

Multi-party Information Systems Development: The Challenge of Cross-Boundary Collaboration

Thesis Proposal

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Abstract

IS development has always involved multiple stakeholders, but IS literature has traditionally focused on communication issues between two groups: technical developers and users. With changes in technology and the increased strategic role of IS applications, the number and diversity of stakeholders on IS projects has increased significantly. Problems of integrating the knowledge of multiple stakeholders are particularly acute in the E-commerce arena because of the novelty of this area of activity and the constant technological and business changes within it. People from diverse walks of life—business strategists, technologists, graphic designers, marketers—now need to work together to invent new E-commerce applications. In my dissertation research I conduct an ethnographic field study of a multi-party development project in an Internet consulting organization to understand how people collaborate across social boundaries to achieve results. In answering this question, I first draw on the literature of communities of practice, organizational culture, and social identity to understand the nature of *social boundaries* in organizations. I then use the lens of *communicative genres*, traditionally applied within a single community of practice, to understand the issues and conflicts that arise when different social groups have to communicate across boundaries. I then explore the role of *boundary objects*—shared artifacts that relate to the practices of multiple social groups—in cross-boundary communication practices. This research makes a first step towards developing an integrated perspective on how people share knowledge across boundaries by emphasizing the role of communicative norms, knowledge representations, and individual actors in cross-boundary collaboration practices.

Introduction

The literature on knowledge management and innovation places primary importance on the role of sharing diverse knowledge (Kogut and Zander, 1992; Liebeskind, et al., 1996; Nonaka, 1994). In this view innovation is based on successful integration of diverse knowledge (Kogut and Zander, 1992; Nonaka, 1994; von Hippel, 1994). The success of an Information System (IS) development effort has traditionally been associated with the effective combination of the business knowledge of users with the technical knowledge of IS professionals (Marcus, 1983; Orlikowski and Gash, 1994). With changes in technology and the increased strategic role of IS applications, the number and diversity of stakeholders on IS projects has increased significantly. Problems of integrating the knowledge of multiple stakeholders are particularly acute in the E-commerce arena because of the novelty of this area of activity and the constant technological and business changes within it. People from diverse walks of life—business strategists, technologists, graphic designers, marketers—now need to work together to invent new E-commerce applications. Moreover, with the growth of IS outsourcing, building information systems frequently involves various external organizations. Knowledge sharing across organizational boundaries in IS outsourcing is a critical factor in making outsourcing relationships work (Koh, et al., 1999). In short, the success of multi-party IS development efforts is dependent on the effective sharing of diverse knowledge across multiple social boundaries.

My dissertation research addresses the question of how participants on multi-party IS development projects collaborate across social boundaries to achieve results. It relies on an ethnographic field study of an Internet consulting firm looking at how this firm and its clients deal with cross-boundary collaboration challenges.

The following section discusses the literature on social boundaries, communicative genres, and boundary objects. Subsequent chapters discuss research questions, the study methodology, the research setting, expected contributions, and some anticipated challenges.

Theoretical Foundation

Social Boundaries

In order to understand knowledge sharing in heterogeneous environments, it is necessary to first clarify the nature of the heterogeneity that is creating challenges in collaboration.

The question of heterogeneity in organization has been traditionally addressed through the lens of organizational culture. This socio-cultural view is focused on uncovering shared interpretations derived from multiple interactions among people (Van Maanen and Barley, 1985). Over the years, the literature on organizational culture has shifted focus from that on cultural unity of an organization (Schein, 1992) to that of cultural fragmentation (Martin, 1992). Some researchers outright deny cultural unity arguing that

organizations consist of subcultures that are used as a differentiation mechanism (Van Maanen and Barley, 1985). Others argue that organizational culture is in a constant state of flux and ambiguity (Martin, 1992). Still others argue that culture is complex and multi-faceted:

Members of an organization are unlikely to be restricted in their membership to one single culture or subculture because people may identify with their gender, ethnic background, parent and spouse roles, sports, club, city, the university from which they hold a degree, profession, department, division, work organization, geographical region, industry, national, or greater region such as Europe, America, and Asia. (Sackmann, 1997: p. 2).

In this “complex” culture view, researchers have to focus on those cultural contexts that are salient to the circumstance (Sackmann, 1997: p. 37). The “complex” view provides us with some insights on boundaries: “boundaries between people appear and disappear, as they are marked or ignored depending on the ideas, interests, and identities that are at stake and the setting in which the interaction takes place” (Ybema, 1997: p. 164).

While the cultural perspective acknowledges multiple types of heterogeneity, it leaves us with the question of how to identify and differentiate salient boundaries. Social identity theory (Tajfel, 1978) along with social distance theory (Park, 1950) have been traditionally used to define boundaries. These perspectives view boundaries as “physical, temporal, emotional, cognitive, and/or relational limits that define entities as separate from one another” (Ashforth, et al., 2000: p. 474). Boundaries are viewed as “mental fences” that help individuals simplify and order the environment (Ashforth, et al., 2000: p. 474). The research on social identity has focused on issues of individual identification with the group (in-group) as opposed to other groups (out-group) showing that this differentiation has a strong influence on how individuals perceive other individuals (Suzuki, 1998). This research has also focused on how an individual integrates multiple identities and which identities are more *salient* in given circumstances (Ashforth, et al., 2000). While social identity theory does not pay attention to knowledge shared by the group, it does offer some useful insights into the investigation of the knowledge sharing question. In particular, it offers: 1) clarity and versatility of the definition of a *boundary* and 2) insights into psychological difficulties that organizational actors experience in sharing knowledge across boundaries; and 3) insights about which identities (boundaries) are most salient in a given context (although on an individual rather than a group level). These are useful insights yet there is still a need for the understanding of boundaries among social groups.

The ambiguity in the cultural perspective has been critiqued by practice theorists (Bourdieu, 1977; Giddens, 1984). Practice theory argues that the controversy within the socio-cultural perspective stems from the futile attempt to unambiguously define “shared interpretations” or “shared assumptions” (Lave, 1988; Lave and Wenger, 1991; Wenger, 1998). As some have pointed out, the values, assumptions, and interpretations that organizational actors draw upon change depending on the context of action (Martin,

1992). To resolve the controversy in the cultural perspective, practice theory researchers emphasize the context of everyday practices denying the ability to formulate rules (including "shared assumptions") that are outside those practices (Bourdieu, 1998; Giddens, 1984; Lave, 1988). Moreover, practice theory, particularly in the work of Bourdieu (1977; 1998; 1992), might be especially suitable for understanding the nature of social boundaries because it focuses on the differences among social groups. This is a relational theory that defines social space by the differences in dispositions:

... the main idea is that to exist within a social space, to occupy a point or to be an individual within a social space, is to differ, to be different. (Bourdieu, 1998: p. 9).

The practice theory perspective has given rise to the notion of "communities of practice" (Brown and Duguid, 1991; Lave and Wenger, 1991), which is at the mainstream of the knowledge management literature. Communities of practice are seen as "groups of interdependent participants providing a work context within which members construct both shared identities and the social context that helps those identities be shared" (Brown and Duguid, 2000: p. 9). The research on communities of practice has focused primarily on the study of homogeneous communities rather than on differences in social practices across or within communities (Brown and Duguid, 2000). Brown and Duguid (2000) noted this shortcoming in prior community of practice studies arguing that knowledge is "sticky" as well as "leaky". While it "leaks" within communities, it becomes "sticky" in transferring across communities. Carlile (1997) has looked at the issues of "sticky" knowledge by analyzing knowledge sharing practices associated with functional boundaries of product development teams. The functional boundaries considered by Carlile (1997) are demarcated by the differences in objects and ends of each group as the group addresses a given product development problem. While these practice theory based accounts have addressed the shortcoming of the cultural literature by shifting the focus from shared assumptions to practices, they have only done so in relation to the functional boundary. Other important boundaries between industries, organizations, project teams, gender groups, national identities, and age groups that have been the focus of the culture literature (Sackmann, 1997) and social identity research (Ashforth, et al., 2000) have not been examined.

In this study, I adopt a practice theory perspective as it has proved to be useful in both understanding IS design (Orlikowski, 1992; Orlikowski, 2000) and studies of collaboration in organizations (Bechky, 1999; Brown and Duguid, 1991; Carlile, 1997; Lave, 1988; Lave and Wenger, 1991; Orlikowski and Yates, 1994; Schultze, 2000). I also propose to draw on the cultural and social identity perspectives to develop a broader practice theory notion of social boundaries. For example, the psychological view on social identity is surprisingly compatible with practice-theory notions. In fact, both see the formation of social identity as an outcome of association with a social group defining social identity only in terms of the differences among groups rather than intrinsic characteristics of a group. It will be an empirical matter to investigate how these different perspectives can be usefully combined to address my research question.

Communicative Genres

Collaboration in organizations unfolds through communicative practices of organizational actors (Weick, 1987). The concept of “communicative genre” has proved to be useful in understanding communication practices in software development teams as they adopt new communication media (Orlikowski and Yates, 1994). Orlikowski and Yates (1994) define “genres of organizational communication as socially recognized types of communicative actions--such as memos, meetings, expense forms, training seminars--that are habitually enacted by members of a community to realize particular social purposes” (p. 542). I propose to extend the notion of “communicative genre” to account for the communication practices that are enacted at the boundary of several social groups. Prior studies on communicative genres focused on genres traced through electronic medium (Orlikowski and Yates, 1994; Yates, et al., 1999), the research question in this study requires an examination of both electronic and non-electronic genres. Finally, this study will focus on the evolution of the genres over the project lifetime focusing on how genres used within social groups relate to genres used to communicate across group boundaries.

One other important advantage that the communicative genre lens offers is the ability to judge genre effectiveness. Based on the definition of a communicative genre, there are two modes of failure associated with it: 1) the lack of agreement about the purpose and form of the genre (when these are not socially recognized by all parties); and 2) failing to achieve the socially recognized purposes of the genre in its enactment. The ability to define genre effectiveness is a useful tool in addressing the broader question of effective collaboration on projects.

Boundary Objects

It is well known in both the practitioner and academic literature that IS development professionals rely on schematics and prototypes to communicate with system users. Formal knowledge representations are used to capture user requirements and to serve as communication medium for project team members (Agarwal, et al., 2000). For example, requirements documents are traditional representations of business stakeholders’ requirements as well as the resource constraints of developers. Within development teams they are typically used to share the knowledge between business analysts and programmers. Representations like these can be seen as “boundary objects” because they can be used to negotiate solutions in collaborative problem solving. Boundary objects have been defined as objects that are “both plastic enough to adapt to the local needs and constraints of several parties employing them, yet robust enough to maintain a common identity across sites” (Star, 1989:46).

The concept of boundary objects comes from the social studies of science. Researchers in this field have found that heterogeneous scientific communities routinely employ boundary objects in their collaborative problem solving (Star, 1989; Star and Griesemer, 1989). Boundary objects have also been found to be useful in engineering product development (Bechky, 1999; Carlile, 1997; Henderson, 1991) and medical classification systems (Bowker and Star, 1994; Bowker, et al., 1996). In the IS literature, Boland and Tenkasi (1995) suggest that while narratives play a critical role in creating knowledge

within professional communities, boundary objects are critical for sharing knowledge across communities. Boundary objects have been found to be effective in combating knowledge sharing challenges because they made the contextual and tacit character of an individual's knowledge more accessible and visible (Carlile, 1997). They have also been seen to function as power tokens by enlarging knowledge boundaries between functions and creating a common investment (Carlile, 1997).

In this study, I will investigate the role of boundary objects in cross-boundary communicative genres. Traditionally, the genre literature has emphasized the norms of communication and the role of actors rather than the knowledge representations used in communicative practices. Our insights will be strengthened by combining the two perspectives. For example, the prior boundary objects literature has pointed to the difficulty of creating effective boundary objects (Henderson, 1991), while several studies have indicated that effective boundary objects should be concrete, in that they should be tied to the specific terms and concepts of the problem in practice (Bechky, 1999; Carlile, 1997). However, it is the concreteness of the boundary object that often makes it too restrictive to allow for different, novel interpretations of the problem (Henderson, 1991). The communicative genre lens will allow me to investigate the relationship between various characteristics of boundary objects, the norms of communication developed around them, and the role of actors involved in creating and using them.

Research Questions

The practical challenges associated with collaboration in diverse environments have led me to investigate the following question: **how do participants on multi-party IS development projects communicate across social boundaries to achieve results?** Prior literature suggests that the following specific questions should be useful in building a framework that addresses this question:

1. What is the nature of the *social boundaries* in and across organizations?
2. Which *communicative genres* emerge in multi-party IS development settings?
3. How do *communicative genres* evolve over the lifetime of an IS project?
4. What role do *boundary objects* play in cross-boundary communicative genres on IS projects?
5. Which communicative genres are *effective* in increasing the quality of IS project outcomes?

Asking these specific questions will not only address my main research question, but will also help me build the tools for addressing other research questions in the future.

Research Methodology

The study of knowledge sharing calls for the use of interpretive methods (Orlikowski and Baroudi, 1991) as knowledge is deeply imbedded in organizational practices (Bourdieu, 1977). To learn how knowledge is shared in IS development settings I have conducted an ethnographic field study of an Internet consulting firm. Internet consulting firms routinely deal with knowledge sharing challenges in their work with clients and within their cross-

disciplinary teams. For nine months I have been collecting data from four different observational settings within this firm: 1) a training program for new employees; 2) a strategic planning phase of a client project; 3) a requirements gathering and prototype development phase of the same client project; and 4) multiple projects at a Research and Development (R&D) group. Multiple observational settings allow me to compare different group practices.

Most of my data collection consisted of on-site observations of the everyday life of participants. Ethnographic techniques (Agar, 1980; Van Maanen, 1979) will be used to collect the data. Systematic iterative coding of the data will be used to develop a grounded theoretical model (Glaser and Strauss, 1967). I have visited the site four days a week on average since December 1999, attending meetings, collecting documentation, shadowing, and interviewing people from client and consulting organizations.

To develop the notion of social boundaries, I have gathered data on different characteristics of actors involved in interactions - demographic data on individuals, their professional backgrounds, etc.

To understand the development and enactment of communicative genres, I kept detailed notes of actor's everyday practices. I spent the bulk of my time observing meetings. I also shadowed individuals to see how their individual work practices influence their communication practices. In interviews, I asked participants about their communication practices in other work environments as well as about their individual purposes in communicating.

To identify boundary objects, I have kept track of various tangible knowledge representations used in practice. This is because tangibility, "the ability to hold and manipulate an object," is a key characteristic of boundary objects (Carlile, 1997). I am taking a broad view of tangibility to include electronic representations because they can be manipulated just like non-electronic ones. After examining numerous tangible representations, I am identifying those matching the definition of boundary objects.

I have completed my data collection in September 2000. As of today, the initial thematic analysis and coding of data (Glaser and Strauss, 1967) has produced some emergent categories, which I am further investigating through systematic collection, coding, and analysis.

Expected Theoretical Contributions

This research will contribute to our understanding of IS development by focusing on communication and knowledge sharing practices on IS projects. This is an important new topic in IS research (Kumar, et al., 1998; Wastell, 1999). This study will investigate collaboration practices of a wide group of developers, system owners, and users, working in a novel E-commerce arena, which will lead to a discovery of new issues and solutions. By using the boundary objects lens I hope to shed light on the role of formal system

representations in communication practices of IS project team members (Agarwal, et al., 2000). This investigation is particularly important in an IS outsourcing environment, helping us understand how vendors and clients can learn from each other (Koh, et al., 1999).

This research will also extend our understanding of boundary objects in organizations. First, it will broaden prior focus of boundary object research beyond functional or professional boundaries. Second, it will enrich our understanding of boundary objects by situating them in the context of communication genres. This will help shed light on how characteristics of boundary objects relate to communicative norms and the roles of individuals.

This work will also help extend the communicative genre concept into heterogeneous environments. Such extension will also help better understand communicative genre evolution and failure because multi-party settings are likely to challenge established genres. Understanding the use of cross-boundary communicative genres can shed light on collaboration mechanisms beyond boundary objects such as sharing narratives, creating common languages, and engaging boundary spanners.

Implications of this study will also contribute to the Computer-Supported Collaborative Work field by showing the adequacies and inadequacies of current process technology in supporting collaboration through boundary objects. Such analysis can further inform the development of more effective collaborative support tools.

This research will begin developing an integrative perspective on many issues that fall under the umbrella of collaboration in heterogeneous environments. Similar issues appear in studies of virtual, cross-functional, multi-organizational, and culturally diverse work settings. Most of the studies focus on knowledge sharing across professional groups (e.g., Bechky, 1999; Carlile, 1997; Sitkin and Brown, 1999). Work on outsourcing and innovation addresses issues of sharing knowledge across organizational boundaries (e.g., Koh, et al., 1999; von Hippel, 1994). Others study the role of national culture in communication (Suzuki, 1998). Yet others focus on organizational unit boundaries (e.g., Dixon, 2000; Szulanski, 1995). A useful cross-pollination of ideas occurs when these diverse organizational research streams are drawn under a unifying lens of collaboration across boundaries.

Expected Practical Implications

This research will have implications for the development of software engineering methodologies aimed at representing diverse knowledge in systems design. For example, object-oriented analysis methods propose that business customers and strategists share knowledge with technologists by describing the behavior of users through key business objects (Jacobson, 1993). Are these representations effective as boundary objects? Findings from my research may suggest how new software engineering methodologies can be created around useful boundary objects and communicative genres.

Organizational members spend a lot of time creating various knowledge representations and then communicating around them in meetings. "Death by PowerPoint" is a familiar expression in the consulting world. Given the resource investment that creating and using knowledge representations entails, there is value in examining and reflecting on which communication practices are more useful for achieving project goals. The theory developed here will help organizational members engage in such reflection.

Challenges

The challenge for the coming months will be to catalogue and analyze an estimated 2000 typewritten pages of data from the study. In analyzing the data set, one of the key challenges lies in making meaningful comparisons between the R&D group observations and the project team observations. Operationalizing communicative genres previously used in archival studies in an ethnographic study is also challenging. My most important theoretical challenges are in clarifying the nature of social boundaries and clarifying the concept of concreteness which, while central to boundary object research not yet been deeply understood. Finally, I see a challenge in integrating my work with the mainstream IS literature on IS analysis and design.

Conclusion

My dissertation research will advance our understanding of knowledge sharing and communication practices on multi-party product development projects as people learn to deal with a variety of social boundaries. Because communication practices are deeply embedded in the day-to-day life of practitioners they are often left unexamined despite the large amount of common frustration that they create. To understand these practices, I will first clarify the nature of heterogeneity that creates barriers to knowledge sharing by drawing on the literatures of practice theory, organizational culture, and social identity. Then I will apply and extend the notions of communicative genres and boundary objects into the multi-party IS development setting. An artful combination of these two perspectives should offer new insights into organizational theory and IS research. This work will have implications for IS Development practices, the study of multi-party collaboration in general, and the design of collaboration technologies.

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