Knowledge Transfer Challenges in ERP Development Networks:
The Quest for a Shared Development Model

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Abstract
Contemporary Enterprise Resource Planning (ERP) system development is conducted in a multi-stakeholder network. It requires the collaboration of different organizations and stakeholders. Knowledge transfer (KT) is difficult and often causes failure in projects, yet it has not been thoroughly investigated from the network’s perspective. Thus, this interpretive case study investigates what makes KT difficult in ERP development networks. As a result, seven categories of KT challenges were found: articulating domain knowledge, unwillingness to communicate, excessive trust, using informal communication channels and methods, different ways of working, missing or unidirectional connections between parties, and unsuitable or missing tools. The main contribution is gaining a deeper understanding of ERP development networks and especially about what makes KT difficult when developing ERP systems in a multi-stakeholder context. These findings imply that a shared development model for the EDN needs to be created in order to avoid KT challenges.

Keywords: Knowledge transfer, Challenges, ERP development networks, Development model

1 Introduction

“Knowledge Transfer in the Enterprise System context provides continuing challenges for practitioners and many opportunities for researchers” (Volkoff et al., 2004, p. 302).

This statement introduces our research topic: knowledge transfer (KT) in an Enterprise Resource Planning (ERP) system context. The ERP system enables information flows
between departments inside the organization (Davenport, 1998). It provides a backbone for business collaboration with supply chain partners (Moller, 2005). Despite the abundant attention given to ERP systems, the implementations often fail, at least on some level (Momoh et al., 2010). Knowledge management (KM) has been studied rather extensively in information systems research, yet it is still a major challenge in ERP projects and is prone to failures (Al-Mashari et al., 2003; Sarker & Lee, 2003). Only a few researchers provide empirical evidence or concrete suggestions to overcome these challenges (Corvera Charaf et al., 2013). Contemporary ERP development is rarely done as an in-house project. ERP projects are socio-technical endeavors that include numerous stakeholders from different levels of all the involved organizations, including but not limited to the customer or adopting organization (AO), the vendor, consultants, and third parties such as database vendors or business partners (Dittrich et al., 2009; Sammon & Adam, 2002). In addition, these projects tend to cross national boundaries, as projects are for example sourced to low-cost offshore locations (Levina & Vaast, 2008). The stakeholders involved in ERP development together form an ERP development network (EDN) (Alanne et al., 2014).

When developing the system in a multi-stakeholder network, the inter-organizational boundaries are also blurred, increasing complexity and making close collaboration even harder (Levina & Vaast, 2008; Volkoff et al., 2004). Studies on different levels (individual, group, and organizational) of KT have been conducted, yet with very few exceptions they have been limited to local settings (Sarker et al., 2005). Earlier IS studies have focused on the AO’s internal issues (e.g., Lee & Lee, 2000), KT across and within software teams (Heeager & Nielsen, 2013; Joshi et al., 2007), between the AO and the vendor (Al-Salti & Hackney, 2011), and between the consultancy and the AO (Ko et al., 2005; Haines & Goodhue, 2003). Additionally, KT issues between offshored developers and the main vendor have also been studied, e.g., in virtual systems development teams (Levina & Vaast, 2008; Sarker et al., 2005). Overall, the EDNs as a whole and their interaction have not received much attention in the IS research community (Dittrich et al., 2009; Hackney et al., 2008).

In this paper, we focus especially on KT challenges in the EDNs, and identify what makes KT difficult. Our research question is thus: What are the knowledge transfer challenges in ERP development networks? An interpretive case study research approach was chosen. We conducted 35 interviews in two EDNs. We consider the development of the ERP system as an on-going operation through the ERP lifecycle instead of simply a phase in the project (see e.g., Alter, 2002).

The rest of the paper is organized as follows. Next, the related research on KT challenges in ERP development networks is presented. The third section introduces the research methods and setting. The fourth section presents the key findings from the empirical data. The discussion part evaluates the findings and links them to earlier literature. After this, the implications of the study are proposed. Finally, the conclusions wrap up the paper with limitations and future work.

2 Related Research

Much of the knowledge residing in organizations is untapped and unknown (Alavi & Leidner, 2001). A substantial increase in productivity and competitive advantage could be gained by identifying and transferring this across the intra- and inter-organizational boundaries (Argote & Ingram, 2000). However, this is often a difficult and laborious
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activity because much of the knowledge is embedded in practice, e.g., in organizational processes, which is the case especially in information system development (Orlikowski, 2002; Volkoff et al., 2004).

Knowledge itself may be defined in a variety of ways. Different levels (e.g., data, information, knowledge) or dimensions (tacit and explicit) can be distinguished (Alavi & Leidner, 2001). In this paper, the focus is on knowledge related to development, including both tacit and explicit knowledge. More precisely, we investigate business knowledge concerning the processes and workflow in the AO, and technical knowledge about the system’s capabilities and the development skills that are used to translate business needs to software solutions (Al-Salti & Hackney, 2011).

KT has been widely studied in other disciplines, such as organization science (Carlile, 2004), software engineering (Heeager & Nielsen, 2013), and knowledge management (Riege, 2005). The KT in organizations is driven by the communication processes and information flows (Alavi & Leidner, 2001). Moreover, poor communication between different groups, within and between organizations, negatively affects the ERP projects (Al-Mashari et al., 2003). Especially when developing systems in a multinational environment, the cultural issues and different communication methods need to be considered (Levina & Vaast, 2008). The terms “knowledge sharing” and “knowledge transfer” are sometimes used in parallel in the literature (Heeager & Nielsen, 2013). However, here we will focus on knowledge transfer, since it considers both sharing and using the transferred knowledge (Argote & Ingram, 2000) essential for the development. KT may happen on various levels: between individuals, from individual to explicit sources, between and across groups, and among organizations (Alavi & Leidner, 2001; Argote & Ingram, 2000).

The need to efficiently transfer knowledge is highlighted in ERP development networks as there are multiple stakeholders from different organizations. The stakeholders in the EDN have their expertise in different fields. Shared understanding about the scope of the system and mutual “language” is crucial (Jones, 2005; Ko et al., 2005). The domain knowledge of each stakeholder needs to be transferred within the network, over groups and organizational boundaries. KT becomes more difficult as the individuals and organizations might have significantly differing objectives and goals for the development (Volkoff et al., 2004; Alanne et al., 2014). In addition, the EDNs are not stable. Changes in individuals involved as well as the temporal role of stakeholders in the development makes mutual understanding even harder to achieve (Alanne et al., 2014).

The KT challenges can be divided into three key levels: individual (the level where knowledge resides), organizational (the level where knowledge attains its economic and competitive value), and technological (the level that provides tools for knowledge sharing) (Riege, 2005). Figure 1 illustrates the initial levels and categories of KT challenges in EDN as derived from the literature.
3 Research Methods and Setting

An interpretive case study approach (Walsham, 2006) was selected in order to gain in-depth knowledge of ERP development networks. We gathered data from two different cases by conducting 35 theme-based interviews: 33 in January-June 2013 and two in February 2014 (the offshore department in Case B). Cross-organizational interviews were used to enhance the credibility and to allow the testing of one source of information against others, i.e., in “representing a variety of voices” (Myers & Newman, 2007, p. 22).

3.1 Case organizations

Both case companies operate in global environments. Case A is a large manufacturing company and Case B is a large service provider in the retail business. Each of them can be considered regular enterprises acquiring a custom ERP system. A tailored ERP system was chosen due to the fact that standard software would not satisfy the unique business process needs of AOs. In all cases, the cooperation between the AO and the

Figure 1: Knowledge transfer challenges in ERP development networks
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vendor has lasted for several years. In both EDNs, at least five relevant stakeholders were present: AO business, AO IT, vendor, offshore department, and third parties.

3.2 Data collection

We started the data collection in each AO with an initial interview with our main contact person. The subsequent interviewees were chosen by snowball sampling, i.e., the interviewee recommends a suitable person to be interviewed. This way, the EDN was investigated by moving from one node to another. The data gathering was stopped when the interviewees did not suggest any new persons to interview. This allowed us to obtain critical mass of interview data (Myers & Newman, 2007). The interviewees and organizations are shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>AO Business</th>
<th>AO IT</th>
<th>ERP vendor</th>
<th>Offshore department</th>
<th>Third parties</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case A</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>2 (Middleware vendor)</td>
<td>17</td>
</tr>
<tr>
<td>Case B</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>1 (Corporate IT)</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>35</td>
</tr>
</tbody>
</table>

Table 1: The number of interviewees and their affiliated organizations

The interview questions were semi-structured. The open-ended questions considered the following areas: identification of stakeholders in the latest ERP development activity, own experiences, and successful/problematic issues. Each interview was conducted onsite at the case organizations. They lasted from 11 to 98 minutes, the average being about one hour per interview. The interviews were recorded and transcribed for analysis purposes. The researchers also collected secondary research material, such as documents and memos, to better understand the contexts.

3.3 Data analysis

There was a dedicated researcher responsible for the data analysis in each case organization. First, this responsible researcher coded the data from the case organization starting immediately after the first interviews (Walsham, 2006). The challenges in the ERP development were searched from the data and the first version of categories was created. Then, the focus was on EDN related communication and knowledge management challenges, which were further categorized. A comparison of these issues and categories between cases was done in several brainstorming sessions between the researchers. The aim was to find similarities and differences as well as to harmonize the codes and categories for the analysis (see Figure 2).
### 4 Findings

The findings are categorized under three main levels and further into subcategories, as summarized in Table 2.

<table>
<thead>
<tr>
<th>Level of knowledge transfer challenge</th>
<th>Subcategory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Articulating domain knowledge</td>
</tr>
<tr>
<td></td>
<td>Unwillingness to communicate</td>
</tr>
<tr>
<td></td>
<td>Excessive trust</td>
</tr>
<tr>
<td>Organizational</td>
<td>Using informal communication channels and methods</td>
</tr>
<tr>
<td></td>
<td>Different ways of working</td>
</tr>
<tr>
<td></td>
<td>Missing or unidirectional connections between parties</td>
</tr>
<tr>
<td>Technological</td>
<td>Unsuitable or missing tools</td>
</tr>
</tbody>
</table>

#### Table 2: Identified categories of knowledge transfer challenges

### 4.1 Individual level

KT challenges related to individuals were identified from the data. These are categorized into: *articulating domain knowledge, unwillingness to communicate*, and *excessive trust*.

#### 4.1.1 Articulating domain knowledge

The knowledge that is communicated through the EDN is often tacit and embedded in local practices. This causes difficulties in articulating. Some issues surface only when
the system is used. The tacitness of knowledge is highlighted when the key individuals left the project:

“...there was a clear dip in performance when he [project manager] left, there was no single person who has the 13 years of experience about the system.”—Case B, AO Business

The business needs emerging from the AO should be forwarded throughout the EDN. Challenges in reaching an understanding between technical and business personnel of the AO and the vendor were pointed out:

“...it takes several people on both ends to manage and figure out what is wanted. So it’s challenging to specify in that way, and in general, there are so many moving parts there.”—Case B, Vendor

On the other hand, the users may not have enough IT competence and they cannot challenge the system enough, thus expressing true needs forward is difficult. The vendor of Case B saw piloting as essential because only then are the practical issues, such as different working styles and methods, revealed. Additional challenges emerged as the domain knowledge had to be further transferred to the remote locations:

“There’s a lot of know-how in the heads of our guys in this country. It has been challenging to transfer that knowledge to outsiders with only technical IT understanding, and no understanding of the business. In Asia it’s hard to find developers that would understand the domain.”—Case A, Vendor

Also, lack of skills in sharing knowledge and the foreign language sets certain limitations for the KT.

### 4.1.2 Unwillingness to communicate

The importance of the system under development was not always understood by the business side personnel. Sometimes, lack of communication is a matter of attitudes:

“... the cooperation between all [the departments] is not always the best possible. Certain kinds of silos form... Instead of providing things together for the business, everyone has a bit of their own stance.”—Case A, AO IT

In Case A, joint project groups were formed between the AO and the vendor to ensure adequate cooperation and communication for the development projects. However, currently the AO is sometimes unwilling to participate in them. This can lead to unidirectional information flow, distancing the developers further away from the actual users of the system. Moreover, in Case B, business representatives were not interested in taking part in the project even if asked for their opinions, e.g., the requirement documentation review was dismissed, and IT had to follow the original definitions. Similarly in Case A, the “business people disappeared along the way” (AO IT), the project went on and ran into complications.

Because of the global nature of the EDN, some parties, especially subcontractors and offshored developers, may not have enough motivation to receive the knowledge:

“On the one hand, they are [foreigners] and on the other hand they aren’t our own employees and [are] not so interested in the knowledge.”—Case B, Vendor
4.1.3 Excessive trust
Having too much trust between stakeholders can lead to problems. All the relevant knowledge may not be transferred because it is assumed that the other party already has it. More specifically, if the EDN stakeholders have a long history of cooperation, some domain understanding is expected of the partners. AOs often seem to assume that the vendor and partners have a good understanding of their business logic; hence, the vendor’s competence is taken for granted:

“The advantage with this vendor is that during the years the domain knowledge has been built up to a certain level also within there. So they really understand immediately what we are talking about.”–Case B, AO IT

Moreover, this can lead to a situation in which the documentations are rather vague:

“…some functions [have been] described like ‘this is how it should work’”–Case B, AO IT

Due to the vendor’s familiarity with the AO’s business, it was not seen as necessary to do the documentation very rigorously. However, this method for KT was not suitable for the offshore department. The specifications had to be redefined to be understandable for the offshore developers.

Still, it appeared that the vendor has much tacit knowledge about the AO’s business, so that ending the cooperation or changing the vendor is not possible. For example, Case A considered the relationship with the vendor as a “forced marriage,” and even considered buying the system source code from the vendor, but this “did not turn out to be a realistic option.” In Case B, sticking with the same vendor was considered natural since choosing a new vendor “would have meant that they would have had to spend a couple of years learning about the domain issues.”

4.2 Organizational level
Three issues related to organizational level were found: using informal communication channels and methods, different ways of working, and missing or unidirectional connections between parties.

4.2.1 Use of informal communication channels and methods
Informal channels and methods were often used instead of intended ones. The EDNs are the result of a long period of cooperation; hence, personal relationships are inevitably formed and the official communication routes are bypassed:

“If I have questions concerning the system and I cannot contact our IT manager right away, the next place for me to call is the CEO of the vendor directly.”–Case B, AO Business

Distributing documented knowledge was also seen as challenging. A centralized tracking system was agreed to be the primary choice of communication because “otherwise it wouldn’t stay under control” (Case B, Vendor). However, in practice, email and phone calls were often used instead. Further challenges were caused by not having standardized documentation practices. In Case B, for example, the original requirement specification documents were managed in various ways:
“It is difficult to dig up that information when there is no single specification document...the specification that is done with the vendor can be just email conversations...”–Case B, AO IT

Informal documentation methods can lead to confusion about who possesses the needed information in the organization. This hinders the KT as the necessary pieces of information have to be “fished” from various stakeholders.

At times, official methods are not used due to practical reasons. For example, the IT department of Case B is rather small and all its members are co-located and hence share knowledge casually along the daily routines. This may be efficient for knowledge sharing within the group, but not for the whole EDN if one group decides and evaluates which information is distributed to all relevant parties.

4.2.2 Different ways of working

Different ways of working among the organizations in EDNs may hinder the cooperation and create the need to match the local practices with new working environments. Achieving a common understanding between the AO and the vendor turned out to be challenging in Case A:

“I was talking about the fence pole and [the vendor] was talking about the fence. We had agreed on completely different things and neither of us understood anything.”–Case A, AO IT

Similarly, the third parties may be used to dissimilar practices. For example, the subcontractors are accustomed to working strictly along the specifications. This is challenging as the business needs are described loosely to leave room for novel ideas from the technical experts.

In both cases, the ERP systems are to be deployed to multiple countries. This has added challenges for KT as the practices are dissimilar:

“The challenges were with day-to-day work. There are still differences in how Asian culture matches with European, values and we still have topics on how reliable certain tasks and how we work together there.”–Case A, Vendor

Multinational development required two-way knowledge transfer: both gathering the specific needs of other countries and also implementing the business logic of the system into these locations. Besides the national differences, local differences in the business units created a need to match the practices. Both the vendor and the AO in Case B saw that difficulties arise because the offices were used to doing things differently and had their own unique cultures.

4.2.3 Missing or unidirectional connections between parties

Missing connections slowing down the information flow between stakeholders were identified at different levels. In Case A, it turned out to be challenging to manage the needs of different business areas. In Case B, lack of collaboration between the AO’s business and IT departments was identified. For example, business representatives felt like they do not get enough information on the progress of the project and were uncertain which of their needs will be realized and which will not.
The AOs’ IT departments, which are leading the development, are almost entirely situated in a single country, yet the ERP system is eventually (or already has been) implemented in multiple nations. Countries other than the focal one are easily forgotten from the information distribution chain. In Case B, attempts were initially made to avoid this by keeping the other countries informed about the development progress and asking for their unique requirements in joint meetings. However, this activity slowly faded as the project was delayed.

The missing connections were identified between the AO and the vendor. The vendor felt that they were not getting enough feedback from the AO and consequently, the AO’s IT department did not get enough information from the vendor. Moreover, the vendor of Case A highlighted the need to have direct contact with the AO’s business representatives to be more involved in specifying the system:

“*Their business units are customers to their IT department. Our customer is their IT organization. This is the old model that we’ve stuck with.*”–Case A, Vendor

In the worst case, this unidirectional knowledge distribution may lead to a situation whereby the technical know-how (e.g., what can be done with the system) is not transferred through the network. For example, the offshored developers felt they did not have enough information about the overall picture in order not to “reinvent the wheel.” Moreover, this has affected the offshored developers’ ability to advance their ideas and competence:

“If you want to make a proposition, you’ll need to have information about [the environment]”–Case B, Offshore Department

### 4.3 Technological level

The tools that are used for communication and KT can be unsuitable or they may not exist at all. For example, it appeared that the old integrative systems used as the basis for the developed system are often not well-documented. These systems were, however, used as tools between all parties, to which they refer to while discussing the system development:

“The aim is that the new version has at least all the same features as the old version. It has many features that are not documented anywhere, they just are there. So digging them and finding out what is there has been quite a big part of the work.”–Case B, Vendor

In Case A, it appeared that during the project phase of the ERP system development, there were no tools to manage change requests. Furthermore, the need for centralized systems in information sharing was emphasized; the offshored unit said that there is no centralized repository for business process descriptions. Similarly, in Case B, the offshored unit highlighted the lack of certain tools (e.g., storyboards) in the development process hindering the KT.

### 5 Discussion

We have identified KT challenges hindering the ERP development in networks. Most of these issues are recognized in the literature on some level, but we have also found
undiscovered aspects of KT challenges. In Figure 3, our findings are mapped to the related research.

<table>
<thead>
<tr>
<th>Level</th>
<th>Knowledge transfer barriers</th>
<th>Barriers in EDNs</th>
<th>Literature coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Motivation</td>
<td>Unwillingness to communicate</td>
<td>YES</td>
</tr>
<tr>
<td></td>
<td>Skills</td>
<td>Not an issue</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Trust</td>
<td>Excessive trust</td>
<td>PARTLY</td>
</tr>
<tr>
<td></td>
<td>Knowledge attributes</td>
<td>Articulating domain knowledge</td>
<td>YES</td>
</tr>
<tr>
<td>Organizational</td>
<td>Organizational culture</td>
<td>Different ways of working</td>
<td>PARTLY</td>
</tr>
<tr>
<td></td>
<td>Time and resources</td>
<td>Not an issue</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Management style</td>
<td>Not an issue</td>
<td>-</td>
</tr>
<tr>
<td>Technological</td>
<td>Infrastructure</td>
<td>Unsuitable or missing tools</td>
<td>YES</td>
</tr>
<tr>
<td>Development model</td>
<td>Development model</td>
<td>Using informal communication channels and methods</td>
<td>NO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Missing or unidirectional connections between parties</td>
<td>NO</td>
</tr>
</tbody>
</table>

**Figure 3:** Identified knowledge transfer challenges in relation to the literature

In general, KT is time-consuming and lack of resources hinders it (Lyytinen & Robey, 1999; Riege, 2005; Szulanski, 2000). Surprisingly, this is not the case in these EDNs. Besides only a few mentions about not having time to write documentations, having scarce resources was not considered a problem. Issues related to individuals’ skills, for example personal characteristics and interpersonal skills (Riege, 2005), absorptive capacity (Szulanski, 2000), and different levels of expertise (Joshi et al., 2007) were not considered as challenges in KT in our cases. Management style related issues (e.g., ISD change from traditional project management to agile) have been identified as a barrier (Heeager & Nielsen, 2013) or unsuitable communication level or hierarchy (Olsson et al., 2008). However, these were not evident in our cases.

The challenges found in the three subcategories were aligned with the literature. First, the nature of knowledge makes the KT in EDN fundamentally difficult, as suggested by the literature and confirmed in our findings. In EDNs, both the business and technical knowledge is often tacit and embedded in practices, and hence, difficult to explicitly express let alone to articulate it outside the community possessing it (Carlile, 2004; Jones, 2005). The situatedness of the domain knowledge has been acknowledged in our cases; practical means are chosen to transfer these insights to a foreign country by bringing the developers on-site to the AO’s premises. Second, the identified motivational issues were also aligned with the literature. Especially intrinsic motivation (Ko et al., 2005) and unwillingness to share knowledge (Gupta, 2008) were hindering the KT in EDNs. Third, similar to our findings, technology level issues such as inadequate level of technical infrastructure (Heeager & Nielsen, 2013) or reluctance to use the systems (Riege, 2005) have been identified in the literature.

Some of the findings were partly covered in the literature. Lack of trust (Heeager & Nielsen, 2013; Riege, 2005) and source credibility (Joshi et al., 2007; Sarker et al., 2005) hinder KT, yet they were not observed in this study. However, we found that having too much trust may hinder the KT. Personal relationships are potentially helpful for KT (Jones et al., 2006), but we also found that bypassing formal communication routes creates difficulties. Different ways of working was hindering the ERP system development. The literature has suggested that cultural issues, such as organizational
design and lack of knowledge sharing spaces, hinder the KT (Riege, 2005). Our findings highlight that dissimilar practices cause problems especially in a multinational environment.

We found that using informal communication channels and missing or unidirectional connections between parties introduced challenges for KT in EDNs. The former entails choosing practicality over formality, hence hindering the management of the development. Using informal mechanisms is, however, seen as a reasonable choice when transferring highly context specific knowledge. It may in fact be effective in personal knowledge exchange but weaken wider distribution (Alavi & Leidner, 2001). The latter turned out to be critical in Case A, where the vendor could not have direct contact with the AO’s business. Similarly in Case B, the technical know-how from the offshored department was not distributed through the EDN. Yet the existence and richness of transmission channels is one of the relevant elements of KT (Gupta & Govindarajan, 2000). More importantly, these issues will not fit directly under any other category because they are consequences of the networked nature of ERP development. Thus, we suggest the development model as being a new category of KT challenges in IS development.

6 The Quest for a Shared Development Model

The levels of KT challenges are intertwined in practice (Riege, 2005), as illustrated in Figure 1. For example, the reluctance to use the system (technological) may be inherently caused by lack of motivation (individual). Also, it is important to emphasize that there are multiple organizations involved in the EDN. They may have different cultures, practices, and tools, i.e., each stakeholder in the EDN may have their own challenges under these levels. The shared development model of the EDN sits at the intersection of all levels of KT challenges (Figure 4). It includes practices and processes for KT and determines the communication channels and methods for carrying out the cooperative development between the stakeholders in the EDN. The development model has to match the differing practices and evolve along with changes among individuals and organizations and their relationships during the ERP system development.
The development model should enable KT within the EDN. In both cases, the development of the ERP system has been outsourced to a remote country, and implemented and used globally in several locations. Issues such as culture and distance make knowledge management more difficult when development has been offshored (e.g., Olsson et al., 2008; Levina & Vaast, 2008; Sarker et al., 2005). This environment not only makes the EDN more complex, but also emphasizes the role of the shared development model.

The systems in our cases were built from scratch. In the early phases of development, there was nothing concrete (e.g., a demo version) to show for the AO, and thus, the coordination of the development tasks became more difficult. This implies a lack of working intermediary artifacts to support gaining a mutual understanding or the shared knowledge space needed for truly exchanging knowledge. These objects, e.g., prototypes or models, are helpful for KT in new product development (Bechky, 2003; Carlile, 2004). The ERP development in network is not, however, directly comparable to this environment since the stakeholders involved may not share a goal, e.g., the vendor develops a product and the AO develops a custom system (Volkoff et al., 2004; Alanne et al., 2014). Nevertheless, we suggest creating such tools as part of the development model as crossing boundaries within the network would aid to partly overcome the introduced KT challenges.

### 7 Conclusions

We conducted an interpretive case study in two large enterprises. We identified KT challenges hindering ERP development in networks. The shared development model includes commonly agreed practices and tools for all involved organizations. It must be in place to enable knowledge flows throughout the EDN in order to reach a mutual
understanding between stakeholders. Thus, our main contribution is gaining a deeper understanding of ERP development networks and especially about what makes KT difficult when developing ERP systems in a multinational context. In addition, we confirmed earlier observations about KT barriers, yet also identified novel challenges, especially in EDNs. For practitioners, these issues alone are important for choosing the right counter-measures.

This study has its limitations. The context should not be dismissed when applying these findings. These networks are all from similar cultural environments that are generally considered to be democratic in terms of coordination. Within and between the organizations, more emphasis is laid on trust than on different legal agreements. Hence, these findings may not be applicable to North American organizations for example. Also, we have investigated tailored ERP systems, which may differ from the networks implementing and developing standardized packages. It has been suggested, however, that the differences in development between these systems are “one of degree, not kind” (Chiasson & Green, 2007, p. 553); thus, we are confident that our findings are also relevant in a packaged system development environment.

It should be noted, however, that the traditional solutions to overcoming KT barriers may not be applicable in EDNs due to the complexity and number of stakeholders. Identifying suitable solutions and tools to overcome the KT barriers and create shared development models is left for future research.

8 Acknowledgements

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