged in relating the practices of the relevant fields. Dominique related sales agents' interests in accumulating cultural capital (peer recognition) and economic capital (increased sales and commissions) to the cultural capital (financial, legal, and human relations expertise) and economic capital (technology resources) of agents' at headquarters. He then designed and modified various objects (applications such as the FAQ). Through dialogue and interaction, these objects started acquiring common identities in the new joint field, which was a subset of the Insura field.

During the third stage, Dominique reduced his active engagement in the newly established joint field as the specific contents of the FAQ applications became ever more useful in the context of the practices enacted by local sales teams and agents working at headquarters. Moreover, through use, a common identity of the FAQ application emerged which reflected the established relationship between sales agents (advice seekers) and various headquarters agents (advice givers). As Dominique scaled down his involvement, FAQ contributors and users started taking on more or less active roles in negotiating and sustaining the joint field.

Similarly, a new joint field emerged through the use of the commercial initiatives folder. In this case, the new joint field was a subfield of the sales agents' professional field. Traditionally, the various geographic regions in which sales agents worked conditioned their sales practices and their relations with particular clients and prospects. Hence, the new joint field involved spanning the boundaries of the various geographically distributed subfields where sales agents' practices were necessarily embedded. Dominique used his symbolic capital as a boundary spanner to encourage the production of a new joint field by giving symbolic recognition to those agents who contributed to building the practice. He also used his social capital to mobilize participation. The commercial initiatives folder became meaningful and useful for agents who could learn from others how to improve their local practice and accumulate their own professional capital. The folder also acquired a common identity that signified the relationship among sales agents as that of partial collaboration rather than strict competition.

We now turn to the discussion of the second case.

Eserve-Pubco Case

Eserve was a young, successful, and rapidly growing professional services firm engaged in the production of business-to-consumer applications. Although there were no formal titles at Eserve, project teams were comprised of a client partner, a project manager, and strategy, graphic design, and technology consultants who defined, designed, and built the system. Projects generally went through three phases: planning, prototyping, and development. Eserve's service delivery model (and other practices) emphasized that clients knew little about "the Web space" and, thus, they required considerable guidance by innovative, young consultants. Eserve leadership emphasized the importance of a strong, collaborative culture among consultants and, to this end, implemented a state of the art intranet-based KM system (E-share). This system included, among other things, a repository of consulting tools (shared on an intranet) and a separate project space for each

project to share work-in-progress and completed documents (on an extranet).

Pubco was a division of a well-established publishing company with headquarters a mere 30-minute walk from Eserve's offices. Pubco relied on strong hierarchical and departmental distinctions. Historically, Pubco had been cautious when dealing with consultants. However, in the fall of 1999, Pubco's executives decided to hire a consulting firm to revamp their current Web site and boost their e-brand. Pubco's executives argued that Pubco lacked advanced Web development and strategy expertise and that consultants could help prioritize and integrate various grassroots Web initiatives that had been developed at Pubco over the past 5 years. It was agreed that the project would be conducted in close collaboration between Eservers (the consultants) and Pubco employees (the clients).

Stage I: Too Many Nominated Boundary Spanners, No Boundary Spanners-in-Practice

Determining a business vision and high level functionality for the Web site was the primary objective of the planning phase. Frank, a seasoned Eserve strategy consultant, became the project's client partner. Frank usually explained that his role was to represent the client's needs to the Eserve team, but he invariably added, "I will always represent [Eserve] team's needs."

At the outset, Pubco participants struggled to understand Eserve's approach to the project and it was up to Frank to explain Eserve's methodology documentation to Pubco's participants. However, for his explanations, Frank relied heavily on what Eservers called "consulting speak," a particular language highly specific to the organizational culture among consultants. In addition, Frank was often unavailable because of multiple business obligations. Bob, Eserve's project manager, who was new to Eserve and not yet accustomed to its methods, was the other manager who interfaced with clients. His role expectations included coordinating the team's work and coordinating with clients on specific tasks. However, Bob considered Pubco a slow-moving, bureaucratic organization ill-suited to the Internet age, ultimately giving clients' opinions little credit.

Simultaneously, Eservers were trying to learn about Pubco's business through Pubco's project coordinator, Maya, who was entirely devoted to the project. Maya had no previous experience with the Web, but she was a natural choice for a project coordinator because she was a professional consultant who had been involved with Pubco for several years. In fact, she had been responsible for analyzing Pubco's marketing strategy, a skill set of direct relevance to the Eserve-Pubco project. Pubco's executive explained her assignment to the role by saying, "We felt we needed a consultant type to round out our team." In addition to Maya, a project sponsor at the vice president level was involved in the relationship as well, but he lacked domain expertise and still had to perform his regular job at Pubco.

The relationship between Maya and Eservers did not work out, largely because Maya, initially, tried to act "too much like Eservers." This was not acceptable to Eservers because Maya "did not know the Web space." In fact, disrespect for her grew so far as to be openly expressed during Eserve-Pubco joint meetings. Behind closed doors, Eservers referred to her as "the Queen of Darkness," a nickname which she overheard. Initially, Maya tried to help Eserve communicate with Pubco in terms that Pubco would understand. She provided paper-based versions of documents like Pubco's strategic plan and market analysis. Frank and Bob, however, discounted these documents as "useless pieces of paper" without passing them on to line consultants. Maya also advised Eserve on how to approach the project in a "Pubco way." Eservers subsequently complained that Maya was trying to impose ideas on them that did not make sense. At this time, Maya switched to collecting complaints from Pubco's participants about Eserve's processes, eventually delivering them to Eserve's top management.

In terms of IT support for communication, Eserve promised that Pubco people would be able to both

contribute to and access project documents through E-share's extranet facility. Yet, Frank and Bob argued that a firewall prevented this from happening. Until it became clear that clients would not be able to access E-share, consultants were advised to share their work-in-progress through internal e-mail. Despite ready access to e-mail and telephones in both firms, small, face-to-face group meetings among managers became the primary means for discussion and decision making.

For Pubco's participants, the existing relationship appeared dysfunctional. Eserve's approach to the project envisioned that consultants would make recommendations about the strategic vision and high level functionality for the Web site by following Eserve's methodology, which represented consultants' Web strategy and design expertise. Yet Pubco's participants did not understand Eserve's methodology and perceived Eservers as unable or unwilling to understand Pubco's business. Thus, they decided to take control in defining the business vision and high level functionality for the Web site. To this end, Pubco team members generated a list of top priority functionality, eventually passing it on to Eserve in the form of a "must-have" list. Eservers were not convinced of the strategic value of the initiatives and believed the list reflected Pubco's desire to gain full control over the strategic direction and functionality of the Web site. As Pubco threatened to withdraw funding for the next phase of the project, consultants put aside their own judgments and decided to recommend to Pubco's senior leadership the initiatives outlined in the must-have list.

Stage II: The Emergence of Boundary Objects-in-Use and Boundary Spanners-in-Practice

Tensions began to ease when line consultants began engaging Pubco's members directly in discussing the must-have list. With the most contentious issue of making a strategic recommendation out of the way, some Eserve strategy consultants began interacting directly with three of Pubco's team members in face-to-face meetings, further detailing the selected initiatives and reflecting on Pubco's existing Web site and organizational practices. One of the outcomes of this interaction was creation of a DILO (Day in the Life of) scenario, which was a storyboard depiction of a potential user visiting Pubco's future Web site and interacting with the envisioned functionality. Creation of DILOs was part of Eserve's Web design methodology. Pubco's DILO was a graphical slide presentation designed by Eserve's strategy consultants based on their discussions with Pubco and presented to Pubco team members and top leadership. It was very effective at illustrating the proposed functionality and was immediately approved by Pubco's top leadership for implementation.

In the prototyping phase, the work on the project was broken down such that clients and consultants worked together in requirements, technical, and design sub-teams (three to five people each). In this process, the relationship between Eserve's strategy consultants and the three Pubco team members interacting directly over the must-have list, became formalized under the requirements team umbrella. In this team's meetings, members from both organizations continued working closely together, productively developing (through discussion and debate) detailed functionality specifications for the Web site. Nevertheless, a hierarchical management structure was still being enforced by Maya. In fact, even as Maya and Frank became less attentive to project details, Maya continued to insist that significant issues were to be resolved through meetings with the project leaders.

Meanwhile, Eserve consultants became deeply concerned about the project's strategic value and eventually suggested that efforts be redirected. Risking their own careers, they approached Pubco's requirement team members, with whom they had developed a good working relationship, and raised their concerns. Pubco's participants, however, followed the established protocol for resolving significant issues and reported this interaction to Maya who then reprimanded the consultants for going outside established ranks, insisting she be informed of all substantial issues. The very same Pubco team member who elevated the issue to Maya commented,

> Something happened in the communication from our core group to [Maya]... back over to [Eserve]. I think that if there were less process, or it was less formal without having these leaders and project leaders and bearing everything through them, that in all cases early on that were difficult in communication, we would not have had those problems.

> I was expecting it [the communication with Eserve's strategiests] to be a lot more open....But I totally just did not understand the level of terminology that they [the strategists] were using....It seemed like, in a way, they wanted to keep it as their thing, and not explain it in so much detail, to make it a simplified process....Some of the client issues I do not understand still.

Stage III: Emergent New Joint Field Marginalizes Non-Spanners

One of the key issues that arose in the prototyping phase was the communication between the newly designated sub-teams. For example, Eserve's graphic designers—most of whom entered the project during its prototyping phase—were struggling to understand Pubco's business practices and terminology. They only interacted with clients during a handful of design sub-team meetings, and these meetings focused on issues of the site's look and feel, not on its functionality. Yet, the graphic designers needed to form an understanding of Pubco's business so as to interpret functional requirements produced by the requirements sub-team and generate graphic treatments for the new Web site. Additionally, the graphic designers had trouble working with the structured requirement documents that the strategists were producing because working with such documents was not part of their skill set (many of the designers, coming from traditional art backgrounds, had only recently joined Eserve).

One of the tools that strategists used to teach designers about Pubco's business was to show the graphic designers Pubco's DILO presentation. Notwithstanding DILO's use of graphic language, Eserve's graphic designers had trouble learning from DILO as it also relied heavily on Pubco-specific business lingo. Eventually, work on the site design began to stagnate and the strategists blamed the designers for their lack of contributions. One of the designers commented on the phase completion,

Notably, the technologists at Eserve and Pubco had no trouble understanding the requirements as they were involved on the project from the beginning; however, they complained that they had limited ability to shape the Web site's functionality. For example, Pubco's technologists asked numerous times to be included in the requirements team meetings, but their requests were denied by other Pubco participants as "violations of Eserve's process."

Analytical Overview

The Eserve and Pubco constituted fields each engaged in the production of specific subspecies of cultural capital. Eserve agents produced Internet development expertise by combining expertise from their strategy, design, and technological areas of specialization. Pubco, on the other hand, produced publishing expertise by combining editing, production, marketing, and sales. Simultaneously, Eserve and Pubco were themselves occupying specific positions within the field of the consulting practice. Their positions generated antagonisms between their respective members. During the first stage of the project, Eserve and Pubco had each nominated two agents as boundary spanners, none of whom actually became a boundary spanner-in-practice. In fact, they remained unable or unwilling to use designated boundary objects (e.g., the strategic plan, market analysis, and Eserve's methodology) in ways that related the practices of the two fields. In addition, they limited others' capacity for direct contact through IT or other means and, hence,

prevented the emergence of alternative boundary spanners-in-practice.

In the second stage of the project, nominated boundary spanners allowed direct communication among line consultants and Pubco agents on smaller scale issues. Eserve strategy consultants were the first to emerge as boundary spanners-in-practice: they began reflecting upon objects produced in both Eserve *and* Pubco fields (e.g., a strategy group within Pubco produced the strategic plan and the KM group within Eserve produced an archive of DILO templates) and negotiating the relationship between the fields by creating and using new objects, including Pubco's DILO. Pubco's DILO became a boundary object-in-use and was used and coproduced in the new joint field (constituted by the members of the requirements team). In the new joint field, a common identity for Pubco's DILO emerged, signifying that Eservers would draw on their expertise in the wider Web space, while Pubco participants would draw on their expertise in the publishing business. Maya, however, used her symbolic capital as a nominated boundary spanner to limit the ability of emergent boundary spanners-in-practice to influence Pubco's practices. The degree of their engagement in the Pubco field limited their ability to negotiate the relationship between Eserve and Pubco with respect to issues that had broader organizational impact.

In the third stage, boundaries among professional fields within Eserve and Pubco were reinforced through practice. Pubco's DILO became a boundary object-in-use between Eserve and Pubco, but it remained a *designated* boundary object among Eserve's sub-teams. While requirements team members became boundary spanners-in-practice, Eserve designers and Eserve and Pubco technologists became non-spanners.

Discussion

In this section, after contrasting the two cases, we examine how agents become boundary spanners-in-practice and how artifacts become boundary objects-in-use.

The Emergence of New Joint Fields: Cross-Case Comparison

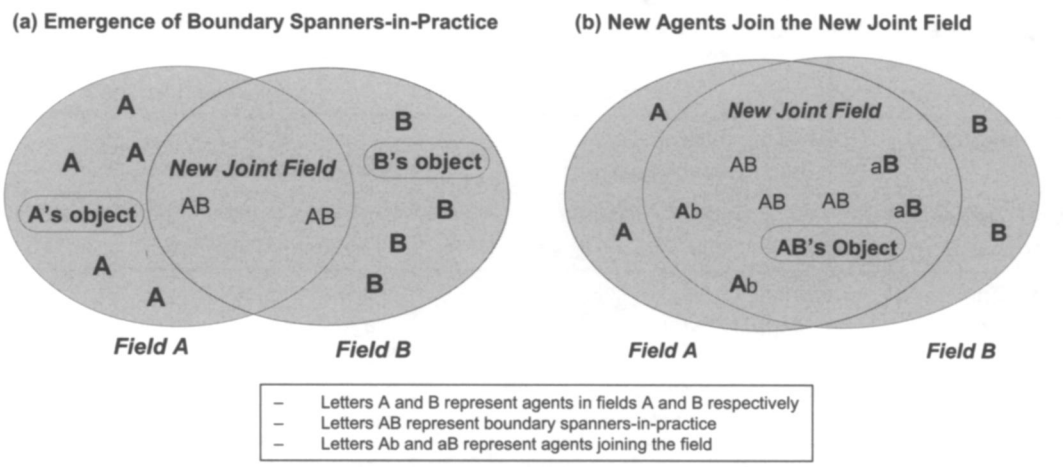
A cross-case comparison reveals key similarities and differences among the two settings summarized in Table 3. Despite the differences, however, a conceptually similar picture emerged. In both cases, boundary spanning competence was slow to emerge with nominated boundary spanners failing to fulfill their roles (Stage 1). Here, the organizational resources (symbolic, economic, social, and cultural capital in each organizational field) invested in building boundary spanning competence were wasted.

It was not until Stage 2 that boundary spanners-in-practice emerged, producing new kinds of practices in each setting (e.g., Dominique went on his tour and Eserve strategy consultants worked together on a sub-team with Pubco participants). These agents deliberately or inadvertently developed an interest in relating practices from diverse fields and produced a unique set of relationships and objects specific to the new practices (e.g., Eserve strategists developed an interest in relating Eserve and Pubco's practices and produced a unique set of relationships with Pubco's participants as well as Pubco's DILO, which they used to represent the relationship among fields). Thus, Stage 2 involved the emergence of new joint fields in each case. (Figure 2a demonstrates the emergence of a new joint field).

Moreover, the agents involved were willing to change the way they practiced in their local fields so as to participate in the new joint field (e.g., Insura's sales agents took time away from working with clients to involve themselves with the FAQs or the postings in the commercial initiatives folders). Their participation in the joint field soon became the basis upon which they were distinguished from those in their *local* fields who were not participating in a similar fashion (e.g., Eserve-Pubco require-

Table 3. Comparing the Main Dimensions of the Two Cases

Dimensions of Analysis	Insura Case	Eserve-pubco Case
Boundaries	HQ departments/local teams Among local teams	Eserve/Pubco Among professional groups
Material context of practice	Geographically distributed	Colocated or located at close distance
Stages in boundary spanning in practice	*Stage 1*: no joint field *Stage 2*: two new joint fields emerge *Stage 3*: new agents engage in the production of the new joint field	*Stage 1*: no joint field *Stage 2*: a new joint field emerges *Stage* 3: a few select agents are engaged in the production of the new joint field
Emergence of a joint field	Two new joint fields emerge distinguishing those who do and those who do not contribute to the FAQ and commercial initiatives folders respectively	A new joint field emerges distinguishing Eserve agents who understand Pubco's business and Pubco's agents who understand Eserve's business and those who do not
Nominated Boundary spanners	Marketing agents from headquarters Dominique, the Web master	Frank, Bob, Maya, and Pubco's vice president
Boundary spanners-in-practice	Dominique, in the second and third stages Some sales agents and members of headquarters, in the third stage	Eserve's and Pubco's members of the requirements team
Designated-boundary objects	Paper-based posters and newsletters, homepage, occupational documentation on the intranet	Pubco strategic plan and market analysis; Eserve's methodology documents shared in meetings
Boundary objects-in-use	Intranet-based FAQ and commercial initiatives folder	Pubco's DILO shared in meetings, email, and through E-share
IT use practices	*Stage 1*: limited use of intranet *Stage 2*: a boundary spanner-in-practice creates and shares objects using the intranet *Stage 3*: the development of the joint field through the use of objects on the intranet	*Stage 1*: not used *Stage 2*: boundary spanners-in-practice create and share objects using an e-mail list *Stage 3*: boundary spanners-in-practice create and share objects using email and E-share intranet



a) Boundary spanners-in-practice emerge by engaging in the negotiation of the relation between practices in fields A and B. They engage in reflecting on and relating objects produced by A and B separately.
b) A new common identity for boundary objects-in-use emerges with the help of boundary spanners-in-practice, and new agents join the boundary practice by using and coproducing boundary objects-in-use; some of these agents may become boundary spanners-in-practice.

Figure 2. Emergence of a New Joint Field

ments team members became distinguished from others). To ensure that the new distinction was adding to their capital in the local fields, boundary spanners-in-practice sought ways of relating the practices of the partner field to the practices in their local fields (e.g., Insura's sales agents need to be able to use the tips they picked up from the commercial initiatives folder to improve their sales and/or their reputations as professionals). In this way, boundary spanners-in-practice were taking a risk in their local fields by investing some of their existing capital accumulated in local fields into the new joint field.

In Stage 3, however, we observed an important difference between the two cases. In the Insura case, the boundaries of the new joint field were shifted rather easily as more agents were able to use IT to join the practice (as illustrated in Figure 2b). In the Eserve-Pubco case, however, the boundaries were heavily guarded by current participants who limited others' access to key face-to-face meetings. In both cases, though, by engaging in the joint field, agents contributed to the development of each organization's competence in boundary spanning.

Becoming a Boundary Spanner-in-Practice

In the two cases, a significant number of agents were nominated to perform different boundary spanning roles (a strategy advocated by Friedman and Podolny 1992). However, only a few of them became boundary spanners-in-practice. Based on practice theory and data analysis, we found three necessary conditions for an agent to become a boundary spanner-in-practice. These conditions have to do with an agent developing an interest (an ability and inclination to participate) in negotiating relationships between fields. The first two conditions relate to developing an ability to span boundaries, while the third relates to having an inclination to do so.

First, becoming a boundary spanner-in-practice requires becoming a legitimate, but possibly peripheral, participant in the practices of both fields. Because boundary spanning requires an ability to negotiate the relationship between the involved practices, it requires the development of, at the very least, a peripheral understanding of each practice. Drawing on Lave and Wenger (1991), a legitimate peripheral participant (LPP) gains access to the practices and artifacts of a field (legitimacy) and develops a stake in the field and in the reproduction of its practices (participation). This is not an easy task as it involves perturbing relations of power within settings and serving "as a source of power or powerlessness, in affording or preventing articulation and interchange among settings" (Lave and Wenger 1991, p. 36). To become an LPP, an agent has to exchange the different subspecies of capital he or she had accumulated in one field for capital in another field.

For example, on the basis of the cultural capital she had acquired as a marketing and strategy specialist, Maya was able to gain symbolic capital at Pubco. Yet, she was unable to exchange her cultural capital for symbolic capital as a *legitimate*, even peripheral, participant at Eserve. Also, Eserve designers joined the project late and did not have enough economic capital (time) to become *participants* in Pubco's practice. On the other hand, Dominique used his cultural capital (the understanding of sales agents' practices), economic capital (time and money to take his "Tour de France"), social capital (his contacts with the sales network), and symbolic capital (his old fame as a prominent sales agent) to become an LPP in the sales agents' field.

Second, in addition to being LPPs in both fields, boundary spanners-in-practice must have legitimacy, not only as participants, but also as *negotiators* on behalf of the field whose interests they are to represent. Being seen as a legitimate negotiator means having the symbolic capital that makes others see the agent as being capable of reshaping the practices in the field for which the agent serves as a representative. For example, initially, even after becoming LPPs in both fields, Eserve's strategy consultants were not able to negotiate the important aspects of the relationship. Because of their junior status at Eserve, in Pubco agents' eyes, they did not yet have enough legitimacy to be credible representatives of the Eserve field. They were able to gain more of this legitimacy with time as Pubco's agents realized that Eserve's rather flat organizational structure afforded a fair amount of influence even to strategy consultants who were not formally nominated to represent Eserve's interests as client partners.

Being seen as a legitimate negotiator does not require holding a dominant position (owning a lot of capital) in the field the interests of which the boundary spanner-in-practice is to represent. Dominique was able to use the symbolic capital of his Web master's position to gain legitimacy as a negotiator on behalf of various departments at headquarters. Dominique was only peripherally involved in the practices of the marketing, legal, and other departments. Thus, through the "supremely mysterious power" of nomination (Bourdieu 1998, p. 51), even peripheral participants in a given field can become legitimate negotiators. Pubco's requirements team members were dominant participants (managers) in their respective departments but, lacking the nomination, neither they nor others at Pubco saw them as legitimate negotiators on Pubco's behalf. Our data analysis suggests that either the privileged position of an agent in a given field or the nomination may be sufficient for an agent who is already an LPP in both fields to become seen as a legitimate negotiator on behalf of the field that they are supposed to represent.

Third, agents engage in boundary spanning because they develop an inclination (not necessarily a conscious motivation) to do so. Moreover, this inclination may stem from the perceived advantages associated with spanning boundaries. Frank, for instance, articulated clearly that he had no inclination to represent Pubco's interests given that he had a stronger interest in representing only Eserve's side. By contrast, strategy consultants were relative newcomers to Eserve. Thus, with fewer stakes in their full association with Eserve, they were more inclined to engage in spanning the boundary with Pubco. Dominique, on the other

hand, had motives for spanning the boundaries of diverse user groups at Insura: he was expecting symbolic rewards (promotion), cultural rewards (knowledge of how to implement distributed information systems at Insura), and economic rewards (a raise associated with promotion).

An inclination to span the boundaries of diverse fields may come not only from expecting rewards within the local fields, but also from the interests stemming from certain professional fields. Professionals such as IS project managers (like Dominique) are expected to develop skills in spanning the boundaries of diverse user fields (Pawlowski and Robey 2004).

Emergence of Boundary Objects-in-Use

Boundary objects-in-use were defined as acquiring both a local usefulness and a common identity in practice. These two parts of the definition dictate the necessary conditions for their emergence.

Consistent with prior studies (Bechky 2003; Carlile 2002), we found that for artifacts to acquire a local usefulness, agents must use and make sense of them in the context of each field. For example, Insura's marketing posters were not used by sales agents and did not make sense to them.

From Bourdieu's practice theory, we also consider what is required for an artifact-in-use to acquire a common identity, one that stems from shared symbolic capital. To develop this symbolic capital, there must be a joint field within which agents jointly recognize and value the artifact in question. Thus, many designated boundary objects that had acquired a local usefulness did not emerge as boundary objects until a joint field emerged. For example, at first, Pubco's must-have list, which was useful for each party, signified very different things: for Eserve agents, it meant that Pubco was a conservative company that did not want to listen to consultant's advice; for Pubco agents, it meant that there were certain critical functions that the Web site had to provide and that consultants were not aware of the importance of these functions.

As the joint field emerged, both parties started seeing the list as the core functionality for the Web site to support. Even though both parties still doubted that the list was the best possible choice of functionality for Pubco, they had a common vision for its meaning on the project.

Boundary Spanners-in-Practice Produce and Use Boundary Objects-in-Use

To establish the local usefulness of boundary objects-in-use *and* to establish their common identity, we found that organizations rely on boundary spanners-in-practice. However, only agents centrally engaged in the negotiation of relationships between practices and who, therefore, posses a significant amount of symbolic capital can establish an object as symbolically valuable across contexts (Bourdieu 1998, p. 57).[5] We now turn to discussing how boundary spanners-in-practice establish and coproduce boundary objects-in-use.

First, boundary spanners-in-practice reflect on objects from each field and reflect on their utility within the context of the new joint field. For example, Eserve strategists reflected on the DILO templates they found in E-share and on Pubco's old Web site while trying to understand what each could bring to the new joint field.

Second, they create new artifacts (or adopt existing ones) and attempt to establish their new identity within the new joint field. For instance, Dominique reflected on sales agents' feedback about the intranet as well as on documents produced at headquarters to design the FAQ applications which signified the relationship between agents at headquarters as advice givers and sales agents as advice seekers.

[5]To be clear, this is not to say that every relationship has to be symbolically represented through the use of an artifact (Bourdieu 1977, pp. 183-197), nor that a boundary spanner must continue being involved in the joint practice and negotiate the joint meaning of the artifact. We discuss situations in which this needs or does not need to happen elsewhere (Levina and Vaast 2005).

Third, boundary spanners-in-practice use various species of capital to establish the local usefulness and symbolic value of the artifacts they are promoting as boundary objects. Dominique, for example, used various species of capital to effectively establish the usefulness and value of various intranet applications. Specifically, he used his symbolic capital to obtain economic capital from department heads at headquarters to assign agents to answer questions posted in the FAQ folders. He also used his social capital (old contacts); cultural capital in the MIS field (knowing how to build an FAQ application), cultural capital in the professional field (knowing sales agents' work practices), cultural capital in the Insura field (knowing that Insura wanted sales agents to use certain information from headquarters), and various types of symbolic capital (as a Web master in the Insura field and as a distinguished sales agent in the professional sales field) to establish the object's usefulness and to stimulate its development and use.

Finally, as artifacts emerge as boundary objects-in-practice, boundary spanners-in-use use them to signify their position in the new joint field and the position of their field vis-à-vis others: Eserve strategists used Pubco's DILO to signify their special relationship with Pubco, which other Eservers lacked.

Implications for Information Systems Implementation and Use in Supporting Knowledge Management

IT-based artifacts have long been viewed as boundary objects intended to support the integration of expertise situated in diverse fields (Boland and Tenkasi 1995; Pawlowski and Robey 2004; Star 1989). Our contribution to the IS literature is in clarifying how IT-based artifacts can actually become boundary objects-in-use. Specifically, our analysis helps clarify how organizational actors who occupy positions of power (e.g., IS project sponsors) can weigh different tradeoffs around four questions concerning building organizational competence in boundary spanning.

1. Which boundaries should be spanned?

2. Should boundary spanners be formally nominated or emergent from practice?

3. How should agents be chosen to be nominated into boundary spanning roles (e.g., project managers or KM initiative leaders)?

4. Should the organization encourage or restrict the growth of practices surrounding IT use for boundary spanning?

First, we have argued that developing a competence in spanning a boundary among particular fields necessitates the emergence of a new joint field. As IS and KM project sponsors invest resources in spanning boundaries among these fields, they foster the emergence of a new boundary between agents who are engaged in the new joint field (boundary spanners) and agents who are not engaged in the new practice (non-spanners). The more rewards an organization associates with the growth of the new joint field, the more pronounced this new boundary becomes and the harder it becomes to span it.

For example, Eserve's leadership invested heavily in human and information systems that promoted Eserve's field as a place where strategists, technologists, and designers knew how to work together. The more Eserve's leadership invested in "building Eserve" as a field, the harder it became for outsiders (i.e., Maya) to engage in boundary spanning with Eserve agents. At the same time, the more Eserve strategists engaged in boundary spanning with the client, the harder it became for them to relate to their Eserve colleagues (i.e., designers, technologists, and people working on other projects). Although the tensions associated with implementing boundary spanning in "strong culture" organizations have been noted in the past (Carlile 2002, p. 442; Orlikowski 2002, p. 269; Wenger 1998, p. 141), our work demonstrates that these issues are prominent not only in designing organizational strategies, but also in day-to-day

practices of IS implementation and use. In the development of practices surrounding KM system use, IS project sponsors must pay attention to the ingroup/outgroup dynamics created around the newly emergent boundary (Sproull et al. 1984).

We have started by distinguishing between boundary spanning in theory and in practice. We found (in regard to the second question posed above) that the acts of nomination and designation by agents empowered in organizational fields are neither sufficient, nor necessary, for the intended practices to emerge; rather, they serve a kind of mediating role. On the one hand, having the symbolic capital associated with the nominated role helps agents who are interested in spanning boundaries to foster the emergence of a new joint field; indeed, it helps them access local fields, obtain other necessary resources, and be seen as legitimate negotiators. On the other hand, owning this symbolic capital also helps those agents who deliberately or inadvertently fail to develop an interest in developing a new joint field to prevent others from becoming boundary spanners-in-practice. Such agents use their symbolic capital to contest the legitimacy of others wanting to engage in boundary spanning or to deny them access to local practices.

KM and IS project sponsors need to be careful when providing special titles and/or roles such as knowledge brokers, KM pioneers, or client partners. Given the bureaucratic nature of organizations, the designation of such roles may be unavoidable in many cases, but it is necessary to carefully monitor how empowered agents enact these roles and whether they are using their position to prevent the emergence of alternative boundary spanners-in-practice. The fact that Insura's Web master did not designate specific individuals among local sales agents to contribute to the KM system actually helped foster the development of the new joint field as such agents emerged from practice.

The third (and related) implication of our findings pertains to the use of specific criteria for nominating boundary-spanning agents. Our findings suggest the importance of paying close attention to the positions of nominated agents within each field. Are these agents able and willing to become peripheral participants in the practices of the fields they are supposed to span? Are they willing to risk possible marginalization within these fields to gain the benefits of building the new joint field? These considerations may imply that, rather than promoting a distinguished person to a boundary spanning position (which is often the case), building an organizational competence in boundary spanning may require promoting somebody who is *less* distinguished. Beyond the considerations of "let professionals do what they are good at doing," our investigation shows that stellar professionals or strong local team players may be unwilling to become even partial participants in the practices of the other field. On the other hand, this consideration needs to be balanced with concern for the legitimacy of a nominated boundary spanner as a negotiator on behalf of a field.

Finally, a critical area of influence for system sponsors concerns how they use their symbolic, economic, cultural, and social capital to influence a cross-field adoption of IS. From our discussion, it follows that investing in a wider adoption may be problematic for several reasons. First, as IT-based artifacts are adopted widely (e.g., beyond agents involved in their initial development) they may eventually lose their boundary objects-in-use status because they may become less useful locally or lose their common identity.[6] Second, with the wider adoption of an IT-based boundary object-in-use, the value added (symbolic capital) of boundary spanners-in-practice may erode if other agents engage in the joint field and begin participating more fully in the negotiation of the relationships among fields. Thus, system spon-

[6]It is well documented that cross-field uses of IS are often in conflict with local practices (Nidumolu et al. 2001; Star and Ruhdeler 1996; Suchman 1987). Our work emphasizes the need to pay continuous attention not only to local usefulness, but also to the development and maintenance of a common identity for IT-based artifacts designed to support KM across boundaries. Failure to do so may lead to IS use that merely reifies existing boundaries (as was demonstrated in an example of a KM system implementation described by Newell et al. 2001).

sors should consider the possible emergence of resistance (see Schultze and Boland 2000). Third, system sponsors must be careful when providing incentives for the growth of systems. If rewards are widely accessible in the organizational field, the widespread adoption of, and contributions to, the system may encourage information overload, diminishing the object's local usefulness (Garud and Kumaraswamy 2005).

If system adoption is restricted, on the other hand, those agents who make use of, or contribute to, the system may start protecting their vested interests vis-à-vis nonusers. Thus, the emergence of a strong group of active users may, in the end, inhibit the wider adoption of the systems. Designing of an IT-based artifact as a boundary object "for everybody to use" (as opposed to one that is "for nominated boundary spanners to decide how to use") may help counteract this scenario. Paradoxically, geographical proximity may be detrimental to the emergence of a new joint field as nominated boundary spanners can advocate avoidance and put restrictions on IT use. In distributed contexts, there is greater incentive even for nominated boundary spanners to use IT to reduce the cost of transporting artifacts.

Contributions to Knowledge Management

The practice-based view on knowledge management in organizations draws on practice theory and on the notion of situatedness to argue that organizational competencies (knowledgeability) are embedded in practice. Whereas earlier works on this topic focused on how to build competencies within particular domains of expertise (communities of practice) (Brown and Duguid 1991), more recent works have argued that another critical aspect of such competencies is in agents' abilities to span multiple boundaries in practice (Bechky 2003; Carlile 2004; Orlikowski 2002). Our contribution to this literature is made through our investigation of how an organizational competence in boundary spanning actually *emerges* in practice. Such emergence is associated with the engagement of agents in a new joint field, a space between, through which agents develop a new interest in spanning boundaries, eventually transforming knowledge (Carlile 2004). We show how the emergence of a new joint field is facilitated by agents who become boundary spanners-in-practice and by the use of artifacts that become boundary objects-in-use. In this way, we integrate more closely extensive streams of research on boundary spanners and objects into a practice-based view of KM.

The second contribution of this paper is in using Bourdieu's theory to systematically investigate different kinds of tradeoffs involved in fostering the emergence of an organizational competence in boundary spanning. Brown and Duguid (1991) and Wegner (1998) have pointed out the tradeoffs involved in setting up formal structures for KM. Orlikowski (2002) suggested that organizations face tradeoffs associated with developing rigidity when they invest heavily in practices for spanning a specific boundary or set of boundaries. Still others have noted tradeoffs involved in providing symbolic and monetary incentives to encourage wider adoption of knowledge management systems (Garud and Kumaraswamy 2005). Looking at how new joint fields emerge in organizations allowed us to view these diverse tradeoffs through a single theoretical lens.

Finally, we draw on the IS literature to clarify how IT-based artifacts can support the development of an organizational competence in boundary-spanning by becoming boundary objects-in-use. Various types of information systems (and KM systems in particular) are often designated as tools to support KM across the boundaries of distributed groups (Alavi and Leidner 2001; Pan and Leidner 2003). In practice, however, the implementation and use of these systems often fails to fulfill expectations (McDermott 1999; Schultze and Boland 2000). Specifically, many IT-based artifacts are used solely in local contexts and do not promote the emergence of organizational competence in boundary spanning (Currie and Kerrin 2004; Newell et al. 2001). It has been argued that IT use for KM is more likely to succeed when the system is integrated into practices of particular communities (Bobrow and Whalen 2002;

Goodman and Darr 1998; McDermott 1999). Our paper illuminates how IT can be implemented and used to support KM *across boundaries* by focusing on fostering the emergence of a new joint field (a new organizational community). This view allow us to highlight specific tensions that IS project sponsors need to pay attention to when nominating project managers and growing organizational competencies in boundary spanning.

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References

Ackerman, M., and Halverson, C. "Organizational Memory: Processes, Boundary Objects, and Trajectories," in *Proceedings of the 32nd Annual Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Los Alamitos, CA, 1999, pp. 43-55.

Agar, M. *The Professional Stranger: An Informal Introduction to Ethnography*, Academic Press, New York, 1980.

Alavi, M., and Leidner, D. E. "*Review:* Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," *MIS Quarterly* (25:1), March 2001, pp. 107-136.

Aldrich, H., and Herker, D. "Boundary Spanning Roles and Organization Structure," *Academy of Management Review* (2:2), April 1977, pp. 217-230.

Allen, T. J., and Cohen, S. I. "Information Flow in Research and Development Laboratories," *Administrative Science Quarterly* (14:1), March 1969, pp. 12-19.

Ancona, D., and Caldwell, D. "Bridging the Boundary: External Activity and Performance of Organizational Teams," *Administrative Science Quarterly* (37), 1992, pp. 634-665.

Barley, S. R. "Technology as an Occasion for Structuring—Evidence from Observations of CT Scanners and the Social-Order of Radiology Departments," *Administrative Science Quarterly* (31:1), March 1986, pp. 78-108.

Baroudi, J. J. "The Impact of Role Variables on IS Personnel Work Attitudes and Intentions," *MIS Quarterly* (9:4), December 1985, pp. 341-356.

Bechky, B. A. *Crossing Occupational Boundaries: Communication and Learning on a Production Floor*, unpublished Ph.D. dissertation, Stanford University, CA, 1999.

Bechky, B. A. "Sharing Meaning Across Occupational Communities: The Transformation of Understanding on a Product Floor," *Organization Science* (14:3), May-June 2003, pp. 312-330.

Becker, H. S. *Tricks of the Trade: How to Think About Your Research While You're Doing it*, The University of Chicago Press, Chicago, 1998.

Bobrow, D., and Whalen, J. "Community Knowledge Sharing in Practice: The Eureka Story," *Reflections: Society for Organizational Learning Journal* (4:2), 2002, pp. 47-57.

Bødker, S. "Scenarios in User-Centered Design: Setting the Stage for Reflection and Action," *Interacting with Computers* (13:1), 2000, pp. 61-75.

Bødker, S. "Understanding Representation in Design," *Human-Computer Interaction* (13:2), 1998, pp. 107-125.

Boland Jr., R. J., and Tenkasi, R. V. "Perspective Making and Perspective Taking in Communities of Knowing," *Organization Science* (6:4), 1995, pp. 350-372.

Bourdieu, P. *Outline of a Theory of Practice,* Cambridge University Press, Cambridge, England, 1977.

Bourdieu, P. *Practical Reason: On the Theory of Action*, Stanford University Press, Stanford, CA, 1998.

Bourdieu, P. *The State Nobility: Elite Schools in the Field of Power,* Stanford University Press, Stanford, CA, 1996.

Bourdieu, P., and Wacquant, L. J. D. *An Invitation to Reflexive Sociology*, University of Chicago Press, Chicago, 1992.

Bowker, G., and Star, S. L. "Knowledge and Information in International Information Management: Problems of Classification and Coding," in *Information Acumen: The Understanding and Use of Knowledge in Modern Business,* L. Bud-Frierman (Ed.), Routledge, London, 1994, pp. 187-213.

Bowker, G., Timmermans, S., and Star, S. L. "Infrastructure and Organizational Transformations: Classifying Nurses' Work," in *Information Technology and Changes in Organizational Work,* W. J. Orlikowski, G. Walsham, M. R. Jones, and J. I. DeGross (Eds.), Chapman and Hall, London, 1996, pp. 344-369.

Briers, M., and Chua, W. F. "The Role of Actor-Networks and Boundary Objects in Management Accounting Change: A Field Study of an Implementation of Activity-Based Costing," *Accounting, Organizations and Society* (26:3), 2001, pp. 237-269.

Brown, J. S., and Duguid, P. "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* (2:1), 1991, pp. 40-57.

Caldwell, D. H., and O'Reilly III, C. A. "Boundary Spanning and Individual Performance: The Impact of Self-Monitoring," *Journal of Applied Psychology* (67:1), February 1982, pp. 124-127.

Carlile, P. R. "A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development," *Organization Science* (13:4), July-August 2002, pp. 442-455.

Carlile, P. R. "Transferring, Translating, and Transforming: An Integrative Framework for Managing Knowledge Across Boundaries," *Organization Science* (15:5), September-October 2004, pp. 555-568.

Carlile, P. R. *Understanding Knowledge Transformation In Product Development: Making Knowledge Manifest Through Boundary Objects*, unpublished Ph.D. dissertation, University of Michigan, Ann Arbor, 1997.

Certeau, M. D. *The Practice of Everyday Life* University of California Press, Berkeley, CA, 1984.

Contu, A., and Willmott, H. "Re-embedding Situatedness: The Importance of Power Relations in Learning Theory," *Organization Science* (14:3), May-June 2003, pp. 283-296.

Cross, R. L., and Parker, A. *The Hidden Power of Social Networks: Understanding How Work Really Gets Done in Organizations,* Harvard Business School Press, Boston, 2004.

Currie, G., and Kerrin, M. "The Limits of a Technological Fix to Knowledge Management: Epistemological, Political and Cultural Issues in the Case of Intranet Implementation," *Management Learning* (35:1), 2004, pp. 9-29.

Davenport, T. H., and Prusak, L. *Working Knowledge: How Organizations Manage What They Know,* Harvard Business School Press, Boston, 1998.

Dougherty, D. "A Practice-Centered Model of Organizational Renewal Through Product Innovation," *Strategic Management Journal* (13:Special Issue), 1992, pp. 77-92.

Dubinsky, A. J., Michaels, R. E., Kotabe, M., Lim, C. U., and Moon, H.-C. "Influence of Role Stress on Industrial Salespeople's Work Outcomes in the United States, Japan, and Korea," *Journal of International Business Studies* (23:1), 1992, pp. 77-99.

Dyer, J. H., and Singh, H. "The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage," *Academy of Management Review* (23:4), 1998, pp. 660-679.

Friedman, R. A., and Podolny, J. "Differentiation of Boundary Spanning Roles: Labor Negotiations and Implications for Role Conflict," *Administrative Science Quarterly* (37:1), 1992, pp. 28-47.

Garud, R., and Kumaraswamy, A. "Viscous and Virtuous Circles in the Management of Knowledge: The Case of Infosys Technologies," *MIS Quarterly* (29:1), March 2005, pp. 9-33.

Giddens, A. *The Constitution of Society: Outline of the Theory of Structuration,* University of California Press, Berkeley, CA, 1984.

Glaser, B. G., and Strauss, A. L. *The Discovery of Grounded Theory: Strategies for Wualitative Research,* Aldine Publishing Company, Chicago, 1967.

Goodman, P. S., and Darr, E. D. "Computer-Aided Systems and Communities: Mechanisms for Organizational Learning in Distributed Environments," *MIS Quarterly;* (22:4), 1998, pp. 417-440.

Grant, R. M. "Toward a Knowledge-Based Theory of the Firm," *Strategic Management Journal* (17:Winter), 1996, pp. 109-122.

Griffith, T. L., Sawyer, J. E., and Neale, M. A. "Virtualness and Knowledge in Teams: Managing the Love Triangle of Organizations, Individuals, and Information Technology," *MIS Quarterly* (27:2), June 2003, pp. 265-287.

Hargadon, A. *How Breakthroughs Happen: The Surprising Truth About How Companies Innovate,* Harvard Business School Press, Boston, 2003.

Hargadon, A., and Sutton, R. I. "Technology Brokering and Innovation in a Product Development Firm," *Administrative Science Quarterly* (42:4), 1997, pp. 716-749.

Henderson, K. "Flexible Sketches and Inflexible Data Bases: Visual Communication Conscription Devices, and Boundary Objects in Design Engineering," *Science, Technology, & Human Value* (16:4), 1991, pp. 448-473.

Katz, R., Tushman, M., and Allen , T. J. "The Influence of Supervisory Promotion and Network Location on Subordinate Ccareers in a Dual Ladder RD&E Setting," *Management Science* (41:5), May 1995, pp. 848-863.

Keller, R. T., and Holland, W. E. "Boundary-Spanning Roles in a Research and Development Organization: An Empirical Investigation," *Academy of Management Journal* (18:2), June 1975, pp. 388-393.

Klein, H. K., and Myers, M. D. "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly* (23:1), 1999, pp. 67-92.

Kogut, B., and Zander, U. "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology," *Organization Science* (3:3), August 1992, pp. 383-397.

Lave, J. *Cognition in Practice: Mind, Mathematics, and Culture in Everyday Life,* Cambridge University Press, Cambridge, England, 1988.

Lave, J., and Wenger, E. *Situated Learning: Legitimate Peripheral Participation,* Cambridge University Press, Cambridge, England, 1991.

Leifer, R., and Delbecq, A. "Organizational/ Environmental Interchange: A Model of Boundary Spanning Activity," *Academy of Management Review* (3:1), January 1978, pp. 40-50.

Levina, N. *Multi-Party Information Systems Development: The Challenge of Cross-Boundary Collaboration*, unpublished Ph.D. dissertation, Massachusetts Institute of Technology, 2001.

Levina, N., and Vaast, E. "Turning Collaboration into Transaction: A Case of Intranet use in Boundary-Spanning Practices," in *Proceedings of the 37th Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Los Alamitos, CA, 2005, pp. 245.1-245.10.

Liebeskind, J. P., Oliver, A. L., Zucker, L., and Brewer, M. "Social Networks, Learning, and Flexibility: Sourcing Scientific Knowledge in New Biotechnology Firms," *Organization Science* (7:4), July/August 1996, pp. 428-443.

Lysonski, S. "A Boundary Theory Investigation of the Product Manager's Role," *Journal of Marketing* (49:1), Winter 1985, pp. 26-41.

Maguire, S., Hardy, C., and Lawrence, T. B. "Institutional Entrepreneurship in Emerging Fields: HIV/AIDS Treatment Advocacy in Canada," *Academy of Management Journal* (47:5), October 2004, pp. 657-679.

Majchrzak, A., Cooper, L. P., and Neece, O. E. "Knowledge Reuse for Innovation," *Management Science* (50:2), February 2004, pp. 174-188.

McDermott, R. "Why Infomration Technology Inspired But Cannot Deliver Knowledge Management," *California Management Review* (41:4), 1999, pp. 103-117.

Nahapiet, J., and Ghoshal, S. "Social Capital, Intellectual Capital, and the Organizational Advantage," *Academy of Management Review* (23:2), April 1998, pp. 242-266.

Newell, S., Scarbrough, H., and Swan, J. "From Global Knowledge Management to Internal Electronic Fences: Contradictory Outcomes of Intranet Development," *British Journal of Management* (12:2), 2001, pp. 97-111.

Nidumolu, S. R., Subramani, M., and Aldrich, A. "Situated Learning and the Situated Knowledge Web: Exploring the Ground Beneath Knowl-

edge Management," *Journal of Management Information Systems* (18:1), 2001, pp. 115-150.

Nochur, K. S., and Allen, T. J. "Do Nominated Boundary Spanners Become Effective Technological Gatekeepers?," *IEEE Transactions on Engineering Management* (39:3), 1992, pp. 265-269.

Nonaka, I. "A Dynamic Theory of Organizational Knowledge Creation," *Organization Science* (5:1), 1994, pp. 14-37.

Orlikowski, W. J. "The Duality of Technology: Rethinking the Concept of Technology in Organizations," *Organization Science* (3:3), August 1992, pp. 398-427.

Orlikowski, W. J. "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing," *Organization Science* (13:3), May/June 2002, pp. 249-273.

Orlikowski, W. J. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations," *Organization Science* (11:4), 2000, pp. 404-428.

Pan, S. L., and Leidner, D. E. "Bridging Communities of Practice with Information Technology in Pursuit of Global Knowledge Sharing," *Journal of Strategic Information Systems* (12:1), March 2003, pp. 71-88.

Pawlowski, S. D., and Robey, D. "Bridging User Organizations: Knowledge Brokering and the Work of Information Technology Professionals," *MIS Quarterly* (28:4), December 2004, pp. 645-672.

Pettigrew, A. M. "Longitudinal Field Research on Change: Theory and Practice," *Organization Science* (1:3), August 1990, pp. 267-292.

Powell, W. W. "Neither Market nor Hierarchy: Network Forms of Organization," *Research in Organizational Behavior* (12), 1990, pp. 295-336.

Schultze, U., and Boland, R. J. "Knowledge Management Technology and the Reproduction of Knowledge Work Practices," *Journal of Strategic Information Systems* (9:2-3), 2000, pp. 193-212.

Schultze, U., and Leidner, D. E. "Studying Knowledge Management in Information Systems Research: Discourses and Theoretical Assumptions," *MIS Quarterly* (26:3), September 2002, pp. 213-242.

Singh, J., Verbeke, W., and Rhoads, G. K. "Do Organizational Practices Matter in Role Stress Processes? A Study of Direct and Moderating Effects for Marketing-Oriented Boundary Spanners," *Journal of Marketing* (60:3), July 1996, pp. 69-86.

Sproull, L., Kiesler, S., and Zubrow, D. "Encountering an Alien Culture," *Journal of Social Issues* (40:3), 1984, pp. 31-48.

Star, S. L. "The Structure of Ill-Structured Solutions: Boundary Objects and Heterogeneous Distributed Problem Solving," in *Readings in Distributed Artificial Intelligence,* M. Huhn and L. Gasser (Eds.), Morgan Kaufman, Menlo Park, CA, 1989, pp. 37-54.

Star, S. L., and Griesemer, J. R. "Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology 1907-39," *Social Studies of Science* (19), 1989, pp. 387-420.

Star, S. L., and Ruhdeler, K. "Steps Toward an Ecology Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* (7:1), 1996, pp. 111-134.

Staudenmayer, N., Tyre, M., and Perlow, L. "Time to Change: Temporal Shifts as Enablers of Organizational Change," *Organization Science* (13:5), September-October 2002, pp. 583-597.

Strauss, A. L., and Corbin, J. M. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (2nd ed.), Sage Publications, Thousand Oaks, CA, 1998.

Suchman, L. A. *Plans and Situated Actions: The Problem of Human-Machine Communication*, Cambridge University Press, Cambridge, England, 1987.

Swan, J., and Scarbrough, H. "Knowledge, Purpose and Process: Linking Knowledge Management and Innovation," in *Proceedings of the 34th Hawaii International Conference on System Sciences*, IEEE Computer Society Press, Los Alamitos, CA, 2001, pp. 1-10.

Tajfel, H. *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations*, Academic Press, London, 1978.

Tsoukas, H. "The Firm as a Distributed Knowledge System: A Constructionist Approach," *Strategic Management Journal* (17:Winter), 1996, pp. 11-25.

Tushman, M. L. "Special Boundary Roles in the Innovation Process," *Administrative Science Quarterly* (22:4), 1977, pp. 587-605.

Tushman, M. L., and Scanlan, T. J. "Boundary Spanning Individuals: Their Role in Information Transfer and Their Antecedents," *Academy of Management Journal* (24:2), June 1981, pp. 289-305.

Tyre, M. J., and Orlikowski, W. J. "Windows of Opportunity: Temporal Patterns of Technological Adaptation in Organizations," *Organization Science* (5:1), February 1994, pp. 98-118.

Verton, D. "Inadequate Systems Play Role in Columbia Disaster, Report Finds," *Computerworld*, September 1, 2003 (available online at http://www.computerworld.com/printthis/2003/0,4814,84522,00.html; accessed March 20, 2005).

Volkoff, O., Elmes, M. B., and Strong, D. M. "Enterprise Systems, Knowledge Transfer and Power Users," *Journal of Strategic Information Systems* (13:4), December 2004, pp. 279-304.

Von Hippel, E. *The Sources of Innovation*, Oxford University Press, New York, 1988.

Wenger, E. *Communities of Oractice: Learning, Meaning, and Identity,* Cambridge University Press, Cambridge, England, 1998.

Wiesenfeld, B., and Hewlin, P. "Splintered Identity and Organizational Change: The Predicament of Boundary Spanning Managers," in *Research on Managing Groups and Teams*, E. Mannix, M. A. Neale, and J. T. Plzer (Eds.), Elsevier Science Ltd., Oxford, UK, 2003, pp. 27-52.

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Appendix A

Steps to Developing a Common Viewpoint

First, each of us went through our qualitative data to write individual case descriptions following an iterative data interpretation process (Agar 1980; Becker 1998). This process resulted in a series of gradually refined monographs (Pettigrew 1990), which constituted our independent interpretations of the data (i.e., boundary spanning stories). Next, using a comparative method, we contrasted our stories within and across sites (Glaser and Strauss 1967). The contrast between the two cases helped us practice *radical doubt* (Bourdieu and Wacquant 1992, p. 235) or *suspicion* (Klein and Myers 1999): we challenged each other's conclusions and looked for confirming and disconfirming evidence to support or reject our emergent explanations. Next, we identified noticeable, intentional, and emergent shifts in practices over time within each case (i.e., new stages).

For example, in the Insura case, we identified a new stage of IS implementation based on a significant increase in the system's usage. The factors defining each stage were then contrasted within and across cases. This methodological approach allowed us to develop the notion of a new joint field. We could then explain key differences in the cases by distinguishing between nominated boundary spanners and agents who actually engaged in building new joint fields. Moreover, we could also explain differences between designated boundary objects and objects that were actually used for boundary spanning; we subsequently reinterpreted the data using these new concepts.