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Source: *MIS Quarterly*, Jun., 2008, Vol. 32, No. 2, Special Issue on Information Systems Offshoring (Jun., 2008), pp. 227-255

Published by: Management Information Systems Research Center, University of Minnesota

Stable URL: <https://www.jstor.org/stable/25148839>

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COCREATING UNDERSTANDING AND VALUE IN DISTRIBUTED WORK: HOW MEMBERS OF ONSITE AND OFFSHORE VENDOR TEAMS GIVE, MAKE, DEMAND, AND BREAK SENSE¹

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Abstract

Achieving shared, common, or mutual understandings among geographically dispersed workers is a central concern in the distributed work literature. Nonetheless, little is known yet about the socio-cognitive acts and communication processes involved with synchronizing and cocreating understandings in such settings. Building on a case study of a geographically distributed information systems development project at one of India's largest offshore vendors, we postulate that knowledge and experience asymmetries, and requirements and task characteristics (such as complexity, instability, ambiguity, and novelty) prompt onsite and offshore team members to engage in acts of sensegiving, sensedemanding, and sense-breaking. This allows them to make sense of their tasks and their environment, and it increases the likelihood that congruent and actionable understandings emerge. Furthermore, it assists them in cocreating novel understandings, especially when acts of sensegiving and sensedemanding are complemented with instances of sensebreaking. Our results contribute to the literature by explaining how distributed team members mitigate problems of understanding, transfer pre-existing understandings, and co-create novel understandings. Acts of sensegiving, sensedemanding, and sensebreaking allow distributed team members to jointly explore and generate value, thereby amplifying the performance of distributed workers.

Keywords: Understanding, offshore, information systems development, ISD, social cognition, sensegiving, sense-making, sensedemanding, sensebreaking, value creation

¹This paper was recommended for acceptance by Associate Guest Editor Erran Carmel.

Introduction

Globally distributed work is burgeoning (Gibson and Cohen 2003; Griffith et al. 2003; Hinds and Kiesler 2002; Majchrzak et al. 2004), due in part to the increasing availability of competitive resource pools across the world (Cairncross 2001) and the continuous introduction of advanced collaboration technologies (Malhotra and Majchrzak 2005). Examples of distributed work arrangements include international research and development projects and global software development teams (Carmel 1999; Hinds and Kiesler 2002). A common theme across the distributed work literature concerns the influence of geographical dispersion and technology mediation on the development of shared, common, or mutual understandings (e.g., Carmel and Tjia 2005; Cramton 2001, 2002; Hinds and Bailey 2003; Hinds and Mortensen 2005; Jarvenpaa and Leidner 1999; Davis et al. 2004; Majchrzak et al. 2005; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001; Polzer et al. 2006).

Concerns related to the development of advanced understandings tend to be particularly pronounced during initial stages of collaboration as members working from different locations tend to hold different accounts (see Lawrence and Maitlis 2007) or conceptions of reality (see Witt 1998, 2000). These differences may not only cause challenges of understanding, such as distrust, conflict, and misinterpretation (Cronin and Weingart 2007; Vlaar et al. 2006), but they may also complicate the transfer and transformation of preexisting understandings and the cocreation of novel understandings (see Baba et al. 2004; Bechky 2006; Gergen et al. 2001; Hargadon and Bechky 2006). This may ultimately restrict opportunities for innovation and value creation (Lepak et al. 2007; Sandberg and Targama 2007; Witt 1998, 2000).

Although the literature on distributed work recognizes the origins of such challenges—for example, contextual differences, task characteristics, and failures in communication (Cramton 2001; Hinds and Mortensen 2005; Maznevski and Chudoba 2000)—it remains relatively silent on the socio-cognitive acts and communication processes used to advance understandings (for notable exceptions, see Ahuja and Galvin 2003; Cramton 2001; Davidson 2002; Galliers and Swan 2000; Gibson and Earley 2007; Hargadon and Bechky 2006). In response to these observations and calls from several scholars (e.g., Cullen et al. 2005; Hinds and Mortensen 2005; Kellogg et al. 2006; Majchrzak et al. 2005), we therefore explore the following research question: *Which socio-cognitive acts and communication processes do members of distributed work teams use to advance their understandings?*

To investigate this question, we adopt a socio-cognitive perspective on distributed work, presuming that individuals construct their understanding in conjunction with others (i.e. they are socially constructed; for examples, see Cramton 2001; Damian and Chisan 2006; Davidson 2002; Gergen et al. 2001; Gibson and Earley 2007). To substantiate our argument, we conduct a case study of an offshore information systems development project at one of India's largest outsourcing vendors. We opt for offshore ISD outsourcing, which refers to the subcontracting of an activity by a client organization to an independent service provider working from an overseas destination (Carmel and Agarwal 2002; Lewin and Peeters 2006), because it comprises a form of distributed work that has witnessed considerable growth during the last decades. Organizations are increasingly compelled to offshore work to countries such as India, China, Russia, and the Philippines (see Carmel and Agarwal 2002; King 2006; Rottman and Lacity 2006), due to competitive pressures that force them to focus on their core activities, reduce costs, and improve responsiveness (Kern et al. 2002). This development is reinforced by the growing sophistication of data and communication technologies and differences in the availability of skilled IT professionals and comparative costs of ISD work across the world.

In the spring of 2006, we solicited data and perceptions from 18 members of onsite and offshore teams located in New Jersey (i.e., the client site) and Bangalore, India, respectively. Our analysis of their rich and in-depth accounts of communication practices used in four distinct ISD modules resulted in a conceptual framework that depicts the development of understanding as an iterative sequence of socio-cognitive acts and processes. This sequence consists of sensemaking, sensegiving, sensedemanding, and sensebreaking (see Figure 1). Consistent with prior research (e.g., Bhat et al. 2006; Kijkuit and Van den Ende 2007; Ko et al. 2005; Lin et al. 2005; Ramirez et al. 2002), we postulate that knowledge and experience asymmetries and complex, novel, ambiguous, and unstable requirements and tasks prompt onsite and offshore vendor team members to engage in acts of sensegiving, sensedemanding, and sensebreaking. We further propose that these acts increase the likelihood that congruent and actionable understandings emerge. Finally, we advance the concept that team members' engagement in iterative communication cycles not only diminishes problems of understanding (e.g., Cronin and Weingart 2007; Vlaar et al. 2006), but we also contend that it enables the transfer of preexisting understandings and the cocreation of novel understandings (see also Bechky 2006; Gergen et al. 2001; Hargadon and Bechky 2006), particularly when acts of sensegiving and sensedemanding are complemented with instances of sensebreaking.

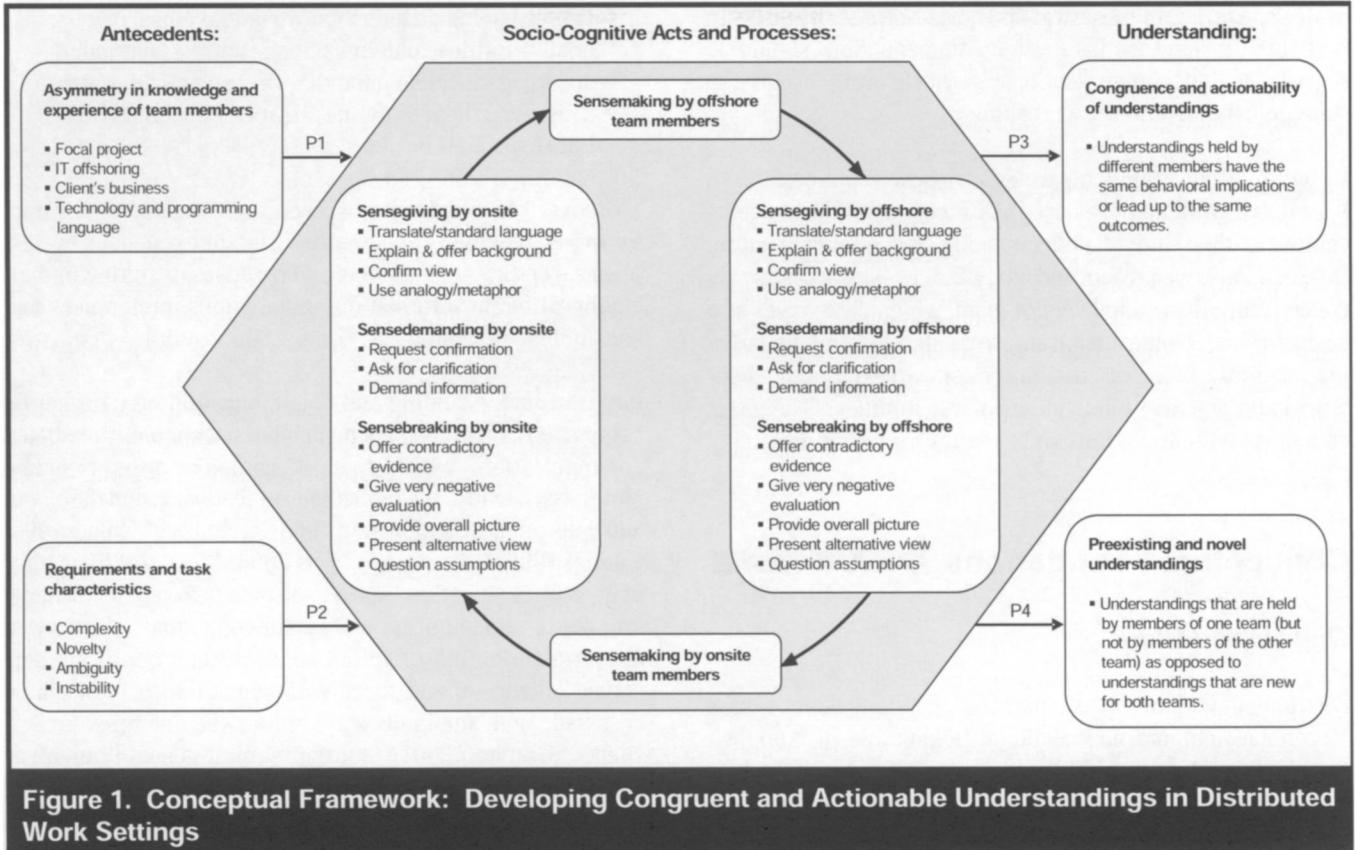


Figure 1. Conceptual Framework: Developing Congruent and Actionable Understandings in Distributed Work Settings

Our study contributes to the literature on distributed work by examining how geographically distributed team members cocreate understandings and value. While researchers have acknowledged that it is sometimes “hard to do work across dispersed groups” (Metiu 2006, p. 418), we highlight some of the acts that are used to alleviate problems of understanding, accomplish complex tasks, and create value in such settings. The latter becomes more significant as distributed work increasingly involves innovative projects that are global in scope and conducive to business growth instead of quick palliatives to reduce cost (see Herbsleb and Moitra 2001; Lewin and Peeters 2006; Rottman and Lacity 2006). In 2005, ABN AMRO bank, for example, entered into an offshore outsourcing agreement with Accenture, IBM, Infosys Technologies, Patni Computer Systems, and Tata Consultancy Services worth over U.S. \$2 billion, for which ISD activities needed to be distributed throughout Europe, Latin America, and India (McDougall 2005). Such initiatives entail complex and innovative tasks, which aggravate challenges of understanding and increase the need to jointly explore how value can best be created.

This paper contributes to the literature on offshore ISD by focusing on the nature of micro-level interactions between vendor teams and by delineating its outcomes (Cannon-Bowers and Salas 2001) in terms of different types of understandings. It moves beyond treating communication as a monolithic concept (Ahuja and Galvin 2003) by highlighting the socio-cognitive acts of communication used to alleviate problems of understanding, transfer preexisting understandings, and cocreate novel understandings. Focusing on intra-vendor teams, our results complement prior research on offshore ISD examining strategic or macro level issues from a client perspective (e.g., Carmel and Agarwal 2001; Feeny et al. 2005). Through exploring the acts used by vendor team members to meaningfully interrelate their understandings, the paper builds on and extends earlier work stressing the need for frequent and intense communication (Herbsleb and Moitra 2001; Prikladnicki et al. 2003), temporal coordination mechanisms (Hinds and Bailey 2003; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001), sophisticated communication tools (Cramton 2001; Sinha et al. 2006), comprehensive requirements documents (Hull et al. 2005; Wiegers 2006), and an effective division and structure of work in distributed ISD

projects (Carmel and Agarwal 2001; Malhotra et al. 2001). In particular, it suggests that these recommendations should be regarded in light of their relationship with acts of sensegiving, sensedemanding and sensebreaking.

In building our argument, we first review the literature on distributed work and offshore ISD, focusing on the concepts central to this study: understanding and communication. Subsequently, we present and analyze a revelatory case study concerning a distributed vendor team, which then serves as a basis for our conceptual framework and several tentative propositions. In the discussion section, we explore the theoretical and practical implications of our findings. The paper concludes with limitations and avenues for future research.

Conceptual Foundations

Distributed Work

Distributed work involves collaboration among teams across "locational, temporal and relational boundaries to accomplish an interdependent task" (Martins et al. 2004, p. 808). It is characterized by geographic dispersion, reliance on electronic media, and national diversity (Carmel 1999; Griffith et al. 2003), which form "a centrifugal force that propels team members apart from each other," causing breakdowns in communication, coordination, control, and cohesion (Carmel and Tjia 2005, p. 151). Scholars have alluded to the role of communication in distributed work settings as it affects, among others, collaboration (Majchrzak et al. 2005; Sarkar and Sahay 2003), trust (Jarvenpaa and Liedner 1999), conflict (Hinds and Bailey 2003; Hinds and Mortensen 2005), and team dynamics (Cramton and Hinds 2005; Metiu 2006). Specifically, members in distributed work settings encounter challenges related to information exchange and process transparency (Cramton and Orvis 2003); isolation, detachment, identity and status (Ahuja and Galvin 2003; Kirkman et al. 2002; Metiu 2006; Polzer et al. 2006); attribution and interpretation (Armstrong and Cole 2002; Sole and Edmondson 2002); and the development of mutual, common, or shared understandings (Cramton 2001; Postrel 2002).

Large geographic distances and differences in culture, background, and experience among team members complicate communication and understanding in remote collaborations (Carmel 1999; Cramton and Hinds 2005; Damian and Chisan 2006; Metiu 2006; Sinha et al. 2006). Cramton and Hinds (2005, p. 236), for example, argue that differences in demographic attributes and individual backgrounds may result in

people having different worldviews, values, beliefs, goal priorities and behavioral norms, and being accorded different amounts of power and status. This leads them to define situations differently, see issues differently.

Moreover, as distributed workers are situated in distinct locations, they will "experience different exogenous events, physical settings, constraints and practices, resulting in their having different information, assumptions, preferences and constraints" (Cramton and Hinds 2005, p. 236).

Issues of understanding and communication may further be aggravated by members' dependence on technology mediated communication, which reduces communication richness, closeness of teams, the immediacy of feedback, and the extent and rate of information transfer (Carlson and Zmud 1999; Carmel 1999; Gibson and Gibbs 2006; Metiu 2006). Moreover, communication across distance frequently entails failures to communicate and retain contextual information, uneven distribution of information, differences in the perceived salience of and speed with which information can be accessed, and ambiguities regarding the interpretation of silence (Cramton 2001). Furthermore, it generally involves diminished opportunities for face-to-face, synchronous, informal, and spontaneous communication (Carmel and Tjia 2005; Herbsleb and Mockus 2003; Maznevski and Chudoba 2000). In particular, challenges of understanding and communication are more salient in geographically distributed teams than in collocated teams due to the absence of shared context (Hinds and Bailey 2003; Kiesler and Cummings 2002) and team members' lack of awareness of distant knowledge (Sole and Edmondson 2002). In contrast to collocated teams, distributed team members can rely less on visual inspection and observation, demonstration of problems, non-verbal expressions (e.g., facial or body movements) expressions, and ongoing or spontaneous conversations (Becky 2003; Cramton and Orvis 2003; Montoya-Weiss et al. 2001). This may cause issues to go unrecognized or lie unresolved for prolonged periods of time (Herbsleb and Moitra 2001), and it requires members of distributed teams to spend considerable time on reviewing, clarifying, and resolving the meaning of issues resulting in delays and costly communication processes (Rottman and Lacity 2006; Wiegers 2006).

Offshore ISD and Requirements Development

Offshore ISD represents a particular form of distributed work, which has characteristics that inhibit communication and development of understandings among team members beyond the ones already discussed. First, offshore ISD involves an

indirect communication setup: most of the vendor employees reside at offshore delivery centers, usually in India, Eastern Europe, or Latin America (Carmel 1999), while relatively few of them are located at client locations (e.g., North America, Europe, Singapore, and Japan). Onsite team members closely interact with the client to gauge requirements and transfer these to the offshore team, which then completes the work and sends it back to the onsite team that eventually arranges delivery to the customer (Krishna et al. 2004). On the one hand, this indirect setup reduces economic costs, as the majority of the project members reside in a low cost location. On the other hand, it also amplifies coordination costs and challenges related to the development of understandings, as both onsite and offshore teams have to cope with a lack of shared context and information (Carmel 1999; Carmel and Agarwal 2002; Herbsleb and Mockus 2003). Second, relationships between onsite and offshore vendor teams are characterized by *asymmetries in knowledge and experience*. Onsite teams tend to consist of highly experienced and competent members that interact with the client, whereas offshore teams represent a mix of experienced and novice employees. Offshore centers serve as a learning ground for new recruits, and attrition—a growing concern for offshore vendors—generally leads to a high turnover of employees. This structure entails inherent knowledge and experience asymmetries between onsite and offshore vendor teams, increasing the potential for misunderstandings.

Challenges of communication and understanding in offshore ISD are most pronounced during requirements development, which we define as the framing of expectations concerning the business value and technical properties of information systems (Davidson 2002; Nuseibeh and Easterbrook 2000). First, the craft character of software imposes the need for interactivity among developers, but the exchange of documents is generally insufficient for making the rationale behind a code transparent to others (Metiu 2006). Second, software development generally entails high levels of ambiguity and uncertainty, causing inconsistencies and differences in perception and understanding among stakeholders (Kellogg et al. 2006; Kraut and Streeter 1995). Third, stakeholders possess different and evolving interests and conceptions of reality, making it difficult to interpret and analyze requirements (Bergman et al. 2002; Brooks 1975; Gorschek and Wohlin 2006; Nuseibeh and Easterbrook 2000). The resulting problems of communication and understanding are significant as requirements development is considered a crucial activity for ISD (Aurum and Wohlin 2005; Davidson 2002; Sommerville and Sawyer 1997). Better understandings of software requirements may help stakeholders to select and prioritize projects and minimize efforts wasted on unnecessary functionality, while reducing feature creep, defects, and rework (Damian

and Chisan 2006; Wiegers 2006). Moreover, consequences of errors, omissions, or misunderstandings in requirements development tend to cascade into later phases of software development (Edwards 2005), causing it to be significant beyond “a single phase that is carried out and completed at the outset of product development” (Hull et al. 2005, p. 6).

Empirical evidence on the challenges associated with requirements development in offshore ISD is starting to accumulate. In a study involving U.S., Dutch, and Indian practitioners, Sinha et al. (2006, pp. 52–53), for example, found that “communicating and managing requirements in a distributed setting” was their primary concern. Similarly, Damian and Zowghi (2003, p. 158) advanced that improving “communication between remote stakeholders will have the greatest effect in reducing the impact of global collaboration on managing requirements in multi-site organizations.” Accordingly, scholars conjecture that the micro-processes involved in advancing understandings during requirements development deserve closer examination (Damian and Zowghi 2003; Davidson 2002; Hull et al. 2005).

Understanding and Communication

In line with these observations, understanding and communication have emerged as central concepts in the literature on distributed work (see Cramton 2001; Hinds and Bailey 2003; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001) and in the literature on offshore ISD in particular (e.g., Levina and Ross 2003; Majchrzak et al. 2005; Metiu 2006; Polzer et al. 2006; Sarker and Sahay 2004). They are likely to further gain in importance as people increasingly act not only according to “their understanding of the rules and routines governing their work,” but also according to their understanding of “tasks and the reality in which they act” (Sandberg and Targama 2007, p. 9). Understanding and communication thus progressively serve as a basis for coordinated and collective action (Cronin and Weingart 2007; Rathe and Witt 2001; Vlaar et al. 2006; Witt 1998, 2000).

But what do we mean with understanding? The notion of understanding implies that individuals use their cognitive capability to think about an issue in their task environment (Spender 1996). They focus their attention on a particular phenomenon and invest mental efforts in developing more meaningful and elaborate thoughts (Bakhtin 1986; Weick et al. 2005). Researchers have developed numerous labels to describe understandings that are in some sense similar, shared, overlapping, compatible, or complementary (see Cannon-Bowers and Salas 2001). Following Cronin and Weingart (2007) and Sandberg and Targama (2007), we focus

on understandings that are at least congruent with each other, so that different parties envision comparable behaviors and outcomes. Taking this position is warranted by the fact that individual understandings almost always differ (Bechky 2003; Donnellon et al. 1986; Gibson 2001; Maitlis 2005; Ngwenyama and Lee 1997). After all, people will generally understand, interpret, and attend to situations differently (Baba et al. 2004; Cronin and Weingart 2007) because of structural differences in prior experience (Balogun and Johnson 2004), bounded rationality (Simon 1997), and discrepancies in interests and objectives among stakeholders (Vlaar et al. 2006).

By focusing on congruent and actionable instead of shared, mutual, or common understandings (see Donnellon et al. 1986; Weick and Roberts, 1993), we thus avoid becoming “trapped” in recommending practitioners to engage in costly and time-consuming activities such as education and training to equalize their knowledge and experience. The latter would cause benefits from specialization to dissipate (see also Grant 1996) and it potentially interferes with creativity and innovation by homogenizing diverse perspectives (Cannon-Bowers and Salas 2001; Cronin and Weingart 2007; Levina and Vaast 2005). Instead, we recognize that the goal should be not to reduce diversity in perspectives, but rather to capitalize on distinct views in order to cocreate understandings that are sufficiently congruent and actionable so as to achieve purposeful collective action. We also deliberately use the plural noun in discussing congruent and actionable understandings, rejecting the notion that multiple individuals may hold a single thought and form a single brain (Bigley and Roberts 2001; Cronin and Weingart, 2007; Donnellon et al. 1986; Weick and Roberts 1993). Next, we explore the adjectives *congruent* and *actionable* in more detail.

The term *congruence* qualifies the relationship between the expectations held and the actions and outcomes produced by different individuals (Weick 2006; Weick et al. 2005). From a hermeneutics point of view, it indicates that understandings have to be at a minimum consistent or compatible. Particularly, congruence refers to the extent to which person A’s and person B’s understandings of a certain task interrelate in a fashion that is perceived as being coherent and compatible (see Gaehde and Hartmann 2006; Gibson 2001).

Concerning actionability, we advance that although members may develop congruent understandings, they may still be unable to act upon these understanding due to a lack of information and resources, or because of organizational and contextual constraints (Cramton 2001; Hull et al. 2005; Johns 2006). Actionability thus refers to the capability of members to configure and execute action patterns in a manner coher-

ently tied to someone else’s expectations. To be congruent and actionable, understandings then need to have the same behavioral implications or lead to the same outcomes (Cronin and Weingart 2007; Donnellon et al. 1986).

We advance that understandings of different people become more congruent and actionable with each other if they fulfill at least three conditions. First, individuals should direct their thinking toward the same behaviors or outcomes. In software development this involves questions such as “Are we building the right product?” and “Are we building the product right?” (Katasonov and Sakkinen 2006). Second, individuals should have the same temporal orientation (see Bardram 2000; Emirbayer and Mische 1998) in that they are either considering things retrospectively (Weick 1995), focusing on the here and now, or contemplating on future behavior and outcomes. In the case of IS requirements development, the focus is commonly on the latter category, involving the development of expectations about the behavior and output that should be produced by oneself and other (Weick 2006; Weick et al. 2005). After all, requirements tend to serve as a basis for future behavior and outcomes. Third, individuals have the ability to translate their understanding into actions contributing to collective value creation.

Considering these conditions, understandings of tasks and requirements are thus less likely to be congruent and actionable if individuals (1) focus their thinking on different outcomes and/or behaviors; (2) adopt distinct time orientations; and/or (3) cannot act upon their understandings.

Methods

Presuming that congruent and actionable understandings are socially constructed and that they emerge from iterative communication processes (see Cramton 2001; Damian and Chisan 2006; Davidson 2002; Gergen et al. 2001; Gibson and Earley 2007), we conducted a case study to examine our research question. Case studies are ideally suited when the investigator has limited control over events and boundaries of a phenomenon (i.e., developing understandings) and when the phenomenon and the context in which it is investigated (i.e., offshore outsourcing) are unclear or closely related (Yin 2002). Challenges of understanding and communication within offshore ISD projects satisfy these criteria. Moreover, case studies provide “a source of well grounded, rich descriptions and explanations of processes occurring in local contexts” (Miles and Huberman 1994, p. 15), which makes them well suited for studying and building theory on emergent

phenomena at the micro-level, including communication and understanding (Baba et al. 2004; Eisenhardt and Graebner 2007). Following Eisenhardt (1989, p. 536), we started with *a priori* definitions of the central constructs in our study, which helped us in developing "firmer empirical grounding for the emergent theory." At the same time, we deliberately selected an inductive pathway guided by broad research questions rather than *a priori* hypotheses, with the aim of generating propositions (consistent with Baba et al. 2004).

Case Selection

We applied two case selection criteria. First, we focused on an Indian vendor, as India is the world's leading offshore outsourcing destination and because Indian vendors such as Infosys Technologies and Tata Consultancy Services have become more and more sophisticated (Lewin and Peeters 2006). Offshore IT-services and back-office work in India are expected to grow into a U.S. \$57 billion annual export industry in 2008 (Kripalani and Engardio 2003), and 40 percent of the companies that have achieved a level-five CMM certification currently reside in India (King 2006). Additionally, one of us worked at a major Indian offshore vendor for more than 2.5 years on projects for a U.S. retail chain and a U.S. insurance firm. He therefore had intimate experience with working in an Indian offshore vendor team (first as a junior programmer, later as a module leader), enabling him to empathize with our informants. This also provided us with the opportunity to interview participants in their native language (Hindi), thus diminishing potential misinterpretations arising from cultural differences. The Western backgrounds of the other authors further enriched discussions and enabled us to view the case from multiple angles.

Second, we decided to focus on communication and understanding among members of onsite and offshore vendor teams. ISD vendor studies are still rare (Levina and Ross 2003), partly because of language problems and confidentiality agreements between vendors and clients. However, a focus on distributed vendor teams promises to reduce potentially confounding effects emanating from incentive and contracting issues, or from top management inexperience with ISD offshoring. These issues are more likely to surface in studies on client–vendor relationships. In line with this argument, we selected a project conducted for a client in the financial services industry, as such firms were the first to experiment with offshore outsourcing setups, and as they comprise the major revenue generators for Indian offshore vendors (Lewin and Peeters 2006). This makes them relatively mature in working with offshore vendors, reducing the risk that problems stemming from inexperience with off-

shoring, or from incentive and contracting issues cascade from the client–vendor relationship into the onsite–offshore vendor team relationship. After exchanging ideas with project managers, the FINANCE project (fictitious name) was chosen, as it satisfied all selection criteria. This project represents a revelatory case study (Levina and Ross 2003; Yin 2002), offering us unique access to members of onsite and offshore vendor teams.

Data Collection and Data Analysis

As we intended to investigate the development of congruent and actionable understandings within a real-life context and because the vendor firm was prohibited from sharing behavioral data with third parties, we chose to elicit the stories and accounts of onsite and offshore team members concerning the latest requirements upon which they had worked. This minimized the risk that participants displayed retrospective bias, and that they forgot some of the subtleties in their interactions with members of the other team. Data was collected from various data sources and with the help of different data collection methods, enabling triangulation (Eisenhardt 1989). We used unstructured and semi-structured interviews, surveys, documents, and e-mail exchanges to establish a clearer picture of the patterns of communication and understanding that were ensuing among members of onsite and offshore ISD vendor teams. Each step of the research process was explicitly operationalized and documented, which enhanced the reliability of our inquiry (see Yin 2002).

In May 2006, we conducted 18 interviews, 8 with onsite and 10 with offshore team members, spread over four project modules (Table 1). The interviews, which were guided by a semi-structured interview protocol (Appendix A), were conducted over the phone, as our informants worked in geographically remote locations. The interviews were held in either English or Hindi, allowing informants to speak in their mother tongue, and increasing their comfort level, so that they would candidly share their views and ideas. Follow-up e-mails were sent to request clarifications and to offer informants the opportunity to provide feedback. Interviews were all recorded and fully transcribed (the ones in Hindi were translated into English). Subsequently, we sent a tailored survey to members of the onsite and the offshore team (for the onsite version, which is comparable to the offshore version, see Appendix B). The aim of this survey ($n = 18$) was to obtain more information about the team members, such as their level of experience and expertise. Another survey ($n = 52$) was distributed among offshore vendor personnel in different projects to assess which factors they considered most important for project success.

Table 1. Overview of Interviewees

Location	Name*	Location	Role	Date (M/D/Y)
Onsite (New Jersey)	Mr. SK	Onsite	Team Member	05/03/2006
	Mr. VM	Onsite	Team Member	05/22/2006
	Mr. AK	Onsite	Team Member	05/08/2006
	Mr. NS	Onsite	Project Leader	05/06/2006
	Mr. NK	Onsite	Team Member	05/06/2006
	Mr. AB	Onsite	Team Member	05/08/2006
	Mr. GK	Onsite	Team Member	05/22/2006
	Ms. AB	Onsite	Team Member	05/06/2006
Offshore (Bangalore, India)	Mr. GS	Offshore	Team Member	05/16/2006
	Mr. NP	Offshore	Team Member	05/11/2006
	Mr. VR	Offshore	Team Member	05/21/2006
	Ms. NH	Offshore	Team Member	05/09/2006
	Mr. AR	Offshore	Team Member	05/10/2006
	Mr. YP	Offshore	Team Member	05/11/2006
	Mr. RK	Offshore	Team Member	05/11/2006
	Mr. RM	Offshore	Team Member	05/16/2006
	Mr. RP	Offshore	Team Member	05/12/2006
	Mr. SK	Offshore	Team Member	05/13/2006

*For reasons of confidentiality, we use abbreviations here.

The initial analyses occurred parallel to data collection (Eisenhardt 1989). While conducting the interviews, listening to the tapes, and reading transcripts, we wrote down extensive comments and discussed potential themes, impressions, and patterns in the data. Data analysis then proceeded through several overlapping phases (Levina and Ross 2003; Pettigrew 1990). We started by writing an extensive case description (Eisenhardt 1989), which included project history, project setup, daily activities, communicative practices, and requirements-related processes. This was primarily done by the third author, while the other two authors, based on their conceptions of the case and their discussions with the third author, reviewed and modified the write-up. In the next phase, we concentrated on studying particular instances where misunderstandings or misinterpretations occurred, and on situations in which participants noted that understandings were transferred, advanced, or transformed. We closely examined the connections between communicative acts, possible antecedents, and the development of understandings. Our finding and observations were shared with colleagues in several informal conversations, seminars, and conferences. This helped us in achieving more precise and convergent

thoughts on the practices and processes that vendor team members used to advance their understandings.

In the final phase, we connected emergent themes and ideas with theoretical concepts from the literature (Pettigrew 1990). We adopted Van Maanen's (1979) approach and proceeded from facts to first-order concepts to higher-order themes, going from interview texts to themes by using open-coding techniques, matrices, checklists, and causal diagrams (Miles and Huberman 1994; Strauss and Corbin 1998). Constant comparison was used to make sure that the themes were relevant and salient across multiple interviews. Each of the authors reread the interview transcripts several times to link empirical evidence to recurring themes and to develop new themes. After each major iteration, discussions were held to identify and resolve differences in interpretation, refine themes, and test their connections with the data. Additionally, we organized regular chat, Skype, and face-to-face sessions among the authors, ranging from 15 minutes to 4 hours in which we discussed emerging themes and reviewer comments, and in which we shared insights from the literature. E-mail traffic was intense as well (more than 600 e-mails were

exchanged between us during the period of writing and revising the paper). In further analyzing the data, we continuously grouped the themes to generate concepts and we used multiple causal diagrams to explore relationships between these concepts, while simultaneously assessing their relations with theoretical notions in the literature. Finally, we connected concepts and developed the analytical framework presented in Figure 1.

Results: Case Description and Analysis

The offshore vendor is part of one of India's largest conglomerates, with revenues of more than U.S. \$12 billion in 2006. It is considered one of the world's leading global IT services firms, employing more than 90,000 people. The company's clients include various Fortune 500 companies. Several of the company's ISD centers are assessed at level five of the capability maturity model. Clients include firms in industries such as financial services, manufacturing, telecommunications, and media and entertainment. The FINANCE project was initiated for a leading U.S. financial institution in 2002, with New Jersey as the client and onsite vendor team location, and Bangalore, India, as the offshore team location. The project, situated in the vendor's application services department, had generated revenues of around U.S. \$1 million over the last 4 years.

The FINANCE project was divided into four modules (see Appendix C). We intentionally selected multiple modules within this project so as to augment the diversity of issue domains and characteristics affecting communication and understanding in our empirical study. This would enhance the generalizability of our findings (see also Maitlis and Lawrence 2007). The project involved four different programming and controlling languages: IBM's Job Control Language (JCL), IBM's Report Program Generator II (RPG II), FOCUS, and VPLUS. The system (platform) used was an HP 3000, a midrange mainframe machine released by Hewlett Packard in 1973. The main application used to manage distributed software development was a configuration management tool called ChangeMan. The offshore team was working directly on the client's machines in the U.S. through a virtual private network. To enable version control of various documents and program files, offshore used Microsoft's Virtual SourceSafe. Communication between onsite and offshore team members primarily involved conference calls and e-mail traffic. Instant messaging was rarely used due to significant time-zone differences between the onsite and offshore location.

Although the size and composition of the onsite and offshore project teams changed over the years, in May 2006, the onsite team consisted of nine members, including a project leader responsible for the interface with the client. The offshore team comprised 13 members, including a project leader responsible for project management. Most of the offshore team members had not visited the client site nor had they met onsite team members personally. Information on tasks and requirements came primarily in the form of documentation composed by the onsite team. In the initial stages, offshore team members tried to understand the content of these documents and they attempted to understand the written text, based on their comprehension of IS development terminologies and their experience with the project. From the requirements document, they could only develop a narrow conception of the actual requirements issued by the client's business users, as is illustrated by the following quotes.

We were given requirement documents, and we started with those documents....We faced so many things when we started...many unexpected things. I can understand the requirements, but onsite knows more. (Interview with YP, Offshore)

They do deliver what they are asked, but since they don't carry the same perspective, you have to very specifically ask them about particular things....The way you think is not necessarily the way they think. (Interview with GK, Onsite)

The problem with these technical documents was that offshore team members could only develop literal understandings of the requirements. They were not really able to relate the text to the context from which these requirements originated and to the final systems in which they had to function. This caused misunderstandings between members of onsite and offshore vendor teams.

For certain functionality we have made a document and sent it off to request changes and testing to be done....They [offshore] construct or change things according to the technical document...but they cannot test the global picture, the aim of the business, the impact on upstream and downstream, and whether it is fulfilling business requirements or not. They cannot assess these things. That is why there are gaps. (Interview with NS, Onsite)

Knowledge and Experience Asymmetries

Onsite team members noted that the offshore team was hardly exposed to information about the client's business. A lack of

business knowledge caused severe problems, as offshore team members did not understand the intention or rationale behind the clues offered by onsite.

This project is strongly dependent on business knowledge. It is very important for the project. When online changes were needed, we asked [offshore] to conduct these changes, taking into account their impact on a certain type of loans. But they did not consider these loans and said it was not mentioned in the document....It was mentioned, but in business terms. (Interview with AB, Onsite)

Moreover, it appeared that offshore team members did not have sufficient knowledge of particular technologies and programming languages. They therefore did not fully understand the terminologies and technological jargon used in the requirements documents.

People in Bangalore did not have expertise of that particular technology. They had done AS 400 trainings or they had experience of AS 400, but they didn't have knowledge of the HP 3000 platform and the perspective needed for HP 3000. So, when we sent them the requirements document, they analyzed it, but for some part they analyzed it in AS 400 and for some part in HP 3000. Consequently, they couldn't come down to the actual thing. (Interview with NS, Onsite)

Experienced members at offshore generally found it easier to understand requirements and did not need as much communication compared to novices.

There are very few people in the offshore team with more than one or one and a half years of experience in the project. These people usually guide the others. When we work on a requirement with them, it becomes much easier....We don't have to tell them too much. (Interview with AK, Onsite)

Offshore team members that had previously worked onsite brought valuable experience regarding the onsite-offshore setup. These members had lived in a different context and they had learned how the setup worked best.

When I was in offshore, we had other people with us who had been at onsite for different projects. This helped us, because we could ask things and confirm our doubts with these senior people rather than calling or mailing onsite. (Interview with NK, Onsite)

Once a person has been at the onsite of any project and interacted with the client, he carries the same perspective....Half of the time, people at offshore don't know what is happening, but if someone has been onsite and he understands the background behind the job, then he has a better view on what onsite wants. (Interview with GK, Onsite)

Task and Requirements Characteristics

Problems of understanding and the need for intense communication not only emerged from asymmetries in knowledge and experience between vendor teams, but they also stemmed from particular requirements characteristics. Especially when offshore team members perceived tasks and requirements to be complex or ambiguous, it became more difficult for them to understand what was expected. Moreover, when requirements were unstable or continuously changing, offshore team members increasingly became confused and misunderstandings arose. This sharply increased the need for communication.

I had sent a requirement offshore to make some changes in the code, but then the client asked to make other changes, which were different from the previous ones. When I communicated this to offshore, they got confused. (Interview with NK, Onsite)

We received the requirements document and they explained to us what the aim of the exercise was [in a teleconference]. The first two days, they were only explaining the requirements. Subsequently, we started developing the tool. After one week, they asked us to change the complete logic and to present output in another format. There was a big slippage in the schedule and when we submitted, there were a lot of bugs. It sort of oscillated between here and there. (Interview with AR, Offshore)

Additionally, when tasks were new for team members, they found it difficult to relate to the terminologies used, the information and actions required, and the constraints associated with requirements. In contrast, when tasks were more common, few problems of understanding emerged and communication was limited.

They had to write a short program for a new seller. They did a good job. They had completed a similar requirement just one or two months ago, so we didn't have to tell them a lot. (Interview with AB, Onsite)

Mediating Role of Communication

Onsite and offshore team members proceeded through the design process by sharing their knowledge with the intention of bridging information gaps, preempting and mitigating potential misunderstandings, and at times unearthing incorrect assumptions held by some of the other team's members. Results from our first survey indicate that 15 out of 18 informants in this study rated the extent of communication required for requirements delivery as being high or very high. Results from our second survey of 52 other members of the vendor company reveal that "quality of interaction" was perceived to be the most important factor for successful collaboration between onsite and offshore teams.

Customer requirements are explained by customers directly to the onsite team....They will probably understand 90 percent of it. Then they pass it on to us, and we may only get 80 or 90 percent of what the onsite team has understood. So, overall, we get only 70 percent of the actual requirement. We try to reduce this gap by communication. (Interview with RK, Offshore)

Communication often assumed the form of explanations regarding the ultimate objectives and background of requirements, or the context from which they originated. In other cases, examples or illustrations were used to clarify requirements.

Since offshore is not there during requirements elicitation and design, they don't have the perspective of what actually needs to be done. To pass this on to everybody at offshore, we have to communicate and explain to them a lot. (Interview with GK, Offshore)

We explain why one is doing this and that. We also show them what we talk about with the client and what the ultimate objective is of what they are doing. (Interview with SK, Onsite)

When team members perceived that their understandings were incomplete or different from those of their counterparts, they probed the other team with questions, asking for clarification.

I used to call him [Mr. SK, Onsite] and ask him lots of questions. He then explained what the system looked like, how things were working and other details which were not fully related to this particular requirement. That helped us a lot to understand new requirements. (Interview with YP, Offshore)

We go through the requirement, and if there is some problem of understanding, we call the person concerned. First we put our understanding to them... and then we explain our doubts. (Interview with RM, Offshore)

Team members also attempted to mutually verify one another's thinking by proceeding through feedback loops. Offshore team members continuously sought the approval of onsite team members to ensure that their actions were in line with their expectations.

It is hard to understand everything at once. So, at various stages you have to keep asking them whether your idea about the requirement is still correct. (Interview with SK, Offshore)

I asked offshore to make a small change—just to add a field. So, after making the change, he mails to me without cc-ing anyone else to please check whether it was wrong or right....He was a bit scared and wanted his work to be confirmed. (Interview with VM, Onsite)

Onsite and offshore team members engaged in iterative patterns of interaction to increase their opportunities of sharing information and to make sure that erroneous assumptions or misunderstandings would surface during conversations. The use of a common language and templates was regarded as valuable for the development of better understandings, as becomes obvious from the following interview excerpts:

Whenever they [onsite] send anything to offshore, it is important that they write in a programmatical [or technical] way, rather than a business way. Even if we have a lot of experience at offshore, our business knowledge will not be equivalent to that at onsite. (Interview with NP, Offshore)

It is better to follow some kind of template....If we follow some template, problems of interpretation and pinpointing can be solved. (Interview with NP, Offshore)

When some of the onsite team members found that members of the offshore team had inappropriate conceptions of particular requirements, they occasionally provided highly negative feedback so as to unsettle existing understandings. In other cases, they tried to discover why the offshore team did not produce what they expected.

The very first delivery from offshore was a disaster....Instead of referring to production, they referred to development. This led to a lot of junk. So the result was nothing. I had to call them again and give them the perspective that this was not what we wanted. (Interview with GK, Onsite)

They deliver, and then we see if they have done what we asked. If not, we talk to them and ask them why they did it like this. (Interview with AB, Onsite)

In some instances, onsite team members were confronted with the offshore team presenting output that did not confirm to their expectations several times in a row. Just providing additional information was insufficient here, and onsite team members decided to offer their offshore counterparts the "large" or "complete" picture behind a set of requirements.

We say to them that we want something else to be done. They interpret it in a different way, and whatever they present is even worse. When we find that such a thing has happened, we call or mail them and explain the complete picture to them. (Interview with SK, Onsite)

A typical problem that emerged was that members "did not know what they did not know" and that they "did not know what others did not know." In this situation, it became very hard to ask questions or offer explanations, as becomes evident from the following remarks.

They are scared that something may be wrong, so they explore more and keep sending us queries to ask if they are on the right track. (Interview with NK, Onsite)

I think offshore should have confirmed their understanding with us before working. If they have not understood even after we have explained it to them, they should again ask us. (Interview with AB, Onsite)

The tone of interaction, the motivation to interact, and the language used also played a significant role, as is reflected in the comments by two offshore team members.

Friendly interaction is very important. If the person at onsite is not responding properly, or not guiding us properly, for example, then it is difficult for us to complete the requirements too. (Interview with YP, Offshore)

Language also matters. People write just like that. They could tell the same thing in a normal way,

rather than blaming someone. (Interview with NK, Offshore)

Congruent and Actionable Understandings

In many instances, interviewees mentioned that acts of communication helped them prevent or diminish problems of understanding, or communicate part of their preexisting understandings toward offshore team members.

Initially, the understanding of offshore is frequently not sufficient to carry out the requirements. We therefore give them certain instructions to do the work in a particular manner. They can't always see the repercussions of what will happen to the system. They don't have the perspective of what actually needs to be done, as offshore is not there when we receive the requirements from users or when we are designing how to tackle the requirement. To pass this on to offshore, we have to communicate and explain to them a lot. (Interview GK, Onsite)

In some cases, team members maintained incorrect assumptions, causing problems of understanding. For instance, an onsite team member once falsely presumed that offshore was aware of the tools that were to be used to analyze production components.

I asked offshore to analyze the components that were impacted by a certain application. When they provided me with the analysis, I was surprised. It was totally useless. They had done the impact analysis on components available in the development environment, whereas they needed to do it on the production environment. When we discussed, I found out that they were not aware of the ChangeMan tool that we use for production analysis. While giving them the requirement, I assumed that they would be aware of how to analyze production components. It turned out that these two members had actually never used ChangeMan before, so I had to give them that perspective. The final work delivered by them was very good. (Interview with GK, Onsite)

In other cases, requirements were not interpreted by offshore in the way onsite intended.

We received a requirement with code already pasted in it. Onsite meant that we should add these fields into the program. We thought that since the code was written in the requirements document, we had to exactly cut and paste it into the program. We did

not understand the actual thing. They wrote that all we needed to do was insert this code at the end of the program. This terminology was used in the mail. In the first part, it said that a similar kind of code needed to be created and that there were two to three code lines. All that we needed to do was insert these lines at the end of the program. Onsite's view was that we had to write similar kinds of lines but not exactly the same lines. However, we inserted those lines at the end of the code as we thought that the same lines as stated in the requirement document had to be inserted in the program. (Interview with NP, Offshore)

This problem was caused by the ambiguity characterizing the requirement, but also by the limited use of communicative acts, as is reflected in the following interview fragment.

I copy pasted the fields in the requirements document for them to check the order of fields, but they thought that what I sent needed to be copy-pasted in the actual code. I had given them the code only for their understanding. But they copy-pasted the exact specifications I had given them, instead of creating new fields. The problem was caused by both sides. If the requirement was not clear to them, they should have asked for confirmation or clarification. Besides, I should have made it clearer that I copy pasted only for illustration. (Interview AK, Onsite)

Preexisting and Novel Understandings

Communicative acts not only enabled onsite and offshore team members to transfer preexisting understandings, but they also allowed them to actively cocreate novel understandings. Particularly, when offshore team members developed more advanced understandings, they also started taking on a more participative role.

In the first phase, they only know part of the entire project. They have a narrow idea of what has to be done. The picture in their mind is not clear during this phase. But, as the project progresses, they understand more and start to actively participate. (Interview with SK, Onsite)

In these cases, preexisting understandings held by onsite team members were not only transferred to and absorbed by the offshore team (i.e., offshore team members' understandings were transformed, while onsite team members' under-

standings remained the same), but novel understandings (new for both parties) also emerged from the interaction between the parties.

In a particular requirement, I had asked offshore to create a duplicate program with changes only to certain aspects of the program. I provided them with the base program and instructions on how to create the new program. This new program was to be used on a different platform than HP. When offshore delivered the program back to me, the output was not consistent with what I was expecting, so I communicated back to offshore that they should look at my instructions again and make modifications. Next day, offshore delivered the program, which was giving the correct output, but they also showed that my instructions were creating the problems. In our discussion, we found that my instructions were only appropriate if the program had to run on HP, but I was testing the program on the new platform so the output was different. Offshore showed that to get the correct output, different changes were needed if the program was to run on another platform. Honestly, I was not aware of this. I did not know that we needed different instructions. (Interview with GK, Onsite)

After a while, onsite even reported and updated offshore team members about the discussions they had with clients. As a result, onsite and offshore team members could jointly develop better solutions for the issues that were brought up by clients. They started to rely more on each other's experience and knowledge, viewing problems and potential solutions from multiple perspectives, and cocreating new understandings.

We have started to inform offshore about our communication with the client and business users about the business activities. This gives them a lot of exposure and also helps us, as they come up with good suggestions and solutions to issues. (Interview with SK, Onsite)

Propositions on Communication and Understanding

The case description reveals that requirements development is a fundamentally human-oriented and socially mediated process in which understandings are socially constructed (see also Galliers and Swan 2000). It shows that understandings of requirements do not exist "out there" in the minds of stake-

holders, but that they are dynamically constructed and negotiated during interaction processes (Bergman et al. 2002; Davidson 2002; Katasonov and Sakkinen 2006). Specifically, requirements development appears to consist of iterative discovery and invention cycles in which feedback on earlier work refines expectations and drives the evolution of understandings (Bigley and Roberts 2001; Wiegers 2006). During this process, participants expose their vision to others, while concurrently trying to figure out what others understand and want (Gioia and Chittipeddi 1991). They continuously exchange information in order to take into account new thoughts, alter perceptions, shift expectations, and eradicate false assumptions (Ko et al. 2005; Maitlis 2005). Specifically, our analysis suggests that members of offshore ISD projects engage in processes of sensemaking and in communicative acts of sensegiving, sensedemanding, and sensebreaking (see Figure 1) so as to calibrate different thoughts and reconcile previously incompatible and possibly antagonistic understandings (see Gergen et al. 2001). Before developing propositions on the antecedents and consequences of these acts and processes, we first delineate their meaning.

Sensegiving, Sensemaking, Sensedemanding, and Sensebreaking

Acts of sensegiving, sensedemanding, and sensebreaking tend to take place in an iterative fashion (Gioia and Chittipeddi 1991), influencing the sensemaking and meaning construction of others toward a new definition of reality (Gioia and Chittipeddi 1991; Maitlis and Lawrence 2007; Rouleau 2005; Weick 1995). *Sensemaking* involves the reciprocal interaction between information seeking, meaning ascription, and action (Gioia et al. 1994; Weick 1969). It consists of social construction processes that form "the primary site where meanings materialize," which inform and constrain action (Weick et al. 2005, p. 409, citing Mills 2003, p. 35) and by which individuals attempt to interpret and explain cues from their environment (Maitlis 2005). Sensemaking permits parties with different views and expectations to achieve congruency (Ring and Van de Ven 1994) and to construct accounts of reality that allow them to comprehend the world and act collectively (Maitlis 2005; Rouleau 2005; Weick and Roberts 1993). Sensemaking processes are activated when observations and expectations diverge from each other, or when there is no obvious way to engage in activities (Weick 1995). Although sensemaking has mainly been associated with retrospection, it is also associated with anticipation and future-orientation (Weick 1995, 2006). Acts of sensemaking include, among others, observing, reasoning, analyzing, contemplating, anticipating and imagining. These processes are generally accompanied by socio-cognitive acts of sense-

giving, sensedemanding, and sensebreaking. Since these are easier to identify in empirical research (Gioia and Chittipeddi 1991), we focus on the latter when analyzing the case study.

Sensegiving consists of acts by which individuals attempt to alter and influence the way others think and act (Maitlis 2005; Weick 1995). It concerns the activities by which stakeholders frame and disseminate visions and beliefs to others so as to increase their understanding and support (Fiss and Zajac 2006; Gioia and Chittipeddi 1991). Sensegiving may include offering descriptions and explanations, providing signals (Lin et al. 2005), constructing credible and consistent narratives, and projecting images through stories, slogans, metaphors, and artifacts (Ravasi and Schultz 2006). Gioia and Chittipeddi (1991, p. 443), for example, describe how the CEO of a large public university gave sense when he "held meetings explaining key initiatives, [and] disclosed intentions through 'hypothetical scenario' presentations" in order to clarify "the nature of his vision, the values underlying it, and the actual changes that he wanted to see as a result."

In our study, acts of sensegiving assumed several forms. In some instances, onsite team members purposefully translated business requirements in a software language that could easily be understood by offshore team members (see also Carlile 2004). Consistent with findings from Orlikowski (2002), both parties also used standard templates and standard methods for conveying information. In other instances, team members provided explanations as to why certain requirements were posted and the background and rationale behind their requests. Team members further gave sense by confirming and correcting the viewpoints of others and, in line with earlier findings (Bechky 2003; Majchrzak et al. 2005; Malhotra et al. 2001), by using examples, analogies, and metaphors.

Sensedemanding stems from the fact that most individuals are unlikely to wait for others to clarify their situation (Ramirez et al. 2002). Instead, they will seek to ameliorate the quality of the information upon which they base their decisions, and they will undertake strenuous efforts to acquire and process information so as to establish "a workable level of uncertainty" and equivocality (Weick 1969, p. 40). This connotes with the assertion that team members whose communication is mediated through technologies "should resist making assumptions about the situation and constraints of remote others," and instead actively seek out such information (Cramton 2001, p. 368). Sensedemanding may involve, for example, cross-checking one's own perceptions and interpretations with those of participants from another organization (Maitlis and Lawrence 2007) and performing inquiries or asking questions (Ashford et al. 2003). Such acts are evident

in a study by Hargadon and Bechky (2006, p. 490) on creative collectives (i.e., consulting firms) where individuals actively sought the assistance of others when they recognized or experienced a problematic situation. They claimed that this often provided new insights into problems. But sense-demanding may surface in a myriad of subtle forms as well, because individuals fear being blamed for ignorance and failure (Ashford et al. 2003). Team members may, for example, attempt to gauge what is going on by asking indirect questions. In our study, sensedemanding assumed the form of team members asking their counterparts for clarification, requesting confirmation, and soliciting additional information.

Sensebreaking is used to question existing understandings of others, causing them to experience their views of reality as incoherent, insensible (Lawrence and Maitlis 2007), and untenable. Acts of sensebreaking involve the reframing of previously held conceptions and redirecting other team members' attention and search for solutions. It makes new aspects of tasks and environments salient to team members, prompting them to view these in a new light (Hargadon and Bechky 2006). A focal person engages in acts of sense-breaking when he or she believes that others hold incongruent or undesirable views of reality, and when he or she believes that other lines of thinking lead to adverse and disjointed action. In line with this, Lawrence and Maitlis (2007, p. 15) argue that sensebreaking is motivated by the need to problematize the understandings held by others so as to have them "question the bases on which they have been acting" and interrupt any undesirable courses of action they have taken. These authors advance the view that in the absence of sense-breaking, people may continually strive to incorporate new knowledge into existing understandings, rather than fundamentally challenge the validity of preexisting understandings (see also Kang et al. 2007), something possibly causing cognitive myopia, preventing people from achieving more congruent understandings.

Whereas sensemaking, sensegiving, and sensedemanding entail the creation of meaning (Weick 1995), sensebreaking involves the disruption of others' understandings (Lawrence and Maitlis 2007), and creating "a meaning void that must be filled" (Pratt 2000, p. 464). Successful sensebreaking practices should lead to discontentment and a drive to find meaning (Pratt 2000). In the context of offshore ISD, this means that parties use acts of sensebreaking to unsettle existing understandings and lines of thinking by others, which aligns with the idea that draft requirements should be presented to stakeholders as soon as possible, so as to "encourage criticism" (Hull et al. 2005, p. 102). In our study, sensebreaking took the form of team members offering their remote counterparts contradictory evidence, or highly nega-

tive evaluations of their work. Other attempts at sense-breaking included the provision of an "overall" or "big" picture, presenting alternative views that were radically different from the ones that were held by the other team, and openly questioning assumptions.

In summary, acts of sensegiving, sensedemanding, and sensebreaking constitute ongoing and dynamic processes with a fundamentally social character (see also Maitlis 2005; Pratt 2000). Jointly, they enable individuals to change, synchronize, and deepen their understandings.

Antecedents of Sensegiving, Sensedemanding, and Sensebreaking

Having clarified the meaning of sensegiving, sensedemanding, and sensebreaking, we can now elaborate on the factors driving these acts. We focus on knowledge and experience asymmetries and requirements characteristics, as these have received most attention as determinants of communication and understanding in the literature (e.g., Bhat et al. 2006; Kijkuit and Van den Ende 2007; Ko et al. 2005; Lin et al. 2005; Ramirez et al. 2002). We recognize that each of these types of antecedents can both have a direct relationship with understanding (e.g., when individuals share an experience, they develop understandings without relying on extensive communications) and an indirect relationship with understanding (i.e., their effect is mediated by communicative acts and interaction dynamics) (Donnellon et al. 1996; see also Rico et al. 2008). However, as offshore ISD necessitates frequent adjustments and changes in team members' understandings, our study primarily focuses on the mediating effects of communication.

When team members possess similar experience and comparable knowledge, communication becomes more accurate and efficient (Carlson and Zmud 1999; Ngwenyama and Lee 1997). Synchronized knowledge bases increase the capacity to absorb information communicated by counterparts (Lane and Lubatkin 1998) and they augment the likelihood that actors share knowledge in common and know that they share it (Bechky 2003; Cramton 2001; Faraj and Sproull 2000; Weick 1995). Furthermore, such knowledge bases diminish the chance that members of different teams interpret information in a different way (Davidson 2002), reducing misunderstandings (Kijkuit and Van den Ende 2007; Lin et al. 2005). Conversely, knowledge and experience asymmetries arising from differences in contexts, functional and educational backgrounds, and experiences among members of distributed work teams (Bhat et al. 2006; Cramton 2001; Hinds and Bailey 2003; Katasonov and Sakkinen 2006) are

proposed to decrease the congruence and actionability of understandings.

As individuals interpret a problem or situation in accordance with their knowledge, beliefs, and experience (Cronin and Weingarten 2007), knowledge and experience asymmetries tend to reduce the alignment of stakeholders' understandings of requirements (Kaiya et al. 2005; Kellogg et al. 2006; Metiu 2006). This is supported by our survey data, which reveal that members of onsite and offshore vendor teams had different levels of experience with respect to the IT industry and the project itself (see Table 2). The higher these experience asymmetries were, the more the perceptions of onsite and offshore team members differed regarding bugs per module. In addition, knowledge and experience asymmetries have been associated with acts of communication. Ahuja and Galvin (2003), for example, found that asymmetries in knowledge and experience between newcomers and more experienced persons in virtual groups incited the first group to engage in information seeking behavior and the second group to exhibit information giving behavior. Generally speaking, our case description indicates that differences in knowledge and experience trigger acts of sensegiving, sensedemanding, and sensebreaking so as to enhance the congruence and actionability of understandings held by members of distributed work teams, as is captured in the following proposition (see also Figure 1).

Proposition 1: *Knowledge and experience asymmetries among distributed workers prompt them to engage in acts of sensegiving, sensedemanding, and sensebreaking.*

A second factor affecting the development of understanding and communication among team members consists of task and requirements characteristics such as the complexity, novelty, ambiguity, and instability of requirements (Gorscheck and Wohlin 2006). Studies have shown that only one-fifth of IS requirements can be regarded as singular or independent from other requirements (Dahlstedt and Persson 2006). This renders them complex (Campbell 1988), increasing the amount, intensity, and precision of the interaction required among members of different teams, and augmenting the extent to which individual knowledge and experience have to be integrated (see Baba et al. 2004; Cramton 2001). Similarly, the novelty of tasks and requirements has been shown to significantly increase communication among team members (Ahuja and Carley 1999) as it may render routines inapplicable and because it involves high levels of uncertainty and ambiguity (Baba et al. 2004; Kraut and Streeter 1995), causing team members to experience puzzling situations.

Moreover, the instability of tasks and requirements also presents software developers with uncertain and ambiguous situations in which they have to engage in continuous interaction so as to elicit and recognize changes (Nuseibeh and Easterbrook 2000). On top of that, complex, novel, ambiguous, and instable tasks and requirements increase the likelihood that behavior and outcomes produced by team members do not match their counterpart's expectations (Baba et al. 2004). In such cases, communicative acts are used to reduce deviations between expectations and perceptions (Bhattacherjee 2001; Weick et al. 2005). We therefore advance that complex, novel, ambiguous, and instable tasks and requirements propagate socio-cognitive acts of sensegiving, sensedemanding, and sensebreaking, as is reflected in our second proposition (see also Figure 1).

Proposition 2: *Complex, novel and instable tasks and requirements prompt distributed workers to engage in acts of sensegiving, sensedemanding and sensebreaking.*

Cocreating Value: Developing Congruent and Actionable Understandings

The ultimate outcome of advanced understandings should be measured in terms of value creation (Sandberg and Targama 2007). Value creation is at the heart of any organizational activity. Consequently, it is a central concept in the management and organization literature. Nonetheless, there is little consensus on what constitutes value creation (Lepak et al. 2007). In general, value creation has to do with the quality of a job, task, product, or service as perceived by users or clients in relation to their needs (Bowman and Ambrosini 2000). It concerns to the intrinsic value of product or service components (Galunic and Rodan 1998), which may increase customers' or clients' willingness to pay more for an effort or outcome than the costs to produce it (Kang et al. 2007; Priem 2007; Sirmon et al. 2007). Congruent and actionable understandings tend to increase value creation by preventing inappropriate information processing, reducing failure to interpret new cues and data, and diminishing misunderstandings that lie at the basis of friction and conflict (Cronin and Weingart 2007).

Incongruent and inactionable understandings, instead, frequently cause problems of understanding (Vlaar et al. 2006) as they hamper interpersonal communication, which may cause the deterioration of relationship. Moreover, such understandings could render coordination precarious, increasing the likelihood that workers' actions contradict each other and that they produce outcomes that are inconsistent with other's

Table 2. Experience of Onsite and Offshore Team Members for Each Module

Module	Person	Site	Experience in IT Industry*	Project Experience Offshore*	Project Experience Onsite*	Project Experience Total	Average Project Experience Ratio*	Rating of Bugs*	Ratio Bug Rating*
A	Mr. SK	Onsite	24	13	7	20	Experience ratio A: 3.3	2	
	Mr. VM	Onsite	24	15	5	20		1	
	Mr. AR	Offshore	10	8	-	8		4	
	Mr. YP	Offshore	10	2	-	2		4	
	Mr. RK	Offshore	14	8	-	8		4	
			16.4	9.2	2.4	11.6		3.0	0.38
B	Mr. AK	Onsite	24	15	5	20	Experience ratio B: 1.8	4	
	Mr. GS	Offshore	20	18	-	18		4	
	Mr. NP	Offshore	8	4	-	4		4	
			17.3	12.3	1.67	14.0		4.0	1.00
C	Mr. NS	Onsite	48	24	12	36	Experience ratio C: 2.7	2	
	Ms. AB	Onsite	36	12	8	20		2	
	Mr. GK	Onsite	24	15	5	20		2	
	Mr. RM	Offshore	16	12	-	12		4	
	Mr. RP	Offshore	10	8	-	8		4	
	Mr. SK	Offshore	10	8	-	8		4	
			24.0	13.2	4.2	17.3		3.0	0.50
D	Mr. NK	Onsite	24	15	5	20	Experience ratio D: 2.2	4	
	Mr. AB	Onsite	24	15	5	20		2	
	Mr. VR	Offshore	12	10	-	10		4	
	Ms. NH	Offshore	48	8	-	8		4	
			27.0	12.0	2.5	14.5		3.5	0.75

*Experience is reflected in months. Experience ratios were calculated by dividing the average project experience of onsite team members by the average project experience of offshore staff. The ratio for module one, for instance, is calculated as follows: $((20+20)/2) / ((8+2+8)/3) = 3.3$. For module 1, the average experience of onsite team members with the project was 20 months, while the average experience of offshore team members was only 6 months. The ratio of onsite/offshore staff experience was therefore equal to 3.3.

expectations (Cronin and Weingart 2007). In addition, incongruent and inactionable understandings diminish managers' ability to shape the division of labor in such a way that it consists of "revenue-generating and organized actions" (Witt 2000, p. 740). After all, labor can only be divided when parties have conceived, at least vaguely, which activities should be undertaken and what the results of those activities should be (Rathe and Witt 2001, p. 344). In brief, incongruent understandings may diminish value creation by

reducing the unity of intention and action (Baba et al. 2004). Because people frequently hold incomplete, different, and sometimes competing viewpoints on what is valuable and how value is created, it thus becomes necessary to recognize and reconcile incompatibilities in understandings (Cronin and Weingart 2007; Lepak et al. 2007). In our case study, we found that acts of sensegiving, sensedemanding, and sense-breaking and socio-cognitive processes of sensemaking provided members of onsite and offshore vendor teams with

representations of previously ambiguous or unclear requirements, allowing them to act in line with each other's expectations. In other words, onsite and offshore team members use these acts to shape each other's sensemaking processes (Maitlis and Lawrence 2007) so as to develop more congruent and actionable understandings of requirements (see also Figure 1).

Proposition 3: *Acts of sensegiving, sensedemanding, and sensebreaking increase the likelihood that congruent and actionable understandings emerge among distributed workers.*

Cocreating Value: From Preexisting to Novel Understandings

We propose that acts of sensegiving, sensedemanding, and sensebreaking not only augment value creation by diminishing problems of coordination and conflict, but also by helping onsite and offshore workers in conceiving what has to be developed and how this has to be done (Witt 2000). By engaging in these acts, team members may experience "imaginary moments" (Gergen et al. 2001, p. 697) from which new and valuable ideas emerge, enabling them to enhance the vendor's value proposition (also see Levina and Ross 2003). Specifically, ideas and opportunities for imagining and discovering value generally reside in interactions where existing knowledge and perspectives conflux and where existing accounts of reality are recombined. Value creation then rests on the ability of distant workers to bring together their perspectives and experiences through social interactions, possibly changing how they define and think about concerns and situations (Baba et al. 2004; Hargadon and Bechky 2006). By having access to others' knowledge, experience, and perspectives, group members can gain insights and "discover higher-order themes, generalizations, and ideas" that go beyond any individual deductions (Weick and Roberts 1993, p. 358). Communicative acts allow them to explore the knowledge of different parties (Kang et al. 2007) and to actively reframe situations, problems, and possible solutions (Hargadon and Bechky, 2006). This may lead to new images, conceptions, or accounts of what to do, how to do it, and within which constraints (Witt 2000), possibly uncovering previously hidden or incompletely articulated opportunities for value creation (Gergen et al. 2001; Sandberg and Targama 2007).

In the context of offshore ISD, this implies that onsite and offshore vendor team members not only engage in acts of sensegiving, sensedemanding, and sensebreaking to communicate preexisting understandings (transferring or transforming the understandings held by members of one team), but also to

cocreate novel accounts or conceptions of requirements and the processes by which software should be developed. These understandings are new for members of both teams and they enable them to see their world in a different light (Bechky 2003, 2006; Gergen et al. 2001; Haragdon and Bechky 2006). Following Hargadon and Bechky (2006), we therefore propose that members of distributed work teams deploy micro-level interactions of a transient nature to arrive at novel conceptions (Witt 1998) or accounts (Lawrence and Maitlis 2007) of tasks, requirements, and the processes by which software has to be developed. As offshore relationships increasingly include innovative and complex activities that require vendors to go beyond the plain execution of predefined tasks (see Lewin and Peeters 2006), the socio-cognitive acts constituting those interactions tend to become more significant (see Priem 2007). In this case, requirements and software development processes can no longer be considered as "given." Both parties have to complement acts of sensegiving and sensedemanding with instances of sense-breaking so as to jointly conceive, imagine, and discover where value resides (Witt 1998, 2000). This entails a shift from communicating preexisting to cocreating novel understandings, as is captured in our final proposition (see also Figure 1).

Proposition 4: *The higher the relative incidence of acts of sensebreaking as compared to acts of sensegiving and sensedemanding, the higher the likelihood that members of distributed work teams cocreate novel understandings (new for both parties).*

Discussion

The objective of this study was to clarify how members of distributed teams develop advanced understandings. In line with a socio-cognitive perspective on communication and understanding (e.g., Cramton 2001; Damian and Chisan 2006; Davidson 2002; Gergen et al. 2001; Gibson and Earley 2007), we constructed a conceptual framework proposing that distributed workers engage in acts of sensegiving, sensedemanding, and sensebreaking so as to arrive at more congruent and actionable understandings. Our empirical study shows that knowledge and experience asymmetries and task and requirements characteristics—such as complexity, instability, ambiguity, and novelty—constitute important antecedents of the interaction cycles in which these acts alternate. Furthermore, our empirical results indicate that distributed workers not only use acts of sensegiving, sensedemanding, and sensebreaking to prevent problems of understanding and transfer preexisting understandings, but also to cocreate novel understandings and to explore how value can be created in distributed work settings.

Implications for Research

This paper contributes to the literature on distributed work and offshore ISD by examining the cocreation of understanding and value by members of geographically dispersed teams. It nuances earlier recommendations to increase the frequency and intensity of communication (Herbsleb and Moitra 2001; Prikladnicki et al. 2003), or to engage in acts of help seeking (seeking assistance from others), help giving (devoting time and attention to assist others), and reflective reframing (attending and building on the comments and actions of others mindfully and respectfully). Positioning our study in a proliferating stream of literature on sensemaking, we suggest that acts of sensegiving, sensedemanding, and sensebreaking promulgate the development of different types of understanding. Our conceptualization of communication and understanding is not only applicable in situations where “help” is required. It extends to circumstances in which understandings are transferred, transformed, or cocreated. Moreover, it incorporates the notion of sensebreaking, which is shown to be fundamental to the cocreation of novel understandings, preventing team members from inappropriately exploiting existing knowledge and incrementally refining preexisting understandings (Kang et al. 2007). Finally, our conceptualization of communication and understanding may permit team members to recognize the existence and validity of differences in their understandings (Baba et al. 2004). We further advance that acts of sensegiving, sensedemanding, and sensebreaking may work as potential levers for diminishing problems of understanding (e.g., misinterpretation), transferring or transforming preexisting understandings, and co-creating novel understandings. This prevents value dissipation, enhances the integration of contributions, and allows distributed workers to jointly explore and exploit opportunities for value creation.

This paper contributes to the literature on offshore ISD by focusing on micro-level interactions between onsite and offshore vendor teams. In doing so, it not only answers calls for more empirical research on communication and understanding in distributed work settings in general (Cullen et al. 2005; Hinds and Mortensen 2005; Kellogg et al. 2006; Majchrzak et al. 2005), and for globally distributed offshore outsourcing projects in particular (Damian and Chisan 2006; Rottman and Lacity 2004, 2006). It also complements existing perspectives on the evolution of understanding in such settings. Prior research emphasizes that understandings develop or converge through various cycles or stages (Cramton 2001; Cronin and Weingart 2007; Gibson 2001; Gibson and Early 2007; Kellogg et al. 2006). Our research, instead, suggests that communication may largely have an *ad hoc* character. Moreover, it indicates that achieving more

advanced understandings depends not only on the existence of perceived asymmetries in knowledge and experience, and the prevalence of particular task and requirements characteristics, but also on individual abilities and opportunities to engage in acts of sensegiving, sensedemanding, and sense-breaking (Hargadon and Bechky 2006; Maitlis and Lawrence 2007).

The paper further contributes to the debate on the question of whether individuals or collectives constitute the primary source of new value creation. Empirical studies that disentangle these effects are lacking (Felin and Hesterly 2007). In this paper, we connect perspectives oriented toward the individual and the collective by emphasizing the significance of asymmetries in knowledge and experience among team members, while also pointing at the importance of social interaction for advancing understanding and creating value. We argue that individual and social aspects of value creation are interrelated, as asymmetries on the individual level give rise to socio-cognitive acts at the collective level. This renders the question of where the most heterogeneity lies, be it on the individual or the collective level (Felin and Hesterly 2007, p. 201), somewhat less appropriate. It suggests, instead, the need to tease out the connection between individual and social aspects of value creation. This could be done, for instance, by focusing on the relationship between individual conditions (e.g., knowledge and experience asymmetries), individual processes (e.g., reasoning, analyzing, and imagining), social conditions (e.g., structure, technology, and norms), and processes (e.g., acts of sensegiving, sensedemanding, and sensebreaking).

Implications for Practice

Congruent and actionable understandings increase the likelihood that work accomplished by offshore teams coincides with the expectations held by onsite team members and client representatives. Achieving such understandings, therefore, involves the generation of—sometimes considerable—value. To advance understandings, practitioners have to promote acts of sensegiving, sensedemanding, and sensebreaking (i.e., iterative cycles of communication) among distributed workers. We suggest that they can do so by establishing favorable organizational, individual, and technological conditions and by influencing opportunities for synchronous communication. First, on the organizational level, managers could create a climate that allows for reflective reframing. This enables people to suspend their judgments, call each other’s beliefs and values into question (Baba et al. 2004), and build on the comments and actions of others in a mindful and respectful manner (Ashford et al. 2003; Hargadon and Bechky

2006; Gergen et al. 2001). Likewise, institutionalization of norms of communication among stakeholders (Ahuja and Galvin 2003; Chudoba et al. 2006; Gibson and Earley 2007; Sarker and Sahay 2004) and the adoption of an ethno-relativistic attitude—implying that people take the perspective of the other team and attempt to understand the world through someone else's eyes—have to be encouraged (Cramton and Hinds 2005). Creating such a climate requires minimizing hierarchical and status barriers between distributed work teams (Ahuja and Galvin 2003; Ashford et al. 2003; Cramton and Hinds 2005; Metiu 2006), so that members become more inclined to communicate across levels and specializations.

Second, on the individual level, training and education programs for IT specialists could pay more attention to communication and other so-called soft skills that help them to better anticipate and assess when and how to effectively give, demand, and break sense. Such skills still receive limited attention in the curricula of global IS education programs (King 2005; Prikladnicki et al. 2003). In conjunction with technical and business expertise, these training programs should therefore focus their attention on increasing the sensitivity of distributed workers in recognizing possible differences between their own and others' understandings, and on effectuating changes in others' understandings. In order to further enhance future IT specialists' abilities to engage in remote communications, training programs could also stress the development of skills and traits related to eloquence, patience, credibility, and the capacity for gaining sympathy and confidence (Gergen et al. 2001; Witt 1998, 2000).

Third, with respect to technological conditions, our findings suggest that some methods, collaborative tools, and technical solutions may be more useful than others. This depends, among other variables, on the extent to which they inhibit or stimulate processes of sensemaking, and drive or hamper acts of sensegiving, sensedemanding, and sensebreaking (Boland and Tenkasi 1995). For example, virtual prototypes can save costs and time (Sutcliffe et al. 2005), while also stimulating sensegiving and sensemaking. Moreover, instant messaging is a tool that incorporates quick feedback, thereby increasing the likelihood that double-interacts arise during communication. Likewise, computer-based interviewing could help in eliciting information from clients (i.e., sensedemanding), but it may also enhance interpersonal communication between onsite and offshore teams afterward, as the information that is being transmitted among stakeholders is likely to become less equivocal in nature (Hands et al. 2005). In addition, practitioners may use tools that help to identify differences in interpretation and evaluation by stakeholders during requirements development (see Kaiya et al. 2005). When organizational, individual, and technological conditions promote

sensegiving, sensedemanding, and sensebreaking, vendor team members probably engage in more complex, advanced, and possibly more valuable communication patterns. In this case, the organizations in which they are active may develop distributed organizing competencies (Orlikowski 2002), which increase their ability to realize the potential value inherent in offshore relationships, and which allow them to explore and exploit practices that add more value (Lewin and Peeters 2006).

Finally, organizations may influence the availability of opportunities for synchronous communication. They can expand the overlap of temporal collaboration windows, for example, through working longer, shifting working hours, and increasing worker availability (Espinosa and Carmel 2003). Another option is to vary the location of resources in order to reduce time separation between clients, onsite teams, and offshore teams. In practice, Indian firms have been expanding their global presence already in response to threats posed by the rising prominence of "nearshore," or proximate, foreign locations. Some firms now provide their clients with a locational menu of choices. TCS, for instance, offers its British clients services from farshore (India), nearshore (Budapest, Hungary), and onshore (London and Nottingham) (Carmel and Abbott 2006). Other vendors have opened facilities in countries such as Mexico and Portugal to combine proximity to customer sites with low costs and 24 × 7 service delivery. Our research indicates that clients' choices between (networks of) locations should be contingent upon the challenges they anticipate when trying to achieve congruent and actionable understandings during requirements development.

Limitations and Future Research

As with any study, several limitations apply. First, our primary data consist of reflective interviews and surveys. An ideal research design, however, would include an event-based study and participant observations during requirements sharing instances. However, such research designs are hard to implement, because offshore projects generally involve security protocols and nondisclosure agreements prohibiting vendors from sharing behavioral data with third parties. Second, data was derived from only one project and one vendor company, reducing the generalizability of our results. We used a replication logic (Eisenhardt 1989; Yin 2002), by including instances of requirements sharing from four different project modules to neutralize this problem and enhance the analytical generalizability of our findings. Third, we did not integrate several concerns that are known to restrict communications among distributed work teams in our research framework, such as differences in status and dif-

ferences in interests and objectives amongst team members (Cramton and Hinds 2005; Levina and Vaast 2005; Metiu 2006). We refrained from incorporating these and other aspects as moderators in our framework because we aimed to clarify the relationship between communication and understanding. However, we recognize that organizational, individual, and technological conditions have to be kept in mind when considering the framework.

A first opportunity for future research resides in distinguishing between understandings of the *content* of tasks and requirements and understanding the *context* from which they originate and to which they apply. Failures to exchange adequate information about the contexts of task represent a significant challenge in distributed work (Sole and Edmondson 2002). Consequently, team members are “likely to work from different definitions of the situation, which handicaps communication and collaboration” (Cramton 2001, p. 362). Moreover, unshared contexts limit opportunities for direct observation, co-orientation on artifacts and boundary objects, and synchronization of activities around shared temporal rhythms (Baba et al. 2004; Levina and Vaast 2003; Maznevski and Chudoba 2000; Montoya-Weiss et al. 2001). Instead, workers depend to a large extent on documents, from which they construct literal, “face-value” understandings, implying that they interpret the “cold, dead numbers” and symbols (Boland 1991, p. 453). However, stakeholders also need to understand the context in which requirements are developed so as to arrive at a “warm” and “subjective” reality (Boland 1991, p. 453). This is crucial, since situational opportunities and constraints may shape the needs of stakeholders (Johns 2006), and the meaning of words, texts, and their salience “depend[s] upon the situation, context and community in which people are expressing themselves” (Bechky 2003, p. 313; see also Cramton 2001; Kellogg et al. 2006; Ngwenyama and Lee 1997). Researchers could therefore investigate the socio-cognitive acts that favor the development of understandings of the content of tasks and requirements and those acts that primarily support the development of understandings regarding the contexts in which they feature.

A second avenue for future research concerns the artifacts that are being used to advance understandings in distributed work settings (Bechky 2003; Boland and Tenkasi 1995; Malhotra et al. 2001). Researchers have argued, for example, that drafting formal documents may help partners in collaborative relationships to develop joint understandings. This occurs, among other reasons, because such processes enable participants to focus their attention, provoke them to deliberate and reflect, and diminish the incompleteness and inconsistency of their cognitive representations (Vlaar et al. 2006). Others have hinted at the idea that objects, models and maps (Carlile

2004), as well as drawings and prototypes (Bechky 2003; Levina and Vaast 2005) may prove to be valuable boundary objects that assist members of distributed work teams in giving, making, demanding, and breaking sense. Such artifacts may, for example, help to elicit feedback from others and create common ground (Bechky 2003), as they focus the attention of various working teams on the same issues, while narrowing down opportunities for misinterpretation and overly broad discussions. Future research could assess the role of such boundary objects in developing congruent and actionable understandings.

Third, researchers may investigate how application of the socio-cognitive processes and communicative acts that we have investigated varies for different cultures. Krishna et al. (2004, p. 64) refer to the example of British managers in an outsourcing relationship with an Indian software supplier, who found that Indian programmers would not voice criticism in face-to-face meetings but would sometimes send their opinions in e-mail messages after the meeting had disbanded. The British managers, “who were used to intense interaction and the development of ideas through meetings, felt frustrated at this polite behavior” (Krishna et al. 2004, p. 65). An interviewee in another study mentioned that, “What you say and mean in India and in another country could be entirely different. I think it requires a lot of work...to ensure the matching of minds” (Oza and Hall 2005, p. 33). These examples indicate that members from different cultural backgrounds may exhibit distinct preferences for social interaction norms, which may hamper communication (Baba et al. 2004; Maznevski and Chudoba 2000). Other examples show that cultural differences may both prohibit and facilitate learning across teams. This is proposed to vary with the extent to which members adopt an attitude of mutual positive distinctiveness, perceived interdependence, and social and institutional supports for interaction (Cramton and Hinds 2005). Future research could build on this work to assess how cultural differences shape the communicative acts used by distributed workers.

A fourth opportunity for future research builds on the notion that it is difficult for distributed team members to assess what others know, and which information they need (Faraj and Sproull 2000; Metiu 2006; Sole and Edmondson 2002). These people face a communication dilemma in ascertaining when and whether to give, demand, and break sense, and what to communicate to others. Moreover, they may sometimes falsely assume that the other “speaks and understands on the basis of [the] same information and interpretation” (Cramton 2001, p. 347). Our study indicates that regular dialogues aimed at achieving “mutual adjustment” (Maznevski and Chudoba 2000) and “double interacts” (Weick 1969)—

referring to actions and reactions that provide the originator of action with feedback—are crucial to remote communication. They enhance the chances that individuals develop more “conjoint realities” (Tsoukas 2005) and therefore deserve further inquiry.

A fifth opportunity for further research concerns the links between each of the socio-cognitive acts that we have identified and the coordination processes by which they are followed. In this paper, we have focused on the socio-cognitive acts that distributed workers use to create advanced understandings, and which are therefore underlying any attempt at value creation (Sandberg and Targama 2007; Witt 1998, 2000). After such understandings have been established, more familiar management processes, such as structuring, bundling, and leveraging of resources may be deployed in order to actually realize the value that potentially can be created (Sirmon et al. 2007). Future research could address, for example, how implicit coordination (i.e., action based on expectations, understandings, anticipation, and predictions) and explicit coordination and management processes interrelate (Rico et al. 2008; Sandberg and Targama 2007). Do congruent and actionable understandings, for example, substitute or complement formal coordination? And, to what extent do early decisions regarding coordination affect whether novel understandings can be cocreated?

Finally, researchers could examine the structural, affective, and cognitive dimensions of social relations among members of distributed work teams (Kang et al. 2007), and they could assess how variation along these dimensions influences the likelihood that members achieve congruent and actionable understandings and that they cocreate novel understandings. Does the use of common systems and standardized languages, for instance, propel the creation of congruent and actionable understandings? And, is it more favorable for the communication of preexisting understandings, or does it also help distributed workers in cocreating novel understandings? Moreover, researchers could examine how the type of language that is being used in these interactions shapes the understandings that are being created (see Gergen et al. 2001). After all, language is arguably “one of the most basic and critical, but also creative, acts of human beings, providing a ‘window to the mind’” (Felin and Hesterly 2007, p. 202). One could assess which elements of language are primarily used for sensebreaking, for example, and which ones are more conducive to acts of sensegiving and sensedemanding.

Conclusion

In this paper, we have investigated the socio-cognitive acts and communication processes that members of distributed

work teams use to advance their understandings. Building on a case study involving one of India’s largest offshore outsourcing vendors, we show that knowledge and experience asymmetries, and requirements and task characteristics—such as complexity, instability, ambiguity, and novelty—prompt members of onsite and offshore vendor teams to engage in acts of sensegiving, sensedemanding, and sensebreaking. These acts allow them to make sense of tasks, requirements and their situation in general, thereby increasing the likelihood that members of different teams achieve congruent and actionable understandings. Moreover, these acts not only assist distributed workers in coping with problems of understanding and transferring preexisting understandings, but they also enable them to cocreate novel understandings. Our findings shed new light on the cocreation of understanding and value in globally distributed work and offshore ISD in particular.

Acknowledgments

All authors have contributed equally to this paper. This research has benefited from inspiring discussions with and feedback from Africa Ariño, Peter van Baalen, Tom Elfring, Eric van Heck, Nicolaj Foss, Justin Jansen, Rosalinde Klein Woolthuis, Otto Koppius, Kuldeep Kumar, Sally Maitlis, Peter Smith Ring, and Henk Volberda. We are also grateful for the constructive and valuable comments and suggestions that we received from the four anonymous reviewers and the editors of the special issue. We further wish to express our gratitude to participants and attendees of the following workshops, seminars, and conferences: NHH (2007), Global Sourcing: Services, Knowledge and Innovation (2007), the 65th Academy of Management Conference (2006), the 7th International Conference on Organizational Discourse (2006), and the workshop Understanding Coordination Within and Between Organizations: Lessons from Software Development (2004). Participants in these events provided us with comments and suggestions that improved the paper. The research has also benefited from the financial support of Erasmus University Trust Fund, Erasmus Research Institute of Management (ERIM), Netherlands Defense Academy, and London Business School. Finally, we would like to thank the vendor company that we studied for its generous cooperation. All remaining errors are the responsibility of the authors.

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Appendix A

Interview Protocol

Personal Information

- Years in IT industry, onsite experience, offshore experience
- Educational qualification and background
- Software industry expertise or competency

Project Characteristics

- Formal structure within the onsite team
- Relationship between onsite and offshore teams
- Complexity, task interdependency, novelty

Onsite-Offshore Setup

- General processes involved in onsite-offshore model

Specific Requirements Development

- Requirements development, requirements sharing, communication process, learning, problems faced, and instances of problems.
Examples of interview questions:
 - Could you tell us more about instance X of requirements sharing?
 - Can you explain the requirements?

- How did you develop these requirements?
- What was communicated to the offshore/onsite team?
- How were these requirements communicated to the offshore team, and why?
- How was the communication process between onsite and offshore?
- Was the amount of communication sufficient; why (not)?
- What are your views about the offshore/onsite team?
- Did you receive deliveries on time?
- Were you satisfied with the deliveries?
- Do you think the offshore team understood the requirements well?
- What problems did you face? Why do you think those problems occurred?
- What was done to rectify the problems/errors/bugs?

Delivery of Requirements • Delivery of requirements matching expectations of onsite team
• Remarks by offshore team on onsite team, or vice versa
• Problems faced during delivery

Overall Assessment • Satisfaction of teams with results/efforts of other teams
• Lessons learned

Appendix B

Survey Onsite Team Members²

1. How many years of experience do you have with the industry practice of your current project (such as Banking & Financial Services or Telecommunications etc.)?
2. Did you attend external or internal training related to this industry practice (such as Banking & Financial Services)
3. Are you aware of most of the concepts/words (used in your project) related to the industry practice (e.g., Escrow for BFSI)?
4. Are your supervisor (PL/GL/PM) and client satisfied with the level of your domain knowledge?
5. How many years of experience do you have with the programming language (such as FOCUS/RPG/JCL etc.) used in your current project?
6. Have you attended external or internal training related to the programming language (such as FOCUS/RPG/JCL etc.) used in your project?
7. Are you aware of most of the concepts related to the programming language used in your project (e.g., Arrays in RPG)?
8. Are your supervisor (PL/GL/PM) and client satisfied with the level of your programming knowledge?
9. Are you aware of most of the process-related concepts in Software Development & Maintenance (Configuration Management, Testing, etc.)?
10. Are you well versed with the processes and key performance indicators of CMM (Capability Maturity Model) levels?
11. Was it easy for you to understand the requirements when explained by the client?
12. Could you understand the business logic behind the requirements?
13. Could you visualize the impact of implementing the requirements on the system?
14. Could you relate experiences from previous CRs to studying/implementing these requirements?
15. Did you refer to insights from best practices or training while studying/implementing the requirements?
16. Are you technically competent to understand and implement requirements?
17. Do you regularly look at the best practices from your project and other projects?
18. Are you aware of the expectations that the offshore team has of you concerning the requirements?
19. Did you discuss the requirements with the offshore team until they had a good idea about the requirements?
20. Did you share business knowledge with the offshore team to implement the requirements?

²All response categories consisted of five-point Likert-type scales.

21. Was it easy for the offshore team to understand the requirements before any discussion with onsite?
22. Could offshore finish the requirements within the estimated time (PDs)?
23. Are you satisfied with the effort put in by the offshore team to understand the requirements?
24. How was the communication between you and the offshore person in order to complete the requirements?
25. How many bugs were reported in the review comments by the onsite team after the delivery by the offshore team?

Appendix C

Modules of the Finance Project

- Module A** The requirements for Module A came from the senior management of the client, which wanted to migrate all its application systems to new mainframe machines in 2 to 3 years, since support for the current machines was about to end. This required an analysis of processes and data flows of all running applications on the system and led to a substantial amount of analysis work to understand the logic of the programs, and the connections between programs. Requirements for this module mainly originated at the onsite team. The offshore team was asked to perform the tasks as requested by the onsite team. We analyzed two instances of requirements sharing, in which a requirements document was sent to offshore. Both instances included the development of a tool by the offshore team to enable the analysis of a set of programs and to provide onsite with the files that were being “populated” (technical term for the process of addition or update). Tools were made for analyzing programs in the RPG (Report Program Generation) and FOCUS languages. The module involved two onsite and three offshore team members.
- Module B** Module B was created to respond to bugs and errors produced in the production system of the client. Problems were categorized as having Priority 1, 2, or 3. Priority 1 refers to extremely urgent issues that need to be solved by the vendor within a period of 24 hours (according to the service level agreement). Priority 2 issues need to be solved by vendor within a period of 36 hours. Priority 3 issues were less urgent and could be solved in a period of 48 hours. Requirements in this module stemmed from the client's business users. In case the business users noticed any errors in the system or wanted to have new functionality, a request was forwarded to the onsite team, which then analyzed the requirements and decided whether the request could be solved onsite or needed to be forwarded to the offshore team. Two instances of requirements sharing were analyzed, in which the requirements document was sent to the offshore team. The requirements involved making minor changes to existing programs. This module had one onsite and two offshore team members.
- Module C** Module C involved an application running on two separate systems, leading to redundancy. The client requested migration of the application to one system. This module therefore involved analysis of the programs within the application, and the relation between the focal application and other applications. It also included development of new programs and deletion of old programs that were no longer being used. The requirements were initially developed by the client's senior management. It was quite complicated and had a 12 month deadline from analysis to implementation. This request involved both analysis and development (coding of programs). We analyzed two instances of requirements sharing, in which a requirements document was sent offshore. This module involved three onsite team members and three offshore team members.
- Module D** Module D facilitated the representation of new partners in the client's information systems. The module mainly involved the development of programs that were similar to the ones currently in use for partners of the client. One instance of requirements sharing was analyzed, which was rated as highly complex by the onsite team members. The module involved two onsite and two offshore team members.