Managing Knowledge Across The Boundaries of a Virtual Organization

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Abstract

This paper examines the knowledge-management behaviors exhibited in a longitudinal field study of the e-Commerce systems group for a global service consultancy. This study demonstrates the mixture of virtual and physical mechanisms employed for distributed knowledge management, when this crosses functional and organizational boundaries. The contribution of this paper is to provide a framework for how such groups manage distributed knowledge in practice and to suggest a fifth type of boundary object in addition to the four forms identified by Star (1989). The findings of the study have significant implications for how we design virtual systems for distributed management collaboration, as they suggest that many of the knowledge-sharing forms are not judged suitable for persistent storage in computer systems.

1. Introduction

Information systems (IS) and workgroups that span organizational boundaries create special problems for management. This is especially true in global organizations, where multiple cultures and local goals add to the problems of geographically and temporally distributed management. New social networks are created by the needs of these virtual teams and new forms of leadership are required to span the organizational boundaries that these networks encompass. The nature of virtual teams requires a certain amount of local autonomy and it can be argued that leadership is distributed in highly-dispersed organizations (Dutfield, 2005). In this paper, we adopt a constructivist view of leadership as the management of meaning, where external events are interpreted for other actors by influential actors to frame them positively for the group’s advantage (Smircich and Morgan, 1982). In a distributed organization, the management of meaning may itself be distributed. This has consequences for collaboration across various boundaries that have not been explored. This paper discusses findings from a longitudinal study of a global management team, responsible for the operation of e-Commerce network systems in a distributed service organization. We examine the different forms of collaboration exhibited during this study, examining the collaboration behavior exhibited in various contingencies and the differences and similarities across different types of distributed organizational network boundary.

Carlile and Rebentisch (2003) argue that existing theories of information processing in organizations do not scale well to the complex forms of knowledge integration required at the boundary between the diverse groups found in global organizations. These rely on a shared language and methods for knowledge exchange that develop over time in stable organizational forms. When new technology is introduced, a single stakeholder or group cannot exploit this technology effectively without collaborating with other stakeholder groups. This entails knowledge transformation and transfer. Transformation of knowledge provides a common language across groups with different cultures and practices. Transfer employs a knowledge-integration cycle of storage, retrieval and transformation. When novelty is low, knowledge from previous cycles can be reused. But in those conditions of change and uncertainty which are typical of many modern organizations, stored knowledge acts as a constraint on the retrieval of effective knowledge for dynamic decision-making (Carlile and Rebentisch, 2003). Organizations increasingly rely on distributed, human interpretive processes to supplement and select stored knowledge in management decision-making and leadership. The research question that guides this study asks how is this fragmented and distributed knowledge managed in virtual and global IS groups, across processes that span organizational boundaries?

2. Conceptual background

To answer this question, we employ the concepts underlying theories of organizational sensemaking (Weick, 1993). At an individual level, sensemaking can be viewed as the construction of a meaningful "reality" that is situated within a social context. Real or implied social interaction underlies sensemaking, as group and organizational expectations and norms
constrain and guide how we interpret our experience (Suchman, 1987; Weick, 1993). At a group level, cultural values, genres, and conventions appear to guide notions of professionalism, defining those who "belong" to the membership of a specific community of practice. How problems are defined, what constitutes appropriate work-practice, and the legitimacy of various perspectives on action are guided by the socio-cultural norms of that group. (Lave and Wenger, 1991). At the organizational level – and sometimes at a group level -- sensemaking appears to be guided by the "management of meaning" (Smircich and Morgan, 1982), where influential leaders interpret events for others, on the basis of shared culture, leading to a co-constructed reality. While this view accorded with the stable management structures of the 1900s, in the distributed organizations that we have today we may alternatively view leaders as thought-leaders: experts in a specific knowledge-domain or set of domains.

Organizational groups need to interact and collaborate for global firms to operate effectively (Carlile and Rebentisch, 2003). An organization consists of multiple communities of practice. Each of these communities constitutes a local workgroup, with its own social norms, social expectations and specific genres of communication (Lave and Wenger, 1991). Communities of practice spring up around projects, around issues, around specific professions or functions, and around product-specific activities, among other things. Individuals typically belong to multiple communities of practice, each with different cultures, languages (terminology) and conventions of behavior. As companies diversified across multiple product-lines and managers sought to balance functional knowledge and reporting structures with product or market-specific knowledge and reporting structures, the matrix organization emerged (Ford and Randolph, 1992). But the matrix model of organizational management has become further complicated with the expansion of global and virtually distributed organizations, so that most large organizations now consist of a combination of management hubs, chains, webs, and sets of people associated with specific projects, products, functions, or geographical regions (Mintzberg and Van der Heyden, 1999). From an interactional perspective, organizational processes may therefore no longer be viewed as static, but as "emergent knowledge processes" (Markus et al., 2002). These involve an unpredictable set of actors, have emergent requirements for IT support, and evolve as organizational product-markets, skills, and responsibilities evolve.

The complexity of organizational processes presents problems for knowledge management, which typically reverts to the scientific management model of “one best way” for organizational practice, to manage equivocality and uncertainty when knowledge is codified (Zack, 2001). Essentially, knowledge management tends to be viewed as the reflection of best practice or standardized procedures. But when supporting emergent knowledge processes across global, distributed organizations, best practice is diverse and fragmented. Organizations may respond to the fragmentation of knowledge by employing product-specific knowledge base systems, or region-specific systems. But this does not deal with the fragmentation of knowledge that results from the interactions between emerging knowledge processes, specific community of practice norms, and fragmented organizational cultures. Various group members’ understandings and experiences are not the same across the organization; instead, consensus emerges only within subcultures. "At the organizational level of analysis, differentiated subcultures may co-exist in harmony, conflict, or in indifference to each other... subcultures are islands of clarity; ambiguity is channeled outside their boundaries" (Frost et al., 1991, Page 8). Managers increasingly need to manage ambiguity, uncertainty, and equivocality in interpreting organizational knowledge about best practice (Zack, 2001). So once again, we return to the research question of how knowledge-fragmentation is managed at the boundary between organizational groups. Smircich and Morgan (1982) argue that leadership is an exercise of social practice, where the leader exerts influence through managing the meaning of situations in a constructive manner. This involves that they (i) understand situations that present equivocality, (ii) pay attention to how people involved in those situations understand the situation, and (iii) communicate and enact an interpretation of the situation that will result in positive modes of organized action. But this begs the question of how meaning is managed at the boundary between organizational groups, where multiple interpretations may be valued by the diverse set of people who belong to a project or boundary-spanning group. To understand this, we need to examine the forms of knowledge and the boundary-spanning mechanisms by which knowledge is communicated.

At the core of the tension between situated involvement (i.e. involvement in the specific norms,
culture and expectations of the situation) and detached analysis is a distinction between explicit and tacit knowledge. Tacit knowledge is equated with know-how, knowledge that we acquire through our experience of acting in the world, while explicit knowledge is related most strongly to know-what, knowledge about facts and undisputed events (Garud, 1997). Know-how is embedded in the actor’s understanding of the situation in which it is used. Cook and Brown (1999) argue that knowledge is shared by four primary mechanisms. Know-what is articulated through concepts. Stories represent a collective know-what that constitutes a collective memory of success or failure. Know-how is communicated by acquiring skills through shared practice. Genres represent a collective know-how, inscribed into organizational conventions through the use of a specific language, form, or medium of communication. But the distinction between tacit and explicit knowledge is insufficient to explain how a boundary-spanning group engages in collaborative sensemaking. Johnson et al. (2002) argue that know-why and know-who (or who-knows-what) are equally important in real-world knowledge identification and use. Know-why supplements and explains know-what and know-how: it represents a knowledge of rationales that is accumulative and situationally-dependent (Blackler, 1995). Know-how is made meaningful through relating it to a wider set of organizational practices and cultural interpretations, for example by explaining or demonstrating how a process exemplar used in one situation may be adapted to another situation (Blackler, 1995; Lave and Wenger, 1991). An understanding of who-knows-what is critical for collaboration when knowledge is distributed across multiple communities of practice (Cannon-Bowers and Salas, 2001; Moreland, 1999). Knowledge of who-knows-what allows group members to predict each other’s behavior and attitudes, to locate sources of information, and to allocate tasks based on the distribution of expertise. While the traditional view of expertise is that it derives from know-how, experts increasingly need to combine and negotiate knowledge from multiple knowledge-domains, to produce hybrid solutions (Engestrom et al., 1995). So who-knows-what is no longer related solely to the individual’s claims to expertise within a single domain, but their perceived expertise in interactions with others in the group’s wider social network.

Technical artifacts, facts and knowledge may be seen as the end product of multiple processes of translation which occur over time as actors offer new interpretations of others’ interests. Translation processes are mediated by non-human intermediaries or inscriptions that stabilize the meaning of artifacts and processes, such as information systems, documents, procedures and organizational rules (Latour, 1987). Such intermediaries may be viewed as boundary objects (Star, 1989): artifacts, representations and models that are sufficiently plastic to permit different meanings to be attached to them by members of various organizational groups. Carlile (2002) argues that different forms of boundary object indicate how members of collaborating groups view the knowledge-sharing problem. Use of a repository (such as a document library) to share knowledge assumes that people understand events and information in the same way, across the boundary between groups. Use of standardized forms, methods, and procedures indicates that people perceive inconsistencies in the way in which knowledge is interpreted and so are attempting to impose a shared method of work to enforce a shared view. Use of the other two forms of boundary object identified by Star (1989), models and maps, indicates that actors perceive a diverse set of knowledge and perspectives at the boundary, that require negotiation and synthesis (Carlile, 2002). These boundary object forms provide shared representations of the work-domain, that are vague enough to permit various interpretations about domain-specific detail, but provide a common basis around which to derive shared interpretations of elements required for collaboration. By analyzing the use of boundary objects, we can understand how the knowledge exchange problem is formulated by people within boundary-spanning collaborative groups.

3. Research site and method

3.1 Research context

The subject of this research was the global e-Commerce group at eServCorp Inc.¹. eServCorp had been acquired by a multinational company only a few months prior to the start of this study. This site provided an excellent example of complex, boundary-spanning knowledge management, where diverse cultures needed to be reconciled to provide an integrated basis for collaboration across workgroup and business unit boundaries. For four years prior to the acquisition, eServCorp had operated a global e-Commerce organization that spanned four major regions: North America, South America, The Asia

¹ Names of the organization, its departments, members, services, and products have all been disguised. Where first-names are shown, these are pseudonyms.
Pacific region, and Europe. Their market-share was achieved by maintaining state of the art distributed information systems and dynamic performance evaluation systems, with operations supported by flexible project systems for use by their clients. A unique competitive advantage was provided by using their operational system data to provide statistics for the customer on their effectiveness and value for money. The company prided itself in responding rapidly to new customer needs, primarily with an established base of major, multinational, client companies. When eServCorp were acquired by a multinational company, ParentCo, the culture of the e-Commerce group was maintained by its Executive VP. He expanded the informal management meetings that he held with his local team, to become a global virtual meeting, supported by telephone conference calls and email. The company’s web facilities provided support for the exchange of project or product-specific information, but the primary mode of communication was the morning conference call. Regular participants in the daily virtual conference are given in Table 1. The company maintained sales offices and support staff in South America and the Asia Pacific region, but most technology and e-Commerce support was managed via local agents, who reported to the managers participating here. So while participating managers were primarily located in the USA or the Europe, the operations, products and services discussed ranged across the global organization. The abbreviations given in parentheses in Table 1 are those used to identify actors in the meeting extracts reported below. Participants were invited by the Executive VP for e-Commerce, who ran the group that we observed, mainly on the basis of their scope of responsibility. Included in this list were managers from VendorCo, the local outsourcing vendor company who ran the group’s data center and to which the majority of system development was outsourced. Occasional participants included other senior managers from eServCorp Inc. and their controlling company, as well as a diverse set of technical or marketing managers.

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<td>EVP, eBusiness (EVP)</td>
<td>eServCorp Inc., USA</td>
<td>Daily</td>
<td>USA</td>
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<tr>
<td>Director, Tech Operations (DirTech)</td>
<td>eServCorp Inc., USA</td>
<td>Daily</td>
<td>USA</td>
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<td>Director, Info Systems (DirInfo)</td>
<td>eServCorp Inc., USA</td>
<td>Daily</td>
<td>USA</td>
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<td>eServCorp Inc., USA</td>
<td>Daily</td>
<td>USA</td>
</tr>
<tr>
<td>Senior VP European Operations (SVP-EU)</td>
<td>eServCorp Inc., Europe</td>
<td>Weekly</td>
<td>Europe (UK)</td>
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<tr>
<td>Manager eSolutions: Cust. Support (Mgr-EU)</td>
<td>eServCorp Inc., Europe</td>
<td>Monthly</td>
<td>Europe (UK)</td>
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<td>Vendor Client Support Consultant (V-CSC)</td>
<td>VendorCo</td>
<td>Daily</td>
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<tr>
<td>Vendor Technical Consultant (V-TC)</td>
<td>VendorCo</td>
<td>Daily</td>
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3.2 Research method

The study followed the team activities of the global e-Commerce group over a period of six months, starting soon after the company’s acquisition by ParentCo. The study is ongoing: this paper presents initial findings as an investigative study. The focus was on understanding the processes of knowledge-sharing and collaboration across organizational boundaries, over time. The research method emphasized an interpretive, naturalistic inquiry (Lincoln and Guba, 1985). Data were collected through an interpretive, ethnographic field study conducted via observations and interviews to understand group knowledge-sharing behavior (Van Maanen, 1988). Two researchers attended, but were not active participants in, 137 management conference call meetings, lasting from half to one-and-a-half hours, which took place on Monday to Thursday of each week. We attended the meetings remotely (by telephone) and also visited the head office frequently. Many of the meeting participants attended remotely, as they kept in touch and coordinated with other managers while they were away from the main office, or were located in geographically dispersed offices. Observation data was supplemented with formal interviews with the management team, with ad hoc interviews with participants, and with email queries to understand the significance of specific events, or the roles of participants and others mentioned in the calls. Because this study focused on understanding knowledge-sharing processes, data collection and analysis were focused around the practices, people,
and artifacts involved in daily work. We analyzed the data using computer-supported qualitative coding, that was constantly discussed, compared and evaluated across the research team. The longitudinal design of the study permitted constant comparison of data samples across time (Strauss and Corbin, 1998). The unit of analysis here is the distributed e-Commerce group and its interactions with other groups, business units and organizations.

4. Findings

The culture of the daily conference meetings was relaxed and informational. The Executive Vice-President (EVP) for e-Commerce led each meeting at which he was present, introducing a clear agenda and leading the discussion. When he was not present, one of the two senior managers, the Director of Information Systems (DirInfo), or the VP for eBusiness (VPeB), would lead the meeting. It was noticeable that they attempted to adopt the same style of meeting management as the EVP. In each daily meeting, there was a clear emphasis on learning across the team. Issues were introduced in a roundtable manner, sometimes preceded by an important or urgent issue on which the EVP needed rapid action. It was possible to track issues across many meetings, as new information emerged and was acted upon, leading to new consequences requiring further action, and so on. During the analysis, several major boundaries emerged as significant, with various forms of knowledge-exchange and mediation. These are described here, with the analysis findings summarized in Table 2.

4.1 Functional boundaries within group

Given the diversity of functional operations, a major need for knowledge sharing between members of the e-Commerce group was the need to provide a uniform and responsive quality of service. The main element of global workgroup knowledge management appeared to center on roles and responsibilities for different types of task. Who-does-what, related to know-how were often a critical part of such discussions. A team analogy was used to relate successful problem resolution to prior cases and to general case, to define future know-how. The e-Commerce group was often represented as facing insuperable odds, by the EVP, and the need for cohesion was emphasized, with requests for ideas about how collaborations could be managed better in various circumstances. Uniformity of response was especially prioritized for operational problems, as these affected the revenue-generating capability of the group and their ability to sell further products and services to that client. The EVP spent a great deal of time assessing various aspects of current projects in a way that was clearly intended to communicate a know-why that justified a group-interface know-how for project management. The most common way that this was achieved was by reference to an ongoing story of how managers of other groups (e.g. "Andy", below) were incompetent because they did not pay attention to the relevant critical issues:

**EVP:** Are the data conversions done?
**V-CSC:** This is one of the elements to be discussed on Wednesday. But we don't have to have all of the data done by Wednesday, just a representative sample of existing and new systems.
**EVP:** When I, as a hybrid sales/delivery person, show up for training, will my data be in there?
**V-CSC:** Good point! <he laughs>
**EVP:** You can't go into customer acceptance unless data is 98% correct. I haven't heard anything about data conversion. I have zero appetite for any additional risk about getting this done.

**SVP-EU:** That's on the Wednesday meeting [agenda].
**EVP:** Take off your rose colored glasses. Assume the worst and tell me what's going to happen. Don't assume that things will fall into place. That's how Andy does it. We have nothing to gain and everything to lose.

The EVP often introduced a discussion of current problems to provide an opportunity for clarifying who-does-what and who-should-be-involved-in-what, associating these with know-why and know-how. Participants would disagree or elaborate on this view to construct a collaborative model of the organization. The metaphors and language-terms used in defining standardized methods and procedures for resolving various types of problem were reflected back in future debates. For example, in one conversation, the EVP emphasized the need to “hold their feet to the fire”, to make external managers take action. This theme reoccurred at a later point, when the VPeB used the same term to describe her action on another project, and yet again, when the DirTech described how he had enforced a commitment to a deadline by ParentCo technical managers. These examples illustrate how knowledge about best practice was communicated via metaphors that lived on in the collective consciousness. By this means, the group co-constructed a knowledge-repository about how to resolve problems; participants frequently referred to previous decisions to justify a proposed action. This was not formalized in an information system. But a diverse set of managers was invited to participate in this construction of best practice, to widen the ownership of procedures within the company.
4.2 Relationships with other business units

Boundary problems with other business units tended to be presented as problems with individuals and so responsibility-disputes and the coordination of boundary-spanning activities were interpreted for the group as a problem with procedural clarification. This was achieved by jointly constructing work-practices in group discussions, so that a set of standardized procedures could be defined for global operations. In this extract, managers are discussing how to prevent a French operational group project from turning into a disaster by imposing standard procedures by which they must work:

V-TC: I have a concern. Jean-Claude has developed operational rules and protocols that we haven’t seen yet. My concern is that Max seems prepared to take the risk and sign off on this.

EVP: My feeling us that Jean-Claude is trying to throw Max under the bus. If he can distance himself from this, he’s going to and let Max take the fall. But he’s not going to be able to distance himself. What can we do, proactively, to make sure that these operational protocols that they are signing off on will work?

V-TC: We work out what their operational protocols are and we work with them to walk them through a complete rollout, to show them how to do a validation test. But if we do that, they will not make a February rollout.

EVP: We have to give them the information that they need to make that decision. Then they are responsible.

The discussions appeared to build into a repository of best practices that group members referenced by analogy with previous situations. For example “the situation with Jean-Claude and Max” was used as an analogy for this type of problem in a subsequent global boundary-spanning situation.

4.3 Managing vendor relationships

In defining new products a great deal of effort was expended in exploring product requirements, but much more of the knowledge exchange was spent on determining coordination problems between eServCorp and their main systems software development outsourcing vendor. Contractual responsibilities were clarified by ensuring that the people overseeing the vendor relationship adopted standardized methods and procedures for ensuring that software product deliveries were made effectively. Managers from the e-Commerce group collaborated with managers from their main outsourcing vendor for software development and support, VendorCo, to collectively define problems by pooling their knowledge. This type of debate would often develop into a discussion of rationale, where group performance drivers were related to various projects and to future vendor strategy. Such conversations had the dual role of communicating the rationale for group strategy to vendor representatives participating in the conference and communicating group performance drivers to other group members, e.g.:

VPeB: It turns out that a vendor that the EU office have is one that everyone else uses.

EVP: Yes and develops stuff for everyone else and shares the information. It depends whether we consider that a system for ... whether it constitutes a competitive advantage ...

SVP-EU: I think that landing and project sourcing has to become a strategic area.

EVP: But the question is, do we do it in such a way that we give the ability to everyone else, to do things the same way. So the question is, do we pay more, given that the minute we do it, everyone else will be doing it as well, scrambling after, or do we do this and give everyone else the ability to do it the same way?

It is clear that who-knows-what was considered so critical that knowledge was to be managed by selecting future membership of projects. In the following extract, the Vendor representative is being warned that a vendor manager is to be excluded from future collaborative projects:

EVP: I have a call with Joe Bloggs about the system at 8.30. Once again, Mr. Bloggs has underwhelmed me with the timeliness of his points. He always happens late on everything. If he’s not late, he’s so close to the deadline he might as well be late. I hate that guy. I’m serious, he’s a pain in the butt. <To the Vendor representative> just so you know, I just want to get him off this project.

4.4 Collaboration with the parent company

The main task that the group faced in its relationship with their parent company (ParentCo) was delivering the economies of scale and scope expected by ParentCo. This was to be achieved by integrating areas of operations with ParentCo. But there was a clear conflict between this objective and the need to maintain the local corporate identity of eServCorp Inc.. They needed to ensure that their specific areas of business continued to be run in a way that provided them with competitive advantage. The basis for differentiation was spelled out in heroic stories of how eServCorp beat the odds, to understand the know-why of their future integration strategy:

EVP: When you think about we’ve done compared to every other company in the world, we’ve done very, very well. Especially when you think we had to pick
up the business, pick up the responsibilities when SoftVendor Consulting screwed up. So I'm very proud of what this group has done – I don't care what anybody else says. But at the same time, a model of outsourcing hurts us a lot with SoftVendor – because of the DBA resources. It doesn't make sense for us to continue in this way. Now we've got an action where ParentCo have got the DBA, they've got the data center, they've got the software, the hardware to run it on.

The group spent much of their time understanding what performance issues drove business success and how to predict and increase revenues. Despite the extensive experience of the EVP, he often deferred to other group managers, to build up a collective model of how performance was reflected in reporting statistics. The group spent many hours constructing a mental model of how the group's finances worked and how this affected their relationship with the parent company. Differences in culture were seen as significant and humor was often used as a way to clarify problems arising from these differences:

EVP: When did the call with ParentCo go?
DirTech: They're moving slowly. They want to have three data centers around the world, to run like we run it. They have no idea how we do it.

EVP: They're used to waiting 15 minutes to log on. Their offices are full of low level staffing people. They're different kinds of people. They're not even white-collar people. They're light blue. One of our people talked about going on a sales call with a woman with plastic shoes! Underneath is a real difference. They work in a low level commodity environment. But their benefits are probably better than ours <laughs>.

4.5 Managing client relationships

When it came to managing client relationships, the impetus was clear. Clients provided the major source of revenue for the group and so any client problems or work were a priority. In discussions, the group built a collective repository of knowledge about why problems occurred, how these related to previous problems and how they could be prevented in future. Much of the discussion centered on who-knows-what (and how do I get them to talk to me) and who-is-responsible-for-what. The EVP proactively managed the group response to client problems and encouraged other group members to define responses:

EVP: I have a question. When will all these e-mail issues go away? Now all when I say I issues, I'm not pointing at blame or rooted causes, but it don't go away. So my question is, whatever the issues are, my customers - our customers - are very displeased and now we're talking about losing business. I've stayed out of this, letting the people who get paid to do this deal with it - it's not getting done. This is a failure - this is an utter failure now. Will I need to personally get involved to make sure it's done? That is my question. Because you guys have proven unable, so far, to make their e-mail system work to their satisfaction. Anybody want to take that?

Knowledge discovery to investigate boundary-spanning projects was delegated across the team. This was presented in terms of role definitions and also a definition of an acceptable social network for the inquiry. For example:

VP: We've been rolling out these global sites for our major clients. You know we have been very careful about setting expectations that the reporting in North America will be different than the reporting outside of North America? And that the outside of North America reporting is wholly dependent on the offline report creation by country? As I was talking to our support staff, we said, we need to talk about who's going to own this, the mechanics of how it's going to happen. We have set up a meeting for Friday with <list of managers>. So we're going to have a little bit of a discovery on what are the commitments on reporting that they have made, at least to these three global companies. Because we've always had these reporting requirements, but with global access it just becomes more transparent on what's missing [in different countries]. It raises the bar about how our global customers are perceiving us.

EVP: Just make sure, you know, we're responsible for the technology. We're responsible for consulting and help. We're not responsible for doing all the grunt work.

4.6 External legal and regulatory boundaries

Legal and regulatory requirements were taken very seriously, both by the e-Commerce group and ParentCo. There were frequently disagreements between the eServCorp auditors and the ParentCo auditors, that resulted in multiple interpretations of requirements for management controls. When this happened, local group culture and loyalties tended to override any third-party definition of requirements. The group co-constructed standardized procedures for regulatory requirements in the same way that they constructed these for project work, to preempt any procedures being imposed by ParentCo. They paid particular attention to making sure that procedures were uniform for global operations:

EVP: We have no global HR. North America has a good process with HR as a focal point. Everything goes to HR. HR does project 1, then passes on the rest. They work via email and phones.
DirTech: It's good now. Everybody is signing stuff off.
EVP: In North America, we have made a good process. We made HR do it.
DirTech: Sarbanes Oxley made us do this. Now we can spread this everywhere.

EVP: We don't want to reinvent the wheel. Let’s explain to Gustav and Mr. East what we do here. Question - who should make the changes? Does Gustav take them off or do we do that here?

### 5. Discussion

The summarized findings are presented in Table 2. These findings demonstrate the diversity of knowledge-sharing forms and mechanisms, but also illustrate the core role of who-knows-what in communicating knowledge that is situated, even when this knowledge is to be transferred to another global location or culture. It is clear from the findings above that many forms of knowledge were communicated through the combination of oral communications and email, that could not have been communicated via a computerized information system. The most significant finding seems to be the centrality of who-knows-what to every form of knowledge transfer. The findings demonstrate that who-knows-what is key to communicating knowledge that is situated and distributed, even when this knowledge is to be transferred to another global location or culture and the individuals do not personally know the people in question.

Different forms of knowledge were employed to span boundaries than the ones so far identified. These tended to relate to membership in some community of practice, as defined by various groups across the boundary. Issues of who-does-what and who-should-be-involved-in-what tended to dominate boundary-spanning coordination, as various groups vied for responsibility and credit for different functions, products, or clients. So a final insight is the need for a new type of boundary object, to manage the who-knows-what and who-I-want-to-deal-with issues. This is the group membership boundary object, which adds to the four types of boundary object defined by Star (1989). This form of boundary object establishes a basis for collaboration at the boundary. It is distinct from the standardized forms and procedures, in that it does not impose a common method or a common perspective at the boundary. But it establishes a set of parameters for collaboration – a scope of operations and ways of working – by identifying people with whom the core group feel comfortable in collaborating. Selection of collaborators and project group members is known to be the way by which managers ensure that collaboration is viable. This is a critical boundary object that has so far been overlooked. The management of meaning (Smircich and Morgan, 1982), by a variety of managers appears to depend on the identification of relevant actors for collaboration. This appears to be a rich and complex process that relies on perceptions of personal qualities from interpersonal interactions: personality, timeliness of work, willingness to prioritize similar issues to the core team, among others. These are a critical part of the knowledge that is shared and managers were unwilling to communicate such knowledge in writing, as it was considered politically sensitive. It is therefore unsurprising that managers avoid the use of computer-based tools to support distributed collaboration. Forms of knowledge-sharing for very different organizational boundaries appear to be performed in very similar ways. The same boundary-spanning knowledge sharing mechanisms come into play repeatedly, whether the e-Commerce group is engaged in managing corporate coordination with the parent company, managing projects and relationships with external vendors, or managing internal relationships across the diverse set of functions represented by group members. Every single boundary required the definition of standardized forms and procedures, to reflect the group’s perception that they needed a shared method to enforce a shared view of operations across the boundary (Carlile, 2002). But equally, every single boundary required the definition of models and maps, that permitted diverse perspectives to co-exist (Carlile, 2002). It appears that this diversity was prized within the e-Commerce group, so that a shared view of the collaboration objectives could be constructed from all relevant knowledge, rather than limited to the partial knowledge possessed by group members. A repository boundary object (which assumes that all actors hold similar interpretations of knowledge) was only used for boundaries across functional responsibilities within the group.
Table 2. Knowledge Sharing Mechanisms Across Various Boundaries

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<th>Boundary</th>
<th>KM Problem</th>
<th>Knowledge-Sharing Forms</th>
<th>Boundary Object Mechanisms</th>
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<tbody>
<tr>
<td>group</td>
<td>service.</td>
<td></td>
<td>Repository: co-construction of evolving set of methods, procedures, and relevant participants.</td>
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<td>group ops.</td>
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<td>Know-why: Understanding significance of various management controls and measures. Know-how: Analogies for how to implement controls.</td>
<td>Definition of standardized methods and procedures.</td>
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6. Conclusions

This study discussed an investigative study of global collaboration within and across the boundaries of a diverse e-Commerce group in a service organization. The contribution of this paper is to suggest a framework for how such groups manage distributed knowledge in practice and to identify a fifth type of boundary object in addition to the four forms identified by Star (1989). The framework of Table 2 provides rich insights into how a virtual group constructs and shares boundary-spanning knowledge in a global organization. These findings have significant implications for how we design virtual systems for distributed management collaboration, as they suggest that many of the
knowledge-sharing forms are not amenable to codification, storage or electronic communication. Useful and relevant knowledge is continually evolving in a dynamic global business and even dispersed groups appear to manage this by constructing an evolving mental model, to provide a repository of knowledge relevant to best practice. The findings on managers’ preference for spoken communications on collaboration issues have significant implications for research. Much of the research into media richness and knowledge transfer relates to the form of interface and interpersonal interactions, rather than the forms of knowledge being transferred. We would conclude that there are many forms of knowledge – including with whom managers wish to deal and why – that organizational managers would not wish to commit to a written or persistent form. The system design implications are that we need to provide communication and collaboration spaces for information that are not stored after the session has ended.

References