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Building bridges:

Using Boundary Spanning Mechanisms for Sharing Information
During the Implementation of ERP Systems

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Abstract

The current work is about obtaining insights about spanning knowledge boundaries in an ERP implementation process, to enhance the understanding of designing and implementing an ERP system. The insights have been obtained by performing a case study at an organisation called Abiom. By hosting semi-structured interviews and a focus-group session, the researcher has found indications for the importance of utilizing the complementary nature of boundary spanning mechanisms. The current research finds critical factors that largely affect the implementation process for better or worse. Boundaries encountered within these factors are found to be individually responsive to boundary spanning mechanisms and, thus, need to be approached separately. The findings of the current study have severe implications for both literature as well as practice. Firstly, the result does not reflect existing literature or touch upon unexplored knowledge. Secondly, knowledge sharing is found to be essential within organisations, and knowing how to deal with knowledge boundaries can be real revelations for organisations.

1. Introduction

1.1 Background

In various organisations, information is scattered around in different sources causing information fragmentation. If information is fragmented and dispersed throughout an organisation, it can be assumed that obtaining relevant information is difficult, and as a result, working becomes inefficient. These inefficiencies induce problems when an extensive understanding of different operations is required. To overcome information fragmentation, different systems are developed to integrate the knowledge flows within a company. An example of such a system is the Enterprise Resource Planning system (ERP). ERP systems support the different organisational elements to share data and knowledge. The implementation of such systems reduces costs, and thus, better manages business processes (Aladwani, 2001). Recent research has found that the global ERP software market was valued at \$35.81 billion in 2018. Even though this is an enormous number already, the global market value is estimated to reach \$78.40 billion in 2026, which shows the increasing importance of ERP software (Allied Market Research, n.d.).

Nevertheless, the implementation process of ERP systems is known to be difficult and inefficient, as implementing these systems generally takes a longer time and costs more money than was anticipated beforehand (Ehie & Madsen, 2005). To emphasise the importance of a well-operating ERP system, Davenport metaphorically compares an organisations' ERP system to the human nervous system. Data within an organisation represents nervous impulses. Thus, if data is incorrect or unavailable, nervous signals will not be properly transmitted, and just like human beings, the organisation will not operate appropriately (Davenport, 1998). With the increasing importance of ERP systems comes a rising interest from researchers. As a result, the topic 'ERP' saw a spike in academic literature between 2000 and 2006 (Schlichter & Kræmmergaard, 2010)

Research has found that ERP implementation processes cause inter-organisational knowledge and legacy systems to be altered. Long-lasting structures have to be changed in order to fit the new ERP system (Vandaie, 2008). To do so, the existing knowledge within a firm needs to be managed. However, this is problematic, since knowledge is embedded, localized, and invested in practice (Carlile, 2002). As such, difficulties, otherwise known as boundaries, exist in integrating knowledge. Akkerman and Bakker (2011) defined knowledge boundaries as sociocultural differences that give rise to discontinuities in both action and interaction. Since it is individuals or groups of people that actually encounter discontinuities in

their actions and interactions, it is worthwhile looking more closely at boundary spanning mechanisms (BSM) in practice, to discover how boundaries are mastered. As BSM is a broad concept that encompasses a large variety of forms, it is essential that its core is defined. This study is based on the conceptualization of BSM as people, objects, practices, or other tools that help to solve problems in cross-functional understanding of others, which are caused by knowledge being based and developed in different contexts. The conceptualization is inspired by the works of Akkerman and Bakker (2011) on boundary spanning and on the work of Carlile (2002) on knowledge development. The concept of BSM will be elaborated later in this work.

As explained before, a great deal of knowledge about ERP implementation processes has been accumulated over the past years. The arrival of a new ERP system causes workers to share their embedded knowledge for the purpose of designing and filling the ERP system with data, but also because of workflows that have been replaced by the new system (Robey, Ross & Boudreau, 2002). However, a gap exists in overcoming the problems encountered in implementing ERP processes. One of the problems is that of sharing the embedded, localized and practice-invested knowledge within an organisation, during the implementation process. By applying boundary spanning, this research aims at identifying BSM usage during an ERP implementation process, and aims to answer the following question:

What influence have boundary spanning mechanisms had in overcoming challenges in data-migration related to knowledge boundaries during the implementation process of a new ERP system?

As the current work is about obtaining knowledge about spanning boundaries, in order to enhance the understanding of designing and implementing an ERP system, it is crucial to define the concept of knowledge. The definition of knowledge is adopted from Boisot and MacMillan (2004, p.7) and encompasses “a set of beliefs which informs decisions by agents to take actions that consume the agent’s (scarce) resources”. Before continuation, it is important for the sake of clarity, to establish that the concepts of information and data are not synonyms for the concept of knowledge. Data and information are considered to be similar and will, in this work, be used intertwined. Data and information adhere to the input process of a new ERP system, which will be elaborated later in this work.

1.2 Relevance

1.2.1 Theoretical relevance

As mentioned above, literature has focussed on a wide array of ERP implementation factors but has neglected the knowledge-sharing aspect during an implementation process, even though this has been proven to affect the success of implementation processes (Jones & Price, 2004). As a result, it is important to dig deeper into knowledge sharing within firms, during the ERP implementation. This study, therefore, aims to address the existing gap within the ERP literature, by attempting to identify the effects of using boundary spanning mechanisms on the success of ERP implementations. The findings of this research, thus, add to existing success factors.

Furthermore, not only can the effects of BSM on an ERP implementation process be better estimated, but also the effectiveness of boundary spanning mechanisms on their own can be better evaluated. As Marrone (2010) notes in her work, the call for cross-collaboration increases due to factors such as globalization, and with cross-collaboration comes boundary spanning. However, large knowledge gaps still exist concerning boundary spanning. In her work, Marrone suggests future research to look into how and when boundary spanning occurs, what the nature of boundary spanning activities is and, what impacts boundary spanning has. A recent meta-analysis shows that the impact of boundary spanning in firms has had a lot of attention, but there are still many knowledge gaps left. One of these under-researched fields is the usage of BSM in accommodating change via knowledge sharing (Posner & Cvitanovic, 2019).

Literature has defined knowledge sharing as a hindrance in ERP implementation processes, but academic insights lack about how knowledge can be shared more efficiently, and how this affects the implementation process in practice. Next to this, literature about ERP has neglected the effects of using BSM on knowledge sharing during implementation processes in general, even though literature has established the importance of knowledge sharing for implementation processes (Jones & Price, 2004). In summary, BSM are still interesting for researchers while much of their nature and possible impacts remain unknown.

1.2.2 Managerial relevance

Next to the theoretical contribution this research hopes to achieve, the current study also aims to add to practical knowledge. The current study is organised around the ERP implementation process at an organisation called Abiom. By reflecting on the implementation process by means

of analysing knowledge management, this work will add to the practical knowledge of the firm itself. Managers obtain an understanding about how knowledge is shared within the organisation. Even though this is not directly relevant for the implementation process itself, as it has been finished, it is interesting for using and developing the ERP system in the following stages. Knowledge about how information is shared within the organisation, and insights about ways to cross boundaries are beneficial in many ways. The organisation can apply the insights to future cross-collaborations, in order to ensure a successful collaboration. Next to this, by sharing knowledge, better understandings can be developed between different organisational departments, which allows for smoother operating processes in general.

In summary, firstly, identifying the presence of boundary spanning mechanisms, and, secondly, their effects on ERP implementation are of value as these insights can be used in further cross-collaboration and knowledge sharing attempts. Next to this, highlighting the knowledge sharing process allows collaborating parties to better understand each other and, as a result, improve collaboration.

1.3 Overview

The following part will elaborate on the theoretical framework on which this study is built. Section 2 will present the key concepts and will eventually provide the sensitizing concepts and a conceptual model at the end of 2.4. After highlighting and elaborating the most important concepts, a clarification of the methodology will be provided in section 3. To establish the research context, and thus increase the transferability of this work, important themes such as the research design, method of data collection and method of data analysis will be presented in, respectively, section 3.1, 3.4 and 3.5. Section 3 will also cover the naturalistic paradigm this work adheres to, as well as the grounded theory method, the case, and the participants of the study. Section 4 of this work will provide the most important results of the study, which will be interpreted and discussed in section 5. Finally, the research question is answered in section 6, which concludes this work by providing implications, limitations, and avenues for future research.

2. Theory

2.1 Literature review

A lot of research has been done towards the implementation processes of ERP systems. Even though the existing body of literature regarding this topic is various and widespread, a clear understanding of knowledge sharing during an implementation process lacks (Jones & Price, 2004). The following part of this work will, therefore, shortly highlight what is known about factors that exert an influence on an ERP implementation process. Also, an introduction towards the concept of knowledge is provided, which aims at increasing the understanding of its importance in ERP implementation processes.

A wide body of knowledge exists about critical success factors (CSF) in ERP system implementation processes. Bingi, Sharma and Godla (1999) find seven broad factors that affect the implementation of an ERP system. These factors are (1) strong commitment from upper management, (2) change management, (3) organisational commitment, (4) selecting and managing consultants, (5) selecting the right employees, (6) motivating employees and (7) training employees. A more up to date metanalysis executed by Finney and Corbett in 2007 has defined and categorized CSF based on the frequency of presence in literature. The researchers found that success factors similar to those found by Bingi and colleagues are still present in literature. The meta-analysis provided by Finney and Corbett highlights the uniformity in literature about CSF in ERP implementation processes.

On the other hand, research has found that employee resistance, organisational fit to the system and system adaptation can be detrimental for ERP implementation, since the latter two factors are difficult to accomplish (Aladwani, 2001; Hong & Kim, 2002). Even though other hindering factors have probably been overlooked by researchers and the literature presented in this work is nowhere close to being exhaustive, consensus about ways to overcome implementation problems does exist. Jones and Price (2004) observe that “firms should identify organisational facilitators of, and obstacles to knowledge sharing, and should proactively seek to overcome the obstacles” (p.35). Jones and Price also find that the firms should be focussed on sharing knowledge, within the implementation team as well as firm wide (Jones & Price, 2004). Vandaie (2008) adds to this insight by considering what makes sharing knowledge difficult and, thus, why ERP implementation processes are being perceived as being difficult. According to the researcher, the tacit nature of knowledge and changing as well as adapting existing knowledge to new structures is what hampers knowledge sharing in firms (Vandaie, 2008). Moreover, Carlile (2002) describes knowledge as being localized, embedded, and

invested in practice, meaning that knowledge cannot be separated from an individual practicing his or her practice. In other words, knowledge is created by a community of individuals that share a practice and its consequences, which is for example done within a certain department.

Robey, Ross and Boudreau (2002) studied the changes in firms as a result of an ERP implementation. Their comparative case study found ERP implementation processes to cause two challenges in established knowledge. Firstly, knowledge was challenged because it had to be adapted to the structures of the new ERP system. In other words, the organisation must figure out how to configure existing (knowledge) systems to fit the new ERP software. Secondly, a new ERP system replaces not only an old system, but also the old ways of working. Employees have worked with the previous system and have developed their own (tacit) ways of using the system. Implementing a new ERP system causes employees to change their way of working accordingly (Robey et al., 2002). In short, the implementation of a new ERP system causes the organisation to change its working behaviours and alter its knowledge systems. As Vandaie (2008) noted: “implementing an enterprise system means that organisations must learn to function in radically different ways than what they have learned during past experiences. Ignoring this essential characteristic of ERP implementation can heavily hamper the success of the whole project” (p.925). Vandaie, thus, observes that it is important to translate the legacy systems and deep-rooted knowledge within an organisation into the new ERP system.

Since an ERP system can be seen as a holistic information system that is based upon a single database of organisational information and knowledge, which integrates all aspects of an organisation, it can be assumed that it is important that existing knowledge within the organisation is managed (Bingi et al., 1999). According to Vandaie (2008) an ERP’s competitive advantage lies in “internalizing and integrating the adopted processes and their knowledge paradigm into the organisation” (p. 926). However, as Carlile (2002) has noted; “knowledge is both a source of and a barrier to innovation” (p. 442). The tacit nature of knowledge might for example be a hindrance to introducing innovations. On the other hand, integrating existing knowledge might lead to better and more efficient work processes.

The above hints at the large number of difficulties that arise during an ERP implementation process. It is because of this understanding that the current study focusses on means to overcome the knowledge barriers accompanying an ERP implementation. Therefore, the following paragraph will elaborate on the characteristics of knowledge and developing knowledge.

2.2 Characteristics of knowledge

To understand why knowledge can both be a barrier and a source for innovation, it is important to understand how knowledge is developed. Carlile has described knowledge as being localized, embedded, and invested in practice, which will be elaborated in the next part. The nature of knowledge is also what makes accommodating knowledge across (functional) boundaries in an organisation troublesome (Carlile, 2002). The following parts of the current work will elaborate on knowledge boundaries and other key concepts for this study.

The localized characteristic of knowledge concerns the idea that knowledge is created because of encountering problems. This causes certain people to learn about certain situations. As a result, knowledge focusses around certain people or certain situations (Carlile, 2002). For knowledge to develop, different people need to focus on different situations, which makes knowledge ‘global’ of nature instead of ‘local’. In the case of an ERP implementation process, representatives of the different departments and their practices are consulted for developing the new system. This provides a ‘global’ insight of practices within a firm. If only certain departments would have been considered, no global insights could have been developed.

The embeddedness of knowledge can be closely compared to tacit knowledge, where people know how to behave because of regular practice. Embedded knowledge, or tacit knowledge is hard to recall or explain, as it is developed and understood by experiences. Therefore, people who are distant from these experiences have difficulties in understanding the people who have developed this embedded or tacit type of knowledge (Carlile, 2002). Imagine a situation during the implementation process in which the sales department advocates for a certain expensive extension of the ERP system, comparable to the previous software used by the department, which enables the department to work in a similar and efficient way. The finance department might not approve with this expense since they do not understand the added value of the extension for the sales department.

Finally, knowledge is established in practice. Practices are developed by applying knowledge. If practice proves to be successful, the practice will be adopted, and thus, knowledge about the practice is formed. People do not want to change their existing practices and the corresponding knowledge about them, and therefore, they are less inclined to use knowledge developed by other groups of people. This obstructs sharing and using of knowledge within an organisation (Carlile, 2002). Suppose that the service staff had developed short-cuts in the previous software, which made the service staff’s work more efficient and less bureaucratic. However, in the new ERP system, the production department develops certain

workflows for the service staff, which is beneficial for the production staff, but which makes the service staff work inefficiently. The service staff refuses to use these new workflows and collaboration between co-depending departments fails.

2.3 Boundaries created by knowledge

As observed by Carlile, the characteristics of knowledge development cause difficulties in knowledge sharing, or so-called boundaries. A boundary can be seen as a sociocultural difference leading to discontinuity in action or interaction (Akkerman & Bakker, 2012). Carlile describes two approaches to boundaries that have been defined by earlier research, which are 'syntactic' and 'semantic' boundary approaches and adds to existing knowledge by adding a third type to boundary approaches, which are 'pragmatic' boundary approaches (Carlile, 2002). The types of boundary approaches will be elaborated below, and a link to boundary spanning mechanisms will be made as well.

The first approach to boundaries is syntactic. Perhaps the easiest way to explain the syntactic boundaries is by considering the well-known and often frustrating 'Syntax-error' code that occurs, for example, in using graphing calculators, excel or statistical programs such as Python or SPSS. This error occurs if the entered code is not recognized by the data-processing tool. A syntactic boundary can, thus, be understood as an incongruity in the transmitted information and the information processing tool. In sharing knowledge, this would entail that the sender of knowledge and the receiver of the same piece of knowledge do not understand each-other, because they simply do not understand the knowledge that is transmitted. As MacDonald (1993) states in a rather complex way, the syntactic component of the information processor does not have access to non-syntactic information. In other words, the knowledge processor does not understand information that it does not know. In communication across boundaries, both actors need to rely on the same syntactic base for the transmitted knowledge to be understood by the receiver. To overcome the 'syntax-error' or syntactic boundaries, Carlile (2002) proposes that establishing a shared and stable syntax ensures accurate communication between two information processing tools, or people, communicating across a boundary.

Relating to the syntactic boundaries are semantic boundaries. Whereas the syntactic boundaries are about incongruities in understanding pieces of knowledge, the semantic boundaries involve differences in interpreting information. Semantic ambiguities are illustrated by words such as *cook*, *watch*, or *train*, that have different meanings in different contexts. The

semantic approach to boundaries assumes that even though syntactic communalities exist between the receiver and transmitter of knowledge, there might still be different interpretations attached to the information that is shared between them. To overcome this problematic situation, Carlile bases the solution on work developed by Nonaka (1994) and suggests that mutual understandings need to be created. Communities of practice should make their tacit knowledge explicit, and in such a way the communities work across semantic differences to understand each-other (Carlile, 2002; Nonaka, 1994). It might be assumed that both boundaries, semantic and syntactic, can be found in an ERP implementation process, as existing knowledge and legacy systems need to be integrated and internalized to suit the new ERP system.

The third boundary approach as described by Carlile is the pragmatic approach to boundaries. The pragmatic approach is an all-encompassing approach that assumes the presence of differences in understandings and interpretations, due to contextual influences, and aims at transforming knowledge to overcome these differences. In the context of the current work, and more specifically during the design of the new ERP system at Abiom, knowledge that was dispersed throughout the organisation had to be gathered and processed to fit into the mould of the new ERP system. To gather and adapt the dispersed information, roles and functions had to be assigned to certain people, who were, thus, responsible for altering current knowledge to create new knowledge.

The following part will elaborate on the focus of the current study, which is data-migration. Data-migration is an interesting process because of the following; firstly, data-migration is a continuous and iterative process. Secondly, data-migration covers the whole organisation, since all departments and employees have their own datasets and ways of working but need to design an ERP system that integrates these multiple datasets. It is, therefore, likely that knowledge boundaries were encountered in cross-collaboration, which had to be mastered.

2.4 Data migration

Research by Singla and Goyal (2006) has found that data-migration is one of the main contributors to experiencing implementation problems. According to Jet Reports, which is part of an organisation that provides information management software for (mainly) Microsoft based ERP systems, trouble with data-migration can essentially be boiled down to two types of problems. Firstly, there is the quantity of data that is difficult to transfer. Secondly, and perhaps most importantly, there is the breadth and scope of the migration (Jet Reports, n.d.). This entails; the quality of the data, what data must be transferred and which data has to be left

behind. Also, how can data from the legacy system be transformed to suit the new system? However, literature has not yet looked into why data-migration can be troublesome for successful ERP implementation, and the research call made by Esteves and Pastor (1999) remains unanswered. Previous research has focussed on the importance of structured data-migration processes (Somers & Nelson, 2001) or actual strategies of migrating data (Vidacic, Pihir & Fabac, 2010). Even though the importance of data-migration has been established in literature, no thorough academic research can be found on what causes data-migration to be difficult.

The current study is built upon the assumption that data-migration is difficult because it forces organisational members to collaborate across boundaries. Data is widely used and constructed within an organisation, and its applications are widespread. In other words, organisational members must decide what to do with existing data, and it is assumed that because of the nature of knowledge, there will be multiple perspectives that influence this decision.

In the current study, data-migration covers the migration of data from the previous ERP system to the new system. The scope of the case study covers the data that was migrated, which entails (1) information about articles, such as descriptions, reference numbers, prices, and stock, (2) articles assembled to form a finished product, known as compound articles, (3) detailed information about the customer and supplier bases, and (4) contracts and agreements between customers or suppliers and the organisation.

This work has now highlighted and elaborated the most important concepts for the research, also known as sensitizing concepts. These concepts will be used as guidelines in collecting data and are presented in table 1 below. Their applicability will be further explained in section 3.4 of this work.

Table 1. Sensitizing concepts

Concept	Definition
<i>Knowledge</i>	A set of beliefs which informs decisions by agents to take actions that consume the agent's (scarce) resources.
<i>Boundary</i>	A boundary can be seen as a sociocultural difference leading to discontinuity in action or interaction. Boundaries can be <i>Semantic</i> , <i>Syntactic</i> or <i>Pragmatic</i> .
<i>Boundary Spanning</i>	To effectively deal with differences, dependencies, and novelties at boundaries, and combining these ingredients to develop hybrid and over-arching solutions.
<i>Boundary Spanning Mechanisms (BSM)</i>	Tools for boundary spanning, include; <i>Boundary Spanners</i> , <i>Boundary Objects</i> , <i>Boundary Practices</i> and <i>Boundary Discourse</i> .
<i>Data / Information</i>	Includes: (1) data about articles, (2) data about articles assembled to form a finished product, (3) detailed information about the customer and supplier bases and (4) contracts and agreements.
<i>Data-Migration</i>	Data-migration covers the migration of data/ information from the previous ERP system to the new system.

With the introduction of the core concepts comes the possibility to design a conceptual model which graphically represents the connections and relationships between the key concepts. It is important to note that data-migration is a process, which, thus, follows a course of action over time. The distribution of this process into phases has been done descriptively and will be further specified in part 3.2 of this work. Furthermore, the model portrays an interaction between boundary spanning mechanisms and knowledge boundaries during these periods. It is assumed that boundaries have been encountered during the periods and that boundary spanning mechanisms have been applied to bridge the boundaries. The following paragraph introduces the types of boundary spanning mechanisms and will elaborate on their link to the knowledge boundaries.

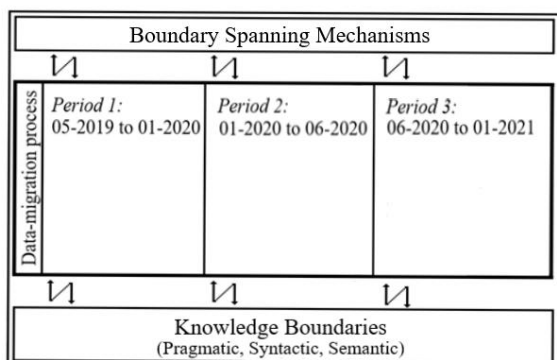


Figure 1. Conceptual model

2.5 Boundary spanning mechanisms

The following part will elaborate on the four boundary spanning mechanisms and will relate these to the boundaries as identified by Carlile (2002) and explained above. According to Carlile, spanning boundaries is not about transferring knowledge, but about transforming it. Transforming knowledge is also one of the difficulties in data-migration. Carlile (1997) defines *transforming knowledge* as “a process of altering current knowledge creating new knowledge and validating it within each function and collectively across functions” (p.445). Transferring knowledge, on the other hand, can be interpreted as the relocation of knowledge. However, as literature does not present a clear-cut definition of boundary spanning, the current work adheres to the following, self-developed definition, which is based upon the conceptualization of boundary spanning by Carlile (2002) and Engeström, Engeström and Kärkkäinen (1995). *Boundary spanning* is defined as: “to effectively deal with differences, dependencies and novelties at boundaries, and combining these ingredients to develop hybrid and over-arching solutions” (Carlile, 2002, p.443).

As was illustrated by Tushman, due to differentiation within an organisation, communication becomes difficult. However, as communication is both an inhibitor as well as an incubator of innovation, it is hugely important that knowledge is communicated. To do so, Tushman noted that boundary roles have to be assigned to people to deal with the difficulties in communication (Tushman, 1977). Since then, lots of research has been done and these boundary roles have been developed into four overarching boundary spanning mechanisms, which will be elaborated in the following part of the current work.

2.5.1 Boundary Spanners

The first BSM is called a boundary spanner. Boundary spanners are human agents who translate and frame information from one community to another to promote coordination (Hawkins & Rezazade, 2012). Boundary spanner studies focus on the human agent as the main unit of analysis, their social interactions, and their ability to translate knowledge across boundaries. However, as research by Williams (2002) points out, there is a broad spectrum of characteristics that are said to identify a boundary spanner. Webb (1991) refers to boundary spanners as people who are sensitive to and skilled in bridging interests, professions, and organisations whereas deLeon (1996) emphasises the innovative and entrepreneurial characteristic of boundary spanners. In his view, boundary spanners can be seen as catalysts that bring together problems and solutions. On the contrary, Eysenck (1995) believes a person’s character determines

whether someone can be a boundary spanner, since successful collaborative action is determined by certain personal attributes and traits.

The aforementioned differences in interpretation of boundary spanners are intriguing. The variety of perspectives shows that boundary spanners can be seen as fluid mechanisms and that their actual function might be based on their attribution by subordinates. However, to demarcate a clear scope, the definition by Hawkins and Rezazade is used to define *boundary spanners* as “human agents who translate and frame information from one community to another in an effort to promote coordination” (Hawkins & Rezazade, 2012, p.1803). By adhering to this definition, it is evident that syntactic and semantic boundaries might be crossed by using a boundary spanner. As a result, it is interesting to investigate the roles of a boundary spanner in overcoming boundaries during an ERP implementation process.

2.5.2 *Boundary Objects*

The second BSM are boundary objects. According to Hawkins and Rezazade (2012, p.1805), a *boundary object* refers to “a physical, abstract, or mental object that serves as a focal point in collaboration, enabling parties to represent, transform and share knowledge”. According to the authors, the main unit of analysis for boundary object studies is the material or symbolic presence of an object that de-contextualises and de-personalises knowledge so that it can be transformed. Research has proven that characterising boundary objects is difficult. As Hawkins and Rezazade (2012) found, previous research has investigated a variety of boundary objects, ranging from narratives to routines. Even though literature is not too specific concerning what constitutes boundary objects, Carlile has managed to classify four types of boundary objects. These are (1) repositories, (2) standardized formats for problem-solving, (3) models and (4) boundary maps. The distinction between four types of boundary objects helps in categorizing empirical findings at a later stage of the current study. Even though the different boundary objects share the ability to minimize syntactic or semantic incongruencies, it is important to make this distinction, since the different types of boundary objects may have different practical relevancies for the transformation of knowledge.

2.5.3 *Boundary Practices*

The third type of BSM is called boundary practices. A *boundary practice* is defined as “a boundary spanning mechanism that overcomes a knowledge boundary by engaging agents from different knowledge communities in collective activities” (Hawkins & Rezazade, 2012,

p.1806). The focal unit of analysis for boundary practice is the practice that allows the co-engagement in activity, resulting in the generation of new knowledge which, in turn, facilitates coordination. Boundary practice is most effective in addressing knowledge boundaries involving tacit knowledge that is not easily codified into explicit knowledge. It is important to recognise that boundary practices are novel practices, and that they occur outside of the structured, community-specific routines (Hawkins & Rezazade, 2012).

The main benefit of boundary practices is, thus, to make tacit knowledge explicit, by showing rather than talking about regular practices. It can be assumed that boundary practices help in overcoming the embeddedness of knowledge, as introduced by Carlile (2002) earlier in this work. Elaborating on the example provided in chapter 2.2, the finance department could have engaged with the activities of the sales department, and as a result, the finance department would have better understood why the sales department advocated for the expensive extension of the ERP system. In other words, instead of verbally explaining the essence of the extension, a boundary practice could have been deployed to engage both departments and develop a shared, explicit, understanding of the problem. In such a way, the boundary practice could have helped in overcoming syntactic and/or semantic incongruencies between the departments, by making tacit knowledge explicit.

Instead of empirically identifying boundary practices, it might be more interesting to identify situations during the ERP implementation process that could have benefitted from boundary practices.

2.5.4 *Boundary Discourse*

The fourth and final BSM is called boundary discourse. *Boundary discourse* refers to “the content of knowledge that shapes the dialogue among the experts from distinct domains”. More specifically, boundary discourse pays attention to what is communicated between knowledge communities (Hawkins & Rezazade, 2012, p.1807). Boundary discourse is, thus, closely linked to syntactics and semantics, and can be used to identify and adapt the knowledge of communication agents. As such, boundary discourse focuses on identifying knowledge that allows communication agents to fill the gap between them (Hawkins & Rezazade, 2012). Consequently, boundary discourse aims at learning and building knowledge, that is necessary to overcome gaps. It is, therefore, different than boundary spanners, since they focus on translating existing knowledge, while boundary discourse builds on, and learns from existing knowledge.

Again, the boundary spanning mechanism allows for syntactic and semantic incongruencies to be dealt with. Pragmatic boundaries are not addressed, as boundary discourse aims at creating knowledge, and pragmatic approaches aim at translating existing knowledge (Carlile, 2002). Like boundary practices, it might be more helpful to empirically identify situations during the ERP implementation that could have benefitted from boundary discourses. Nevertheless, the two types of boundary spanning mechanisms cannot be ignored in analysing the ERP implementation process, as it might show that either one or both mechanisms have, in fact, been used during the implementation process.

3. Research Context

3.1 Research design

The research question was addressed by executing an organisational case-study. A case-study is defined as an “empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident” (Yin, 2009, p.13). This definition of the case-study research design is important because it shows its naturalistic background. Before the naturalistic paradigm, also called constructivism, can be elaborated, it must be understood that researchers have certain paradigms themselves of which the naturalistic paradigm is an example. These paradigms have practical consequences on the way researchers execute their research as well as how data is collected and analysed, how researchers theorize and, finally, how research accounts are developed (Cunliffe, 2011). It can, therefore, be assumed that it is essential to clearly define the current researcher’s paradigm, as this has a large effect on the research execution and theorization.

The naturalistic paradigms arose in contrast to positivist paradigms, and its grounds lay in the assumption that there is no true objectivity. This comes from the understanding that individuals and groups see and interpret reality through their own perspectives. As a result, multiple understandings and meanings are attributed to a single event. Therefore, it can be concluded that there is no objective truth. Next to this, the goal of naturalistic research is to describe certain events or processes, based on the participants perspectives (Rubin & Rubin, 2011). On the contrary, the positivist perspectives are based on the assumption that there is a true, objective reality that can be measured accurately. The goal in positivist research is to find the general and develop universal theories. It can, thus, be concluded that the naturalistic perspective focuses on the specifics and details, whereas the positivist perspective considers the general and universal. As a result, the author decided that designing a case-study is suitable for this research. As a case-study is a research design and not a research technique, part **3.4** of this work will elaborate on the data gathering techniques employed in this work.

3.2 Research object

The case-study was executed at an organisation called Abiom (Altijd Bereikbaar Is Ons Motto). This organisation is located close to Nijmegen and employs between 100-120 people, dispersed over four locations, of which three in the Netherlands and one in Belgium, close to Antwerp. The core business of Abiom consists of multiple facets that all deal with so-called (mission)

critical communication services (CCS). These communication services are employed in critical situations, which are often encountered by the emergency services as well as by the military police. CCS is a broad term that covers a variety of products, ranging from portable radios to on-board-systems found in vehicles, and from bodycams to crash-recorders. Furthermore, Abiom is also responsible for the striping, sirens, and warning lights on emergency services. Next to CCS, Abiom provides communication services during festivals or sports events. The diversity of activities causes a broad spectrum of jobs to exist within the firm. Next to the regular departments such as finance, HR, purchase, and sales there is also a full garage accommodation for modifying vehicles, there is a service department and, finally, there is an R&D department designed to develop innovative communication solutions. Abiom has experienced a large growth over the past five years, which resulted in an enlargement of the overall workforce. Next to this, Abiom has expanded geographically as well. There are four offices of which two close to Nijmegen, one in Houten, and one in Belgium, close to Antwerp.

In the current work, the ERP implementation process within Abiom is studied. The implementation process started in May 2019 and was scheduled to be finished in January 2020. Despite the hard work that was put in, a decision to extend the deadline to June 2020 was made in November 2019. A second extension followed, and the implementation process was eventually finished in January 2021. The current study focusses on a certain process within the whole implementation process, which is the data-migration process. The process will be investigated by taking the deadline extensions as points of departure.

Data-migration covers the migration of data from the previous ERP system to the new system. The scope of the case study covers the data that was migrated, and this entails (1) information about articles, such as descriptions, reference numbers, prices, and stock, (2) articles assembled to form a finished product, known as compound articles, (3) detailed information about the customer and supplier bases and (4) contracts and agreements between customers or suppliers and Abiom. The choice is made to focus on the data-migration because; firstly, it is important to note that data-migration is a continuous and iterative task, and secondly, data migration covers the whole organisation, since all departments and employees have their own datasets, but need to design an ERP system that integrates these multiple datasets. This makes the data-migration interesting to study, as it resembles a process that demands much cross-functional collaboration and understanding, for which the spanning of knowledge boundaries is an essential task.

3.3 Participants

The 11 participants that were interviewed for the current study are all employees of Abiom. They have been selected based on their involvedness with the implementation process. This group of people consists of, amongst others, steering-committee members, project-team members, and key-users. Also, it is important to establish that all participants have engaged with the data-migration process, albeit with different parts of the process. Some of the interviewees have been busy with article information, whereas others have been involved with gathering customer data. Overall, it can be said that all interviewees are sufficiently aware of the process and activities regarding data-migration. Appendix 3 provides an anonymized overview of the interviewees' job descriptions.

Next to this, the interviewees covered a large variety of functions within Abiom. This increases the likelihood that the interviewees have experienced cross-functional collaboration during the data-migration process. Also, the interviewees have widespread geographical locations, including two offices in Nijmegen, one in Houten and one in Sint Niklaas in Belgium. The geographical dispersion of colleagues increases the likelihood that boundary spanning techniques have been used in collaboration during the data-migration process.

3.4 Data collection

To execute a study, it is important to have some guidelines to know what to look for, and how to look for it. The current case study has followed a 'grounded theory' method, which means that constant comparison and sampling were the core process of the research (Kenealy, 2012). Grounded theory is based upon the assumption that, as individuals within a group understand events individually, common patterns can be found. As a result, grounded theory is beneficial to understand social processes and dynamics in a seemingly chaotic context (Kenealy, 2012). The constant comparison was used to find distinguishable differences, or similarities, that explain a certain event. Since the grounded theory is an inductive way of doing research, it is important to establish so-called sensitizing concepts. These concepts "give the user a general sense of reference and guidance in approaching empirical instances" (Blumer, 1954, p.7). Some of these concepts have been explained in previous parts, such as the concepts of *knowledge*, *boundary*, *boundary spanning*, *data*, and *data-migration*. An overview of these sensitizing concepts can be found in table 1.

Based on the naturalistic roots of the grounded theory method, it can be considered that a case-study research is a suitable research design, as a case-study aims to investigate a contemporary

phenomenon in depth and within its real-life context (Kenealy, 2012). The case-study thus focused on an event and its participants as well, which conforms to the aim of the naturalistic research paradigm, which is to describe events based on the perspectives of participants (Rubin & Rubin, 2011). A case-study is, therefore, an excellent way to uncover the various understandings of participants. As a case-study is a research design and not a research method, it is important to distinguish between the research methods or techniques that are adopted in the current work.

The main method that has been used in the current study is that of interviewing. Next to hosting interviews, the researcher has also organised one focus-group meeting. The choice to utilize focus-groups was made because focus-groups are excellent ways of discovering peoples' experiences and feelings regarding a certain event (Kandola, 2012). The focus-group participants were the members of the 'steering-committee', which are, broadly speaking, the managers of the departments. The committee consists of five people of whom three of them discussed their perceptions on why the ERP implementation process deadline was extended twice. The aim of the focus-group was to obtain an overarching view of the most important events, what has preceded them and what influence they have had on the data-migration process. For the focus-group session, a guideline was developed as well. This guideline was mostly based on the participants' experiences of encountering or employing BSM. The full guideline can be found in Appendix 2. In preparation of the session, members were asked to answer a couple of questions to sketch the individual's context as well as to try and start to make them reflect on the implementation process. The questions are provided together with the guideline in the same appendix. Before the focus-groups session was hosted, participants received an explanation of the sessions' structure and goals. In this explanation, anonymity was granted as well. The explanation can be found in appendix 2 as well.

Next to the focus group session, multiple interviews were conducted. Scientists often consider interviewing to be a reliable technique to obtain knowledge about what goes on in an organisation (Alvesson & Ashcraft, 2012). Even though it might be obvious, it was important to decide who will be interviewed. This decision was made based on the representativeness and the quality of the interviewee, meaning that the interviewees needed to have knowledge about the whole data-migration process, and that their knowledge had to be rich and insightful. Next to determining the interviewees, it was also essential to predetermine what will be discussed.

An interview can take a structured, semi-structured or unstructured form. In unstructured interviews, the interviewee is responsible for the topics that are discussed and is

thus leading the conversation. In the structured interview, this is the other way around and the interviewer leads. The semi-structured interview is based on a set of predetermined topics and key-questions but is also open for deviations if interviewees touch upon other interesting aspects. The aim of semi-structured interviews is to make all interviewees reflect on the same events (Justesen & Mik-Meyer 2012). The interviews that have been executed followed a semi-structured interview guide. The interview guide was divided into multiple sections, which all aimed to get an insight into different parts of the implementation process. The first section entailed short questions about the interviewee him- or herself, to get a better idea of the activities and involvedness with the implementation process. The following sections of the interview were designed to get an idea about the data-migration process, collaboration, and process management. The focus was on getting to know how the interviewee has experienced the implementation and migration processes. The final section consisted of questions regarding situations in which BSM were encountered or employed. This section was repeated for the three periods, so the same questions asked three times. An elaborate version of the interview guide can be found in Appendix 1. Before the interviews were hosted, participants received an explanation of the interviews' structure and goals. The explanation can be found in appendix 1 as well. In this explanation, anonymity was granted as well. Before the interviews started, interviewees were reminded of the goals and their anonymity.

An attempt to ensure that all interviewees will discuss the same process was made because all interviews will focus on events within the data-migration part. By interviewing the people that have been busy with the multiple aspects of data-migration, as well as with the people that were responsible for providing the necessary data, this research aims at obtaining the highest quality insights.

3.5 Data analysis

During the month of May 2021, nine interviews and one focus-group session have been hosted. All the data has been transcribed and the transcriptions have been coded twice, using Atlas.ti. The first round of coding was done deductively. This means that a coding scheme was developed a priori, and that the transcriptions have been coded according to the coding scheme. The code-groups that have been used are *boundary*, *boundary spanning mechanism*, *presence*, and *effectivity*, and it has been found that these are pertinent to the data. The deductive coding practice has its base in the template analysis approach to analysing qualitative data. One of the benefits of template analysis is that it balances structure with the freedom to adapt to the

specifics of the study (King, 2012). The structure is found in the predetermined coding schemes. These schemes can be developed based on previous literature or research, but they can be redefined or even discarded during the analysis. This balance between structure and flexibility perfectly accompanies the belief in the absence of a true reality that is inherent to the constructivist stance taken by the current researcher. Consequently, template analysis “works well in examining the perspectives of different groups within an organizational context” (King, 2012, p.447). Therefore, it can be assumed that the application of template analysis is justified. The transcriptions were investigated intensively, and excerpts were given codes based on the *boundary, boundary spanning mechanism, presence, and effectivity*.

As mentioned, a second round of coding has been applied too. Contrasting to the first round, this time the coding was done inductively. The excerpts coded during the first round were studied again and were given an open code based on the nature of the specific situation that was mentioned. As Strauss and Corbin mention: during open coding, the data is broken down into parts which are closely examined, compared, and contrasted, and finally named and categorized into phenomena (Strauss & Corbin, 1990). Existing literature has examined essential factors with regards to ERP implementation processes before and has named them critical success factors (CSF), and defined them as “as a reference to any condition or element that was deemed necessary in order for the ERP implementation to occur successfully” (Finney & Corbett, 2007, p. 331). On the contrary, other researchers have found Critical Failure Factors (CFF) and defined these as “key aspects (areas) where ‘things must go wrong’ in order for the ERP implementation process to achieve a high level of failure” (Wong, Chau, Scarbrough & Davison, 2005, p. 3). For the current work, a slight alteration must be made, as CSF are factors that possibly lead to a successful implementation process and CFF are factors that might lead an implementation process to fail. Therefore, the situations that were coded in the second round are called critical factors, in which the extent to which they are bridged determines their effect on the overall implementation process. The open coded critical factors have been constructed into thematic critical factors by considering CSF and CFF in existing literature, which ensures the credibility of the critical factors.

As was elaborated earlier, data-migration is an iterative and continuous process. As a result, it is difficult for the researcher to predetermine a course of action that the interviewees will discuss and reflect on. Therefore, the choice has been made to investigate the data-migration process by using a ‘storytelling’ method, also known as narrative inquiry. An important characteristic of this method is that it is capable to structure events in a way that they

seem connected and coherent, and in a way that movement or direction over time can be sensed (Gergen & Gergen, 1986). When considering the content of a narrative, thematic analysis of this narrative offers a flexible way to explore central elements that have been constructed by groups and individuals. Furthermore, such analyses provide insights into how the narratives are produced and shaped by the contexts of organisational members (Maitliss, 2012). Consequently, this method allows the researcher to make estimations about what boundaries have been encountered, and how they have influenced the general data-migration process.

3.6 Reflexivity

One of the benefits of qualitative research is that a subjective insight into and an interpretation of social events can be obtained by a researcher. As such, it would not make sense to assess the quality of a qualitative study with objective quality standards, such as validity, generalizability, reliability, and objectivity. Instead, a qualitative study is assessed on standards such as credibility, transferability, dependability, and confirmability (Guba & Lincoln, 1989).

Credibility, as opposed to validity, is about demonstrating a good fit between respondents' subjectively created realities and its reconstruction (Guba & Lincoln, 1989). The current study aims to get the best fit by asking interviewees to develop a timeline of events, which enables the interviewee to comment about and evaluate his or her experience. Secondly, it can be rationally assumed that a case-study is difficult to generalize, as the study focusses on a specific case only, and is thus executed in a certain context. With generalizability, the aim is to adapt obtained results to many contexts. Due to the specific context in a case-study, generalizability is low and therefore, the quality of a study is assessed using transferability. *Transferability* is about the researcher providing sufficient detail about the case and its context, which allows fellow researchers to make an estimation about similar contexts, and thus, about similar expected results (Guba & Lincoln, 1989). Next to this, the study's results are difficult to generalize in a qualitative case-study, but so is the reliability of such a study. The reliability is about the design of the research, and the applicability of the design for other researchers executing similar studies. Therefore, in a case-study, researchers demonstrate *dependability* by keeping diaries, which allows for an overview of why certain research decisions are made, but also captures the emergent and iterative qualitative research process (Guba & Lincoln, 1989). This will allow other researchers to form an understanding of how the current research was developed. Finally, since the current study is about interpreting human perspectives and experiences, objectivity cannot be used as an assessment criterion. Consequently, the concept

of confirmability is used. *Confirmability* is about the clarification of how data was obtained, and how the data was transferred into the findings of the study. Confirmability entails a detailed elaboration of how data was collected and analysed (Guba & Lincoln, 1989).

The assessment criteria as described above are important for the rest of the current work, as well as for other researchers looking to replicate the current study in different contexts. It is, therefore, important to adhere to the qualitative research jargon for the following of the current research. Another important aspect for the researcher is to acknowledge his or her influence on the research itself. As mentioned before, the assumption of constructivist inspired research is that respondents construct their own reality, based on experiences, perspectives, and contexts. As such, it might be assumed that the interviews themselves will exert a certain influence on the interviewees. It is, therefore, important that the researcher is aware of his influence on the interviewee, and that the way he affects the research process and collected data is acknowledged. This awareness is called *reflexivity* and it “questions the process and practice of research, in terms of how our methodological conduct and theoretical pre-understandings as researchers transform and influence new understandings” (Haynes, 2012, p.87).

4. Results

As mentioned in the methodology section, there have been two rounds of coding. During the first round, the researchers has been able to distinguish four code-groups that have been established to be important. These code-groups have been given the names *boundary*, *boundary spanning mechanism*, *effectivity*, and *presence*. As can be seen in table 2 below, the code-groups consist of multiple themes which allowed the researcher to code excerpts based on the code-groups. The code-group *boundary* was divided into four subthemes, based on existing literature. The same has been done for the code-group *boundary spanning mechanism*. The code-group *effectivity* has been based on the effect that a certain mechanism has had. Finally, the group called *presence* is based on the fact whether an example situation has been encountered in practice, or whether the situation is in fact an example, and can thus be considered to be a form of advice for future implementation processes.

Table 2. Code-groups and subthemes defined

Theme	Subthemes	Definition	Example
<i>Boundary</i>	Pragmatic Boundary	The pragmatic boundary approach is an all-encompassing approach that assumes the presence of differences in understandings and interpretations, due to different contexts.	X: ja, dat is wel al twee jaar geleden ofzo. Ik heb ook wel aangegeven hoe wij werken en dat heeft wel tot grote hilariteit geleid bij de AFAS medewerkers. Ik zei op een gegeven moment van ja wij plannen niet, onze klant plant. Bijvoorbeeld Schiphol is de grootste klant van Hessing en die zegt van ja je bent maandagavond om 23u welkom. En dan kan jij zeggen van ja maar dan heb ik niemand, ja dan zeggen ze na twee keer ook dan nemen we wel een ander bedrijf. Maar zij [AFAS] begrepen dat echt helemaal niet. Toen dacht ik bij mezelf al van nou, misschien is dit niet helemaal een goeie match.
	Syntactic Boundary	A syntactic boundary can be understood as an incongruency in the transmitted information and the information processing tool.	X: Alleen echt, er is denk ik eh te weinig begrip geweest, kijk ehm, hoe AFAS nu ingericht is dat lijkt voor mijn gevoel ja redelijk op wat ze voorheen gebruikten bij Abiom. En dat is niet, is denk ik te weinig begrip voor geweest, dat wij eigenlijk helemaal niks daarvan hadden. Dus dat wij dat niet gebruikten. Als je niet weet waar je naar zoekt, dan kan je het ook niet vinden. Dus dat is een beetje moeilijk. Dus van sommige onderdelen hadden wij gewoon geen idee dat het zou kunnen bestaan.
	Semantic Boundary	Semantic boundaries involve differences in interpreting information. Semantic ambiguities are illustrated by words such as <i>cook</i> , <i>watch</i> , or <i>train</i> , that have different meanings in different contexts.	X: ja ik heb wel, ik heb voor de offerte deel heb ik een stuk instructie geschreven. En ja, ik had dan wel de taak om collega's daarin mee te nemen, maar dat, dat was een beetje problematisch omdat ik niet zo heel goed wist hoe het zelf werkte en dat het eigenlijk ook niet zo goed werkte. Ehm, ja dan, ja als je moet gaan uitleggen dat je het ook niet zeker weet dan wordt het wat ingewikkeld zeg maar.

<i>Boundary Spanning Mechanism</i>	Boundary Spanner	Boundary spanners are human agents who translate and frame information from one community to another in an effort to promote coordination	X: Ik merk nu wel als ik op de zaak ben dan pak ik weleens gewoon mijn laptop en dan ga ik gewoon- Kijk, met inkoop zit ik al vaak en dan zet ik iets klaar en dan loop ik naar logistiek toe en dan ben ik benieuwd hoe het bij logistiek eruit komt gerold. En als dat niet naar wens is dan schrijf ik dat op of dan geef ik dat aan richting de stuurgroep. Kijk en zo hadden we eigenlijk ook eind 2020 te werk moeten gaan met het schaduwdraaien. Dat je gewoon met op een gegeven moment met elkaar meekijkt van oké, ik voer nou dit in, hoe komt het bij jou eruit gerold?
	Boundary Object	A boundary object refers to a physical, abstract, or mental object that serves as a focal point in collaboration, enabling parties to represent, transform and share knowledge.	X: ja een werkinstructie zijn er eigenlijk door het thema tijd niet gekomen, die komt ook wel vaker terug zeg maar. En als het op papier staat kun je altijd terugverwijzen naar het papiertje. Dan kun je zeggen nou dit is de hoofdflow, daarmee vang je denk ik 80% van de vragen af, en die andere 20% moet je dan idd naar kijken. Heb je op voorhand dus veel meer tijd gecreëerd.
	Boundary Practice	A boundary practice is defined as a boundary spanning mechanism that overcomes a knowledge boundary by engaging agents from different knowledge communities in collective activities	X: nee uiteindelijk ben ik er via via de wandelgangen weer achter gekomen en dan Y gebeld van joh Y hoe moet je dit inrichten. Toen heeft hij een training gegeven en je hebt gelijk zegt hij, dat moeten we het even breed doen want mijn jongens moeten het ook weten.
	Boundary Discourse	Boundary discourse refers to the content of knowledge that shapes the dialogue among the experts from distinct domains. More specifically, boundary discourse pays attention to what is communicated between knowledge communities	X: even denken, ehm nou eerst bij mij zou het facturatie gedeelte weggaan, daar hoefde ik dus niets meer aan te doen. En toen kwamen we uiteindelijk van nee Niels, je moet wel de verkooporders nog na calculeren, dus ik zeg hoe? Ja dat weet Stijn. Dus ik bel Stijn op en die kon me dat inderdaad haarfijn vertellen. Dus ik denk joh waarom wordt er niet een mail gestuurd van Niels... maar dat is binnen ACS allemaal al besproken en gedaan maar niet gedeeld.
<i>Effectivity</i>	Positive (+)	Applying a certain BSM has led to overcoming a certain boundary	X: En ja, dan op een gegeven moment dan zie je dus op een gegeven moment dat iemand een mailtje stuurt naar AFAS Help met mij weleens in een cc of zo of bcc of als collega zijnde, we lopen tegen- En dan denk ik van o ja, dat probleem heb ik vorige week opgelost. Precies hetzelfde probleem. Dan zeg ik van oké AFAS Help, ik pak dit wel op met Y. Dan loop ik naar Y toe en tik je het samen af.
	Negative (-)	Applying a certain BSM has <u>not</u> led to overcoming a certain boundary	X: ik heb heel vaak wel mails gestuurd daarin, zodat iemand naslag werkt, zodat zij een werkinstructie een soort van vervangt. Kan me voorstellen als ik zon mail ontvang dan zou ik het in een mapje zetten zo van nou als ik het nodig heb weet ik waar het staat. Ehm maar nee want je krijgt toch steeds weer diezelfde vragen uit de mails terug dus dan denk ik ook van ja oke, deze persoon heeft er dus denk ik geen baat bij gehad dat ik een mail heb gestuurd daar had ik dus denk ik beter naar toe kunnen lopen.
	Doubtful (+/-)	Applying a certain BSM has not led to fully overcoming a boundary. Difficulties still exist.	X: Wat je toen heel erg merkte vond ik, dan ga je een beetje de gebruiker erbij trekken, dan merk je wel echt kennisverschil. Zeker omdat je zelf al zolang erin bezig bent, maar soms echt wel ja, als ik kijk met Michel dan vertel je een keer iets en dat kwam in een keer over, maar er waren ook mensen in het proces waaraan je het dan vertelde en die zeiden jajaja, schreven niets op en dan denk je al oke, je bent oud genoeg om te bedenken dat als je het nu hoort van mij dat je weet van oh dat

	Unknown effect	The effect of applying a certain BSM in overcoming a certain boundary is not addressed by the interviewee	onthoud ik of dat je denkt dat moet ik ff opschrijven dan onthoud ik het wel. X: Ik zat ook veel te veel in de processen, dus ik probeerde als middelman, wat je zegt dat mechanisme, ik probeerde ook de olie te zijn en mensen ook, zoals een aantal stuurleden tussen de key-users en ons projectteam en de consultant van jongens hebben we het nu over hetzelfde, had jij het niet over tomaten en jij over aubergines. Oke jij moet dat opleveren, consultant heb je dan alles om weer verder te gaan, missen we nog iets?
<i>Presence</i>	Reality	The described situation has been encountered in real-life.	X: En ook, we hebben uiteindelijk door die problematiek hebben we op een gegeven moment ook iedere maandag hebben we met België vanuit de stuurgroep hebben we gezegd van ja, gaan we dan niet gewoon iedere maandag even een uurtje zitten met zijn allen? Nou en dan gingen we dus iedere week vooral vanuit de stuurgroep kwam dan oké, dit is de update, dit is er vorige week nog allemaal gebeurd, voor komende week staat dit op de planning, wat zijn issues waar jullie tegenaan lopen?
	Advice	The situation that is described is fictional. The interviewee makes a proposal.	X Maar het overbrengen van kennis zeg maar naar de gebruiker, daar mis je vooral achtergrond kennis van hun, een beetje voorkennis van het systeem. Je had eerst ... en omdat je dat dus mist hadden we misschien dus die test moeten doen zeg maar. Ga gewoon met 5 of 6 man in een ruimte zitten en gewoon klikken. En als je een vraag hebt steek je vinger op. En dat echt verplicht maken.

During the second round, the researcher has found three overarching factors, so-called critical factors. These factors consist of multiple themes that are based on an open coding procedure. The three critical factors that have been found are: *open information and communication problems, poor preparation, and lacking project overview*.

Table 3. *Open codes overview*

Critical Factors	Themes	Open Codes	Definition
Open information and communication	Communication policies	<ul style="list-style-type: none"> • Eenrichtingsverkeer communicatie tussen eilandjes • Eenzijdige top down communicatie • Communicatie • Eenrichtingsverkeer in voorbereiding • Te weinig informatievoorziening 	<i>The degree in which relevant information was shared and the extent to which it was clear for employees involved where to obtain necessary knowledge.</i>
	Open information	<ul style="list-style-type: none"> • Interne kennisdeling • Informatiedeling • Slechte interne kennisoverdracht 	
Preparation	Inadequate know-how	<ul style="list-style-type: none"> • Data in kaart brengen • Onduidelijkheid verwachtingen • Relevante informatie ontbrak 	<i>The degree to which the organisation was aware of its processes and problems before starting the process and going live.</i>
	Elaborate testing	<ul style="list-style-type: none"> • Te weinig diepte getest • Variëteit niet in kaart gebracht • Variëteit van de werkelijkheid niet getest 	
Project overview	Poor execution-structure	<ul style="list-style-type: none"> • Geen totaaloverzicht stuurgroep • Langs elkaar heen werken • Stuurgroep weinig aanwezig • Weinig/ inefficiënte documentatie 	<i>The extent to which there was an overview regarding the activities of the departments and the way in which these departments interlink.</i>

Table 3 above describes the themes and open codes on which the critical factors are based. As elaborated earlier, the extent to which boundaries within the critical factors are successfully bridged has an effect on the implementation process in general. Since the critical factors have been inductively found by the current researcher, no definitions in literature exist. Therefore, the researcher has formulated its own definitions, based on the transcriptions. These definitions are presented in table 3 as well. The following part of this work will, therefore, elaborate on the boundaries encountered and BSM employed within these critical factors. This elaboration will be done based on table 4 below, which entails the most interesting patterns and findings regarding the critical factors.

Table 4. Summarization of findings per critical factor.

Critical Factor	Patterns
Open information and communication	Pragmatic and Syntactic boundaries occur the most often. BP useful to span Pragmatic boundary. Lack of using BS lead to inability to span boundaries. BO and BS/BP should be combined to bridge boundaries.
Preparation	Syntactic and Semantic boundaries occur most often. BD useful for spanning Semantic and Syntactic boundaries. BP not useful in spanning boundaries. BO and BS/BP should be combined to bridge boundaries.
Project overview	Pragmatic and Syntactic boundaries occur the most often. BD useful for spanning Semantic and Syntactic boundaries. Lack of using BO leads to inability to span boundaries. BO and BS/BP should be combined to bridge boundaries.

Open information and communication. Within the critical factor of open information and communication, pragmatic and syntactic boundaries have been encountered the most often. The current critical factor that has been encountered during the ERP implementation process at Abiom have mostly seen a positive effect of applying BSM. As can be seen in table 5, the frequency of BSM that have been applied to span boundaries successfully, is higher than the frequency of BSM that did not span boundaries.

Table 5. Frequency table of Open Information and Communication

Boundary:	Positive effect			Negative effect		
	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>
Boundary Objects	9x	7x	5x	4x	4x	1x
Boundary Practices	11x	8x	6x	2x	4x	0x
Boundary Spanners	15x	16x	9x	9x	11x	3x
Boundary Discourse	1x	2x	0x	1x	2x	1x

What might be seen in the table, but is clarified in the transcripts, is that whenever a BSM is used on its own, the boundary is not always bridged successfully. Instead, the research teaches us that a combination of using BSM is beneficial. As was mentioned by one of the interviewees;

“It is the collective memory that helps you, more than the e-mail itself. Because you read the e-mail and you try to make yourself remember it. But then some time later you encounter the situation that was solved in the mail, but you cannot remember the solution anymore. So, you ask a co-worker what the solution was, he or she refers to the e-mail, and you are able to solve it.” (Interview 3)

In the situation described above, the employee encounters a problem which has been encountered before by others and has been solved by others as well. However, the employee does not recall what the exact solution was and thus asks a colleague to explain the solution that has been e-mailed before. In this example, it is evident that a boundary object (BO), which was the e-mail, and a boundary spanner (BS), which was the co-worker, have been applied to successfully bridge the encountered syntactic boundary. Next to this, the possible failure point of lacking open information and communication systems is not experienced.

Furthermore, the claim that is made above can be backed by looking at the situations in which a pragmatic or syntactic boundary has not been successfully bridged. In the following example, an employee talks about the fact that long and difficult e-mails are sent throughout the organisation.

“Many important things are sent via e-mail. Last week, I received an e-mail that was 12 pages long. I had to go through it three times only to understand what it said. After that you still must educate yourself to be able to apply and fully comprehend it. That takes way too much time, whilst when you do not send an e-mail but seat yourself next to someone, grab a cup of coffee and go through all of it in the system itself, that would be much more efficient. At least I would learn more in that way.” (Interview 9)

The respondent notes that sending a single e-mail, thus using a BO on its own, is not sufficient. Eventually, this might lead to experiencing information and communication problems. However, what makes the quote powerful is that the interviewee already tells what would have helped. Instead, sitting together, thus applying a boundary practice (BP), and using the system to get to know it, using the system as a BO, would possibly have led to not experiencing open information or communication problems.

Finally, the interviewees indicate that whenever boundaries could not be bridged, they experienced a lack of BS. In other words, there was no one that helped them in understanding on what stage they were, how their activities related to other departments or colleagues and what was expected from them in order to move to the following implementation stage. As one of the key-user illustrates:

“There were not enough updates, like just giving a short presentation in which it was told what would be relevant for us and what their expectations from us were. Otherwise, we could have said that things would not work for us or that some things seemed impractical in reality. But yeah, there should have been much more opportunities to do so.” (Interview 4)

The quote shows that open information or communication problems were mainly experienced as a result of lacking the opportunities to share experiences and thoughts about the implementation process. The interviewee further indicates that it is important that (s)he is engaged and informed about the process sufficiently, so that necessary changes can be made easily.

Preparation. When looking at table 6 regarding the critical factor of preparation, what stands out is that the mechanism of boundary discourse (BD) has been used only twice for spanning a syntactic and semantic boundary, and that it led to a positive outcome in both of the instances. Next to this, it is important to note that in the situations where boundaries were not successfully spanned, the mechanism of BD has not been used at all.

Table 6. *Frequency table of Preparation*

Boundary:	Positive effect			Negative effect		
	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>
Boundary Objects	4x	3x	4x	4x	3x	2x
Boundary Practices	1x	2x	2x	3x	3x	1x
Boundary Spanners	5x	6x	5x	3x	2x	2x
Boundary Discourse	0x	1x	1x	0x	0x	0x

What is interesting as well is that within the critical factor of preparation, boundaries were encountered simultaneously. This means that there were no occasions in which a single

boundary had to be resolved, it were always combinations of boundaries. Similar to the previous critical factor, boundaries were positively bridged when a combination of BSM was used. As the following example proves, a good preparation depends on a human spanning mechanism supported by an object:

“Based on what the system demanded, we provided a document with columns. We went through this document with everyone who was responsible for a certain column and we divided the work. Also, we made a sort of scope, so the people knew what had to be entered and in what way they had to fill the columns. And then everyone just started filling in their columns, that is how we did it.”
(Interview 3)

The quote came from the person that was responsible for gathering all data regarding articles. In the example provided, all three boundaries have been encountered and bridged. Elaborating on the columns in the document and creating a scope makes sure that everyone works from the same knowledgebase (syntactic), ensures that there are no contextual influences to understanding the expectations (pragmatic) and guarantees that there are no interpretative differences (semantic). These boundaries have been bridged by using a BS who elaborates on the way of working, the expectations, and the final product. The BS is supported by a BO, which is the document that had to be filled in. This document was used as a practical guideline, to ensure uniformity.

The added value of using a BS and BO simultaneously becomes even more evident when looking at an example provided by the employee responsible for data regarding debtors:

“Some of them provided a document with only three columns where I provided six columns. Maybe I had too much data or they had too little, but we could have held whole sessions to construct the final document. In the end I think that there was too much free choice in how the documents were delivered, as well as too little knowledge about the format of the data.” (Interview 3)

In the example, an all-encompassing document regarding customer data had to be produced. The person responsible for the final document asked all people with relevant knowledge to provide data. However, as the quote shows, it was not made clear what information was needed

and in what way the information had to be delivered. As a result, “*I think we delivered a document which held a lot of information, but which was not suitable for importing it in the software*” (Interview 3). This example perfectly shows what happens when BSM are used insufficiently. Based on the previous example it might be assumed that the same boundaries were encountered in the latter example, but because there was no clear BS or a carefully set-up BO, the final product was insufficient. However, as described earlier, there is still the human factor that determines whether or not a BSM is effective. As described by one of the key-users,

“They say they understand everything, so I went to check up on them in December, because it would start in January... even the easiest of things, suddenly they did not know what they had to do anymore! I do not know how often I had explained it to them, even wrote instructions for them, so I tell them, why don’t you look at the instructions they perfectly explain what you need to do? Then they say, ‘oh yeah, but could you please explain it again?’ I don’t know what that is, perhaps they are afraid to do it wrong, I don’t know.” (Interview 6)

Even though the key-user acted as a BS, showed them what to do by applying a BP and even used a BO by creating instructions, people are still not sufficiently helped. When not everyone is willing to bridge a gap, bridging boundaries is very difficult.

Project overview. The third critical factor is the presence of a clear project overview. This entails that whenever a project overview lacks, it is likely that problems will be experienced during the implementation process. On the other hand, keeping the implementation process under close watch will most likely lead to a smoother implementation process.

Table 7. Frequency table for attaining a clear Project Overview

Boundary:	Positive effect			Negative effect		
	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>	<i>Pragmatic</i>	<i>Syntactic</i>	<i>Semantic</i>
Boundary Objects	4x	5x	4x	0x	0x	0x
Boundary Practices	8x	5x	6x	1x	4x	1x
Boundary Spanners	12x	11x	8x	7x	5x	2x
Boundary Discourse	0x	1x	1x	2x	3x	2x

When looking at the positive effects of applying BSM to attain a clear project overview, it becomes evident that BD are not used often, whereas the BS has been used frequently. However, when the BD was used, it has been effective. As the following quote by one of the members of the steering-committee and project-team shows:

“I tried to be the oil in the machine, between a couple of steering-committee members, key-users, the project-team, and the software supplier. I would ask them ‘okay, are we talking about the same? Are you not talking about tomatoes when you are talking about eggplants?’. I would also discuss what everyone needed to go on, and if that could be provided by others”. (Interview 1)

By acting as a BS by focussing on what was discussed and making sure that all the people involved would talk about the same, the employee ensured that the syntactic and semantic boundary could be bridged.

As can be seen in the table above, all three types of boundaries seemed to profit from using a BS. Also, it seems to be important that BSM should not be used individually. Instead, spanning boundaries should always incorporate a human bridging method and an object to span boundaries. When looking at the situations in which bridging boundaries has not been successful, it becomes clear that there has been a lack of using a BO. In fact, none of the boundaries has been successfully bridged without using a BO. The following quote paints a picture of the importance of using BO, as the organisational members struggle with finding their place in the process:

“It becomes important to visualize processes. We do have them, but they are too formal for the average employee. We should try to make them more appealing and understandable for everyone in the organisation, so people know when their tasks start and when they finish. I think people really need this, because I notice that many of them don’t know what to do and when to do it.” (Interview 10)

In addition to the findings regarding the critical factors, the researcher has also found other interesting results. Contrasting to the earlier established essence of using a BO, even when a BO was applied boundaries were not always spanned successfully. It was found that the

willingness of employees to bridge boundaries cannot be changed easily. As a steering-committee member notes:

“It is important to document what decisions have been made, what are problems, which choices have been made, what are risks, what are consequences of the choices, what are priorities... Well, we have had all kinds of logbooks to document this but sadly not everyone attained to this structure of documentation, so the documentation was not always done sufficiently.” (Interview 1)

Again, using BO in bridging boundaries has been stimulated by the steering-committee members, but has not consequently been adhered to by the employees. The interviewees share the experience that not all colleagues are eager to educate themselves regarding the new ERP software. When considering the interviews with people from the steering-committee or the project-team, it can be seen that much effort has been put into engaging the end-users. However, as a project-team member noted when discussing the effectiveness of applying BSM:

“It differs for everyone, but in my opinion, it already starts with taking your responsibility. Because in the end that person should be able to do it individually. There have been colleagues whom I told what to do for over 5 times. I went to their desks and showed and explained them exactly what to do, but after 5 times they still do not know what to do. Well, I don’t know what else I can do, I am not a parrot!” (Interview 2)

The quote shows that according to the project-team member, even though proven BSM are used, the message is not conveyed successfully. This all starts with employees taking their responsibility and doing what is expected from them.

Finally, it is important to note that a clear division of the implementation process into periods has not been found. Contrasting to earlier formulated expectations, interviewees experienced difficulties in recognizing clear stages or periods throughout the whole implementation process. Instead, interviewees felt more comfortable by dividing the process into a pre-going-live period and a post-going-live period. As the following quote illustrates, the interviewee notices clear differences between the two periods, with regards to the information sharing processes:

“After we went live, a lot of things changed in the ERP system, think of the warehouse that was designed. But after we went live, we did not meet a single time anymore to discuss the plans or the execution of the plans. Before we went live, we met weekly.” (Interview 9)

5. Discussion

The current section will, firstly, investigate the different boundaries that have been encountered during the implementation process. This will be followed by an elaboration on the BSM that have been utilized and the overcoming of problems related to critical factors.

The first interesting remark can be made about the pragmatic and syntactic boundaries, which have been encountered the most often. The frequent presence of pragmatic boundaries can perhaps be explained easily. Since Abiom consists of multiple departments, within multiple companies which are dispersed over multiple geographical locations, it can be assumed that all these different locations lead to pragmatic boundaries, as a result from the different contextual influences. This corresponds to earlier statements about knowledge being localized, embedded, and invested in practice (Carlile, 2002). Next to this, the syntactic boundary is encountered often as well. Syntactic boundaries develop when the sender and receiver of information do not speak the same language, and thus are not able to understand each-other. It can be assumed that within an organisation, employees focus on their main tasks and do not necessarily know what other colleagues are up to, which boils down to the embedded, localized and practice invested characteristics of knowledge again. This might lead to misunderstandings during communication. It is, therefore, not surprising that this type of boundary is encountered often.

On the contrary, the semantic boundary is not encountered often in this study. The semantic boundary is based on a difference in interpreting knowledge or information (Carlile, 2002). However, as the implementation process takes place within a single organisation, it might be logically assumed that employees know their jargon and, thus, utilize the same language. The fact that BD is almost not used at all might support this assumption, since BD pays close attention to the content of what is communicated between people (Hawkins & Rezazade, 2012).

When looking at how the boundaries have been spanned, it becomes evident that it is important to use BSM simultaneously, instead of individually. This is consistent with earlier research done by Hawkins & Rezazade (2012), in which it is concluded that an individual BSM can benefit from compounding effects when it is connected to another BSM. Their study also confirms earlier suspicions that new knowledge is often temporarily held in suspense during which someone also looks for support of this knowledge. Thus, utilizing multiple BSM might provide a level of context as well as a level which facilitates learning (Nonaka, Toyama & Konno, 2000).

However, the nature of the BSM that must be used simultaneously is unknown. The current study has found that a human BSM should most ideally be combined with a BO, however, not much about this finding can be found in literature. Levina and Vaast (2004) have found one example of the complementarity of BS and BO, however, the research they found did not propose a conceptualization of the complementarity.

Next to this, the different critical factors have been found to benefit from different forms of spanning mechanisms. In general, it is recommended that mechanisms are used simultaneously to achieve complementary effects. However, BD have been found to be useful in the critical factors of preparation and project overview, but not for the critical factor of open information and communication. Since the mechanism is focussed on identifying and adapting knowledge, it might be assumed that the mechanism suits the critical factors in which knowledge must be mapped. The two critical factors that are mentioned are examples in which problems and processes had to be mapped, as well as the ways in which departments interlink.

On the contrary, the critical factor of open information and communication benefits the most from using BP or BS. These mechanisms both involve the engagement of employees, either verbally or practically in order to promote coordination. It might, therefore, be rationally assumed that these mechanisms suit a factor which includes the promotion of coordination by sharing insightful knowledge and information.

With regards to the critical factors that were identified, the critical factor of open information and communication that was found supports findings from previous research that it is important to share knowledge, and that obstacles to sharing knowledge should be identified and overcome (Jones & Price, 2004). The interviewees mentioned that they not always felt to be engaged, and that information sharing was insufficient. The fact that open information and communication was identified as a critical factor confirms that this is important for ERP implementation processes, but also supports the claim that successful communication is beneficial for the implementation process and inefficient communication may hamper the implementation process. The interviewees mentioned that whenever the communication was sufficient, the critical factor was not perceived to be problematic. This comes down to a gap that has been mentioned earlier, which entails a lack of knowledge about the influence of knowledge sharing on an ERP implementation process in general (Posner & Cvitanovic, 2019). The findings of the current study thus indicate that knowledge sharing is important for the implementation process as a whole, and that it is not just one of the influential factors in ERP implementation processes.

On the other hand, when looking at the codebook as presented in table 3, it can be assumed that, essentially, all the three critical factors come down to a lack of satisfactory communication. The relation to communication in the first mentioned critical factor speaks for itself and is already elaborated above, however, the other two critical factors might need more explanation. The critical factor of poor preparation comes from the interviewees' remarks that people involved with the implementation process did not have sufficient knowledge at the start of the process. Also, when the testing commenced and people noticed that some parts of the system did not function properly, the interviewees felt that there were not enough opportunities to discuss those functionalities. This might be regarded to be a lack of communication. Finally, the third critical factor, project overview, also entails inefficient communication. One of the interviewees has indicated that documentation about decisions made was not done sufficiently. Consequently, decisions made during the implementation process were not always documented, which caused difficulties in overlooking the process, as it became difficult for the project-team members as well as key-users to understand why certain functionalities were designed and what the rationale behind them was.

The results also have another interesting insight. Previous literature has found that it is important for organisations to translate the legacy systems and deep-rooted knowledge into the new ERP system (Vandaie, 2008). The fact that the three critical factors that have been found are all related to knowing and understanding the organisations' processes, sharing, and communicating them and keeping a clear overview of the project is evident for the fact that the legacy systems and knowledge have not been properly mapped and understood beforehand. This finding, therefore, complies with existing literature and supports earlier statements.

6. Conclusion

This research has provided a lot of useful insights into how ERP implementation processes can be influenced when using BSM. The most influential factors, which determine whether an implementation process is successful or not, are found to be: *open information and communication, project overview* and *preparation*. In overcoming struggles related to these factors it has become evident that, firstly, BSM should not be used on their own. Instead, BSM should be used simultaneously, which includes using at least one human bridging mechanism, such as a BP or BS, and a BO, which functions as a reference during the implementation process. Secondly, the organisation should be aware of the types of boundaries that might be encountered. As Abiom is organisationally as well as geographically dispersed, it is important to remember that this dispersion might lead to contextual influences and, therefore, boundaries. Again, these boundaries are solved when mechanisms are used in cooperation. By summarising the main results, the researcher is able to provide an answer to the research question:

What influence have boundary spanning mechanisms had in overcoming challenges in data-migration related to knowledge boundaries during the implementation process of a new ERP system?

The answer to this question is that BSM have had a positive influence for the majority of times. Firstly, it must be noted that pragmatic and syntactic boundaries have been encountered the most frequent. Secondly, not all BSM have had a major influence since BD has not been used often. Overall, a combination of a BP or BS with a BO have had a positive influence in bridging pragmatic or syntactic boundaries and thus have a positive effect on the ERP implementation process in general. On the other hand, using a single BSM mostly did not lead to bridging boundaries, and therefore, has had a negative effect on the implementation process. As was mentioned in the results section, ill application of BSM might lead to disappointing results in, for example, the preparation of data-migration or unclear task-divisions.

Next to this, a distinction might be made concerning the application of BSM for specific critical factors. For example, for the critical factor of open information and communication, interviewees indicate that they experienced a lack of moments in which they were able to express their thoughts or concerns. In such occasions, it might be more beneficial to utilize a human bridging mechanism such as a BS or BP. On the other hand, for the preparation and project overview factors, interviewees indicate that it would have been beneficial if BO were

used more often. As indicated, documentation can be used throughout the implementation process as a reference and are also useful for understanding the assigned tasks and responsibilities in general. Finally, it must be acknowledged that appropriately applying BSM is not always successful. There must be adequate willingness to span a boundary from both sides of the boundary. One cannot impose a certain mechanism on a colleague when this colleague is not willing to bridge a gap.

6.1 Implications

The research has led to multiple managerial implication. First, it is important to be aware of the critical factor that is encountered, because the way in which it is handled might be decisive for the continuation of the process. For further projects within the organisation, it is recommended that managers or project-team members clearly document the process flows as well as responsibilities and expectations. In this way, misunderstandings will be prevented. In line with this statement, it is also important to ensure that employees are provided the opportunity to share their thoughts and feelings regarding the process. In this way, a clear picture can be drawn which includes the needs and wants of all the different departments within the organisation. In short, the researcher advises to apply both a human bridging mechanism and a BO during the beginning stages of new (internal) projects or large alterations.

For the scientific field, the current work has multiple implications. Firstly, this research has investigated the effects of using BSM and found clear differences in using BSM individually or simultaneously. This insight adds to the small body of existing knowledge regarding the BSM usage in ERP implementation processes. Next to this, a gap in knowledge about the effectiveness of specific BSM has been identified by Marrone (2010). The current study allows researchers to estimate the effectiveness of BSM on their own better. Therefore, this research has added to the existing knowledge gap. Next to this, existing research has neglected the effect of BSM on knowledge sharing during implementation processes. The current research has obtained important insights concerning the importance of sharing knowledge during implementation processes and, thus, has added to existing knowledge. The research has shown that by appropriately spanning boundaries, critical factors can be turned into critical success factors.

6.2 Limitations

Firstly, the researcher has been part of the data-migration process himself. As a result, it was beneficial to obtain insights into how other employees have experienced the same process. The colleagues felt at ease with the interviewer because of established relationships of trust. As a result, the researcher has experienced open interviews in which the interviewees would withhold information. Instead, the researcher felt as if co-workers saw the interview as an opportunity to express their feelings and frustrations to someone else. In some way, the interviewees felt heard by the interviewee, and voluntarily expressed what was on their minds.

It is, however, important to acknowledge the fact that a single researcher has done the analysis of the data. Even though the researcher is fully objective, the fact that there has not been a form of triangulation in coding the transcripts may have affected the final dataset. Preparing for the data collection has been done in close cooperation with the thesis supervisor. As a result, the guidelines have been approved by the supervisor.

With regards to the theoretical perspective chosen for this research, the researcher has focussed more on the nature of boundary spanning mechanisms than on the nature of the knowledge gaps that had to be bridged. Next to this, it must be mentioned that a case study makes it difficult to generalize the results. Instead, the researcher has tried to provide sufficient detail about the case and context of the case to ensure transferability.

Finally, it must be mentioned that 11 employees have been interviewed. Due to time limitations as well as a limited number of appropriate interviewees, this number could not have been higher.

6.3 Future Research

Future research efforts might benefit from interviewing a larger pool of interviewees. The current study has collected data from 11 interviewees, due to time limitations and a limited number of appropriate employees. By increasing the number of interviewees, and thus the data set, much more insights might perhaps be obtained.

This research has found that the willingness of colleagues to span boundaries is essential for determining the successfulness of a BSM. However, not a lot of knowledge exists regarding the willingness of people to bridge boundaries. It is, therefore, interesting for future research to investigate what affects the willingness to span boundaries during an ERP implementation process.

By considering the three critical factors that have been presented in the discussion section above, it becomes clear that communication is crucial in many aspects, and that it is not just an individual critical factor. This observation does not comply with existing literature, where communication is often found to be one of the important factors within implementation processes (Motwani, Subramanian & Gopalakrishna, 2005; Finney & Corbett, 2007). It might, therefore, be interesting for further research to look into the influence of communication strategies on the whole implementation process, as well as on other critical factors.

Also, this research has touched upon existing gaps in literature, however, it is recommended that fellow researchers still investigate existing gaps such as the effects of knowledge sharing on implementation processes or the effects of single spanning mechanisms.

Next to this, the current research has found that it is important to combine human spanning mechanism with a boundary object. Since little about this relationship is known, doing further research into the nature of the BSM that are combined would propose an interesting avenue for further research.

Finally, it is also important to note that the researcher has found indications for other possible critical factors to exist along with the three factors that have been elaborated. However, due to a lack of data, these indications could not be explored. For the sake of further research, the critical factors that have been identified but could benefit from further research include: *the quality of employees, the knowledge about the new software, the stubbornness of the organisation, and lastly, the inadequate support provided by the software provider*. Future research might use the current study as a platform to dig into the other, possibly critical factors.

References

- Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of educational research, 81*(2), 132-169. doi:10.3102/0034654311404435
- Aladwani, A. M. (2001). Change management strategies for successful ERP implementation. *Business Process management journal, 7*(3), 266-275. doi:10.1108/14637150110392764
- Allied Market Research. (n.d.). *ERP Software Market Statistics - Future of Cloud ERP Market by 2026* [Article]. Retrieved 10 January 2021 from, <https://www.alliedmarketresearch.com/ERP-market#:~:text=The%20global%20ERP%20software%20market,10.2%25%20from%202019%20to%202026>.
- Alvesson, M. & Ashcraft, K.L. (2012). Interviews. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp.239-257). London, England: Sage.
- Bingi, P., Sharma, M. K., & Godla, J. K. (1999). Critical issues affecting an ERP implementation. *Information Systems Management, 16*(3), 7-14. doi:10.1201/1078/43197.16.3.19990601/31310.2
- Blumer, H. (1954). What is wrong with social theory? *American Sociological Review, 19*(1), 3-10. doi:10.2307/2088165
- Boisot, M., & MacMillan, I.C. (2004). Crossing epistemological boundaries: managerial and entrepreneurial approaches to knowledge management. *Long Range Planning, 3*(6), 505-24. doi:10.1016/j.lrp.2004.09.002
- Carlile, P. R. (1997). *Transforming knowledge in product development: Making knowledge manifest through boundary objects*. Unpublished dissertation, University of Michigan, Ann Arbor, MI.
- Carlile, P. R. (2002). A pragmatic view of knowledge and boundaries: Boundary objects in new product development. *Organization science, 13*(4), 442-455. doi:10.1287/orsc.13.4.442.2953
- Cunliffe, A. L. (2011). Crafting qualitative research: Morgan and Smircich 30 years on. *Organizational research methods, 14*(4), 647-673. doi:10.1177/1094428110373658

- Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, 76(4), 121–131.
- deLeon, L. (1996). Ethics and entrepreneurship. *Policy Studies Journal*, 24(3), 495–510. doi:10.1111/j.1541-0072.1996.tb01642.x
- Ehie, I. C., & Madsen, M. (2005). Identifying critical issues in enterprise resource planning (ERP) implementation. *Computers in industry*, 56(6), 545-557. doi:10.1016/j.compind.2005.02.006
- Engeström, Y., Engeström, R., & Kärkkäinen, M. (1995). Polycontextuality and boundary crossing in expert cognition: Learning and problem solving in complex work activities. *Learning and Instruction*, 5(4), 319–336. doi:10.1016/0959-4752(95)00021-6
- Esteves, J., Pastor, J. (1999). An ERP Lifecycle-based Research Agenda. *1st International Workshop on Enterprise Management Resource and Planning Systems (EMRPS)*, Venice, Italy, 359-371
- Eysenck, H.J. (1995). *Trait theories of personality*. In S.E. Hampson & A.M. Colman (Eds.), *Individual differences and personality*. London, England: Longman
- Finney, S., & Corbett, M. (2007). ERP implementation: a compilation and analysis of critical success factors. *Business process management Journal*, 13(3), 329-347. doi:10.1108/14637150710752272
- Gergen, K. J., & Gergen, M. M. (1986). Narrative form and the construction of psychological science. In T. R. Sarbin (Ed.), *Narrative psychology: The storied nature of human conduct* (p. 22–44). Praeger Publishers/Greenwood Publishing Group.
- Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation*. Sage Publications, Inc.
- Hawkins M. A., & Rezazade M. H., (2012). Knowledge boundary spanning process: synthesizing four spanning mechanisms. *Management Decision*, 50(10), 1800-1815. doi:10.1108/00251741211279611
- Haynes, K. (2012). Reflexivity in qualitative research. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp. 72-89). London, England: Sage.

- Hong, K. K., & Kim, Y. G. (2002). The critical success factors for ERP implementation: an organizational fit perspective. *Information & Management*, 40(1), 25-40. doi: 10.1016/S0378-7206(01)00134-3
- Jet Reports (n.d.). *The big secret to painless data migration* [document]. Retrieved 15th of March 2021 from, <http://istart.com.au/wp-content/uploads/2015/09/The-big-secret-to-painless-data-migration.pdf>
- Jones, M. C., & Price, R. L. (2004). Organizational knowledge sharing in ERP implementation: Lessons from industry. *Journal of Organizational and End User Computing (JOEUC)*, 16(1), 21-40. Doi: 10.1.1.454.4649
- Justesen, L. N., & Mik-Meyer, N. (2012). *Qualitative research methods in organisation studies*. København: Gyldendal.
- King, N. (2012). Doing Narrative Analysis. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp. 426-450). London, England: Sage.
- Kandola, B. (2012). Focus Groups. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp. 258-274). London, England: Sage.
- Kenealy, G.J.J (2012). Grounded Theory: A theory Building Approach. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp. 408-425). London, England: Sage.
- Levina, N., & Vaast, E. (2005). The Emergence of Boundary Spanning Competence in Practice: Implications for Implementation and Use of Information Systems. *MIS Quarterly*. 29. 335-363. doi:10.2307/25148682.
- MacDonald, M. C. (1993). The interaction of lexical and syntactic ambiguity. *Journal of memory and language*, 32(5), 692-715. doi:10.1006/jmla.1993.1035
- Maitliss, S. (2012). Narrative Analysis. In G. Symon., & C. Cassell (Red.), *Qualitative organizational research: core methods and current challenges* (pp. 492-511). London, England: Sage.

- Marrone, J. A. (2010). Team boundary spanning: A multilevel review of past research and proposals for the future. *Journal of management*, 36(4), 911-940. doi:10.1177/0149206309353945
- Motwani, J., Subramanian, R., & Gopalakrishna, P. (2005). Critical factors for successful ERP implementation: Exploratory findings from four case studies. *Computers in industry*, 56(6), 529-544.
- Nonaka, I., Toyama, R. and Konno, N. (2000), “SECI, Ba and leadership: a unified model of dynamic knowledge creation”, *Long Range Planning*, Vol. 33, pp. 5-34.
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5(1), 14-37. doi:10.1.1.115.2590
- Posner, S. M., & Cvitanovic, C. (2019). Evaluating the impacts of boundary-spanning activities at the interface of environmental science and policy: A review of progress and future research needs. *Environmental Science & Policy*, 92(9), 141-151. doi:10.1016/j.envsci.2018.11.006
- Robey, D., Ross, J. W., & Boudreau, M. C. (2002). Learning to implement enterprise systems: An exploratory study of the dialectics of change. *Journal of Management Information Systems*, 19(1), 17-46. doi:10.1080/07421222.2002.11045713
- Rubin, H. J., & Rubin, I. S. (2011). *Qualitative interviewing: The art of hearing data*. Thousand Oaks, CA: Sage.
- Schlichter, B. R., & Kræmmergaard, P. (2010). A comprehensive literature review of the ERP research field over a decade. *Journal of Enterprise Information Management*, 23(4), 486-520. doi:10.1108/17410391011061780
- Singla, A. R., & Goyal, D. P. (2006). Managing risk factors in ERP implementation and design: an empirical investigation of the Indian industry. *Journal of Advances in Management Research*, 3(1), 59-67. doi:10.1108/97279810680001239
- Somers, T., & Nelson, K. (2001). The impact of critical success factors across the stages of enterprise resource planning implementations. *Proceedings of the 34th Annual Hawaii International Conference on System Sciences*, 10 pp.-. doi:10.1109/HICSS.2001.927129

- Strauss, A., & Corbin, J. (1990), *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*, Sage, Newbury Park, CA.
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (2nd ed.). Sage Publications, Inc.
- Tushman, M. L. (1977). Special boundary roles in the innovation process. *Administrative science quarterly*, (22)4, 587-605. doi:10.2307/2392402
- Vandaie, R. (2008). The role of organizational knowledge management in successful ERP implementation projects. *Knowledge-Based Systems*, 21(8), 920-926. doi:10.1016/j.knosys.2008.04.001
- Vidacic, S., Pihir, I. & Fabac, R. (2010). Method of data migration from one ERP system to another in real time, *Central European Conference on Information and Intelligent Systems*, p. 501.
- Webb, A. (1991). Co-ordination: a problem in public sector management. *Policy and Politics*, 19(4), 229–41. doi:10.1332/030557391782454188
- Williams, P. (2002). The competent boundary spanner. *Public administration*, 80(1), 103-124. doi:10.1111/1467-9299.00296
- Wong, A., Scarbrough, H., Chau, P., & Davison, R. (2005). Critical failure factors in ERP implementation. *Pacis 2005 Proceedings*, 40.
- Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

Appendix 1: Interview guide

Uitleg

Hoi (naam persoon), allereerst alvast bedankt voor je deelname en tijd. Heeft u vragen over de toelichting die ik van te voren (datum) heb gestuurd?

Dit interview is onderdeel van mijn scriptie. In mijn scriptieonderzoek bekijk ik hoe het gebruik van zogenaamde ‘grens-overbruggings-mechanismen’ van invloed is geweest, of had kunnen zijn, tijdens het data-migratie traject. De reden hiervoor is dat ERP-implementatie processen bekend staan om hun complexiteit en de waarschijnlijkheid dat zulke processen vaak vertraging oplopen, en daardoor duurder zijn dan begroot.

Vaak gevonden oorzaken van de vertragingen komen voort uit het aanpassen van bestaande informatiesystemen. Een voorbeeld is dat oude informatie aangepast moet worden om in het nieuwe ERP systeem te passen. Daarnaast is informatie vaak divers en erg gevarieerd, maar dient het voor een ERP verandering in een standaard vorm gepresenteerd te worden. Echter, vaak is het geval dat de oude informatie een vorm van impliciete kennis/ handelen is, die in de loop van jaren ontwikkeld is. Dat maakt het dus lastig om deze vorm van kennis of handelen te delen met mensen die niet over dezelfde impliciete basis beschikken, en het is erg complex om zulke kennis te standaardiseren.

Je kunt een vertaler als een grens-overbruggings-mechanisme zien. Hij of zij dient als een ‘brug’ tussen mensen die niet over dezelfde impliciete taalkennis beschikken, die dus letterlijk een andere taal spreken. Op de werkvloer komt ‘het spreken van een andere taal’ ook vaak voor, en helemaal bij een data-migratie traject waar mensen van verschillende afdelingen en vestigingen samen moeten werken en beslissen. Mechanismen die in zulk geval gebruikt kunnen worden zijn bijvoorbeeld:

- *Activiteiten waarbij mensen van elkaar leren, bijvoorbeeld een meeloop-dag;*
- *Protocollen, presentaties of werkinstructies;*
- *Personen die als ‘mediator’ dienen, die kunnen ‘vertalen’, die kennis hebben van beide facetten;*

Mijn onderzoek heeft als doel het bekijken van grens-overbruggings-mechanismen tijdens het data-migratie proces. Ik hoop hierbij inzicht te krijgen in hoe mensen die over verschillende vormen van (impliciete) kennis beschikken, een manier vinden om hun impliciete kennis

begrijpelijk te maken voor anderen. Op deze manier wordt duidelijk hoe diverse en impliciete informatie of kennis toegankelijk kan worden. Dit is niet alleen belangrijk voor informatie-migratie, maar ook voor de samenwerking binnen een bedrijf in het algemeen.

Uw antwoorden op mijn vragen zullen nooit herleidbaar terugkomen in de scriptie. Dit betekent dus dat uw antwoorden anoniem zullen zijn. Als u niet wilt dat een bepaald antwoord terugkomt in de scriptie kunt u dat aangeven.

De structuur van het interview zal bestaan uit een aantal vragen die breed beginnen. Naarmate het interview vordert zullen de vragen specifiekere zijn, bijvoorbeeld over situaties of gebeurtenissen.

1. *We zullen beginnen met wat algemene vragen over u en uw werkzaamheden.*
2. *Daarna zullen de vragen gaan over het data-migratie proces en het overbruggen van kennisverschillen of kennisgrenzen.*
 - *Data-migratie betreft alles omtrent het artikelbestand, leveranciers, klanten en contracten. Dit kunnen dus bijvoorbeeld artikelprijzen, categorisering, contactgegevens of prijslijsten zijn.*
 - *Het data-migratie proces is opgedeeld in 4 fases. Deze fases zijn gebaseerd op het uitstellen van deadlines, en zijn; 1) Mei 2019 tot December 2019, 2) Januari 2020 tot Juni 2020, 3) Juni 2020 tot December 2020, en 4) Januari 2021 tot nu. De fases zijn bedacht om als kapstok te dienen voor uw herinnering, en opdat het verwerken van informatie overzichtelijk blijft.*

Zijn er nog vragen over de fases, data-migratie, het verloop van dit interview, of iets anders? Het interview kunt u zien als een dialoog waarbij u zoveel mag vertellen als wat u zelf prettig vindt. Als u de behoefte heeft om dieper in te gaan op een bepaalde vraag of opmerking is dat prima.

Als u het goed vindt zet ik de opnameapparatuur aan en dan kunnen we beginnen.

Fase	Vragen	Quality check
	<ul style="list-style-type: none"> • Voordat het interview begint zal worden uitgelegd dat het interview over het data-migratie proces gaat. Daarnaast duiken we dieper in het overbruggen van kennisverschillen/ kennisgrenzen. (Zie hierboven) • Daarnaast zal begonnen worden met het toelichten van anonimiteit, en dat de interviewee kan aangeven of iets wel/ niet mag terugkomen in de scriptie (bijvoorbeeld als ondersteunend citaat). Gegeven antwoorden komen niet herleidbaar terug in de scriptie. (Zie hierboven) 	
Introductie vragen	1.1 Kunt u kort wat over uzelf en uw werkzaamheden bij Abiom vertellen?	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide

	<p>1.2 Welke rol had u tijdens het data-migratie proces?</p>	<ul style="list-style-type: none"> • (vriendelijk/ polit.cor.)
<p>Proces beschouwende vragen (Algemene vragen)</p>	<p>2.1</p> <p>Op welke manier werd de data-migratie voorbereid? (denk aan: project-/ stappenplan, afspraken over rolverdeling, tijdlijn, verwachtingen)</p>	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide <p>(vriendelijk/ polit.cor.)</p>
	<p>3.1</p> <p>Kunt u kort beschrijven hoe de samenwerking tijdens de data-migratie op uw eigen afdeling is gegaan? (korte toelichting vragen ahv voorbeelden/ situaties)</p> <p>3.2</p> <p>Kunt u kort beschrijven hoe uw samenwerking tijdens de data-migratie met andere afdelingen is gegaan? (korte toelichting vragen ahv voorbeelden/ situaties)</p>	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide <p>(vriendelijk/ polit.cor.)</p>
	<p>4.1</p> <p>Hoe zou u het procesmanagement in enkele zinnen omschrijven? (niet persoonsgericht, maar procesgericht!)</p> <p>4.2</p> <p>Wat ging er goed?</p> <p>4.3</p> <p>Wie of wat had u kunnen helpen in het uitvoeren van uw werkzaamheden?</p>	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide <p>(vriendelijk/ polit.cor.)</p>

<ul style="list-style-type: none"> • Voordat de vragen gesteld gaan worden wil ik benadrukken dat de vragen toegepast worden op het data-migratie proces, en specifiek bedacht zijn om inzichten over het overbruggen van kennis verschillen te verkrijgen. • Daarnaast herhaal ik kort wat de fases inhouden en waarom het zo ingedeeld is. • Ook zullen 'uitdagingen' en de andere thema's (samenwerken met eigen/ andere afdeling, stuurgroep management, betrokkenheid, overbruggen verschillen benoemd worden om denkproces op gang te krijgen) 		
<p>Specifieke vragen</p> <p><u>Fase 1; 05-2019 tm 12-2019</u></p>	<p>5.1 Welke professionele uitdagingen en kritische situaties kwamen op uw pad? (uitdagingen op het gebied van beeldvorming, besluitvorming, aannames herzien, impliciete kennisbasis)</p> <p>5.2 Welke relatie was er daarbij met het overbruggen van verschillen in het begrijpen van kennis, informatie en data?</p> <p>5.3 Hoe ben je te werk gegaan met het overwinnen van deze uitdagingen?</p> <p>5.4 Wat waren bronnen daarbij: wie (welke individuen, welke groepen), wat (een tool, een document), hoe: (een meeting met dialoog); hoe: een co creatie-werksessie (om iets nieuws te maken).</p> <p>5.5 Hoe kijkt u achteraf terug op de werking van deze hulpbronnen? (Wellicht toekomstig gebruik?)</p> <p>LET OP ANTWOORDEN 5.3-5.5 VOOR DOORVRAGEN!</p> <p>5.6. Doorbraken: wat waren doorbraken in het overwinnen van de uitdagingen?</p> <p>5.7 Welke relatie was er daarbij met het overbruggen van</p>	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide <p>(vriendelijk/ polit.cor.)</p>

	verschillen in het begrijpen van kennis, informatie en data?	
<u>Fase 2; 01-2020 tot 06-2020</u>	<i>Zie bovenstaande vragen 5.1-5.7</i>	
<u>Fase 3; 06-2020 tot en met 12-2020</u>	<i>Zie bovenstaande vragen 5.1-5.7</i>	
<u>Fase 4; 01-2021 tot heden</u>	<i>Zie bovenstaande vragen 5.1-5.7</i>	
Afsluitende vragen	<p>6.1 Hoe kijkt u terug op het data-migratie proces?</p> <p>6.2 Wat zou je als leerervaringen of suggesties aan anderen mee willen geven wat betreft het overwinnen van uitdagingen door middel van overbruggen van verschillen in het begrijpen van kennis, informatie en data in het bijzonder.</p>	Korte antwoorden, belangrijkste is de leerervaring.
	<p>EXTRA</p> <p><i>Samen met interviewee kort vragen overlopen om kern samen te vatten/ conclusie te bevestigen</i></p>	
	<p>EXTRA</p> <p><i>Navragen of er vragen of opmerkingen over de gestelde vragen zijn, dan bedanken en afsluiten</i></p>	

Appendix 2: Focus Group guide

Vorbereidingsvragen

Onderstaande vragen dienen als voorbereiding op de groep-sessie die gepland is op 7 Mei 2021. De vragen zijn gemaakt om informatie rondom u als deelnemer en de context van het data-migratietraject te verkrijgen. Op deze manier kunnen we tijdens de groep-sessie efficiënt werken en optimaal gebruik maken van jullie schaarse tijd. Als u vragen of opmerkingen heeft zullen we die tijdens de groep-sessie kort bespreken. Ingevulde formulieren kunnen gemaïld worden, of geprint afgegeven worden tijdens de groep-sessie.

1. Kunt u kort wat over uw werkzaamheden bij Abiom vertellen?

2. Welke rol had u tijdens het data-migratie proces?

3. Op welke manier werd het data-migratie proces voorbereid? *Denk aan: project-/stappenplan, afspraken over rolverdeling, mijlpalen, verwachtingen,*

4. Kunt u kort beschrijven hoe, volgens u, de samenwerking tijdens de data-migratie tussen afdelingen is verlopen? *Indien mogelijk, geef een voorbeeld.*

5. Wat vond u kenmerkend voor het procesmanagement, en kunt u dat in enkele zinnen omschrijven? *Met andere woorden: op welke manier is het data-migratie proces in de praktijk gemanaged?*

6. Wat zou u de volgende keer anders doen en waarom?

Uitleg

Hoi allen, allereerst alvast bedankt voor je deelname en tijd. Heeft u vragen over de toelichting die ik van te voren (datum) heb gestuurd?

Deze sessie is onderdeel van mijn scriptie. In mijn scriptieonderzoek bekijk ik hoe het gebruik van zogenaamde 'grens-overbruggings-mechanismen' van invloed is geweest, of had kunnen zijn, tijdens het data-migratie traject. De reden hiervoor is dat ERP-implementatie processen bekend staan om hun complexiteit en de waarschijnlijkheid dat zulke processen vaak vertraging oplopen, en daardoor duurder zijn dan begroot.

Vaak gevonden oorzaken van de vertragingen komen voort uit het aanpassen van bestaande informatiesystemen. Een voorbeeld is dat oude informatie aangepast moet worden om in het nieuwe ERP systeem te passen. Daarnaast is informatie vaak divers en erg gevarieerd, maar dient het voor een ERP verandering in een standaard vorm gepresenteerd te worden. Echter, vaak is het geval dat de oude informatie een vorm van impliciete kennis/ handelen is, die in de loop van jaren ontwikkeld is. Dat maakt het dus lastig om deze vorm van kennis of handelen te delen met mensen die niet over dezelfde impliciete basis beschikken, en het is erg complex om zulke kennis te standaardiseren.

Je kunt een vertaler als een grens-overbruggings-mechanisme zien. Hij of zij dient als een 'brug' tussen mensen die niet over dezelfde impliciete taalkennis beschikken, die dus letterlijk een andere taal spreken. Op de werkvloer komt 'het spreken van een andere taal' ook vaak voor, en helemaal bij een data-migratie traject waar mensen van verschillende afdelingen en vestigingen samen moeten werken en beslissen. Mechanismen die in zulk geval gebruikt kunnen worden zijn bijvoorbeeld:

- *Activiteiten waarbij mensen van elkaar leren, bijvoorbeeld een meeloop-dag;*
- *Protocollen, presentaties of werkinstructies;*
- *Personen die als 'mediator' dienen, die kunnen 'vertalen', die kennis hebben van beide facetten;*

Mijn onderzoek heeft als doel het bekijken van grens-overbruggings-mechanismen tijdens het data-migratie proces. Ik hoop hierbij inzicht te krijgen in hoe mensen die over verschillende vormen van (impliciete) kennis beschikken, een manier vinden om hun impliciete kennis

begrijpelijk te maken voor anderen. Op deze manier wordt duidelijk hoe diverse en impliciete informatie of kennis toegankelijk kan worden. Dit is niet alleen belangrijk voor informatie-migratie, maar ook voor de samenwerking binnen een bedrijf in het algemeen.

Uw antwoorden op mijn vragen zullen nooit herleidbaar terugkomen in de scriptie. Dit betekent dus dat uw antwoorden anoniem zullen zijn. Als u niet wilt dat een bepaald antwoord terugkomt in de scriptie kunt u dat aangeven.

De structuur van de sessie zal bestaan uit twee delen:

- *eerst zullen we de vragen die ter voorbereiding zijn gemaakt kort bespreken.*
- *Vervolgens gaan we individueel vragen beantwoorden die we daarna ook zullen bespreken.*
- *Op basis van jullie antwoorden en de daaropvolgende discussie gaan we bepalen wat jullie als meest belangrijk zien. Dit zal ik als het zover is verder toelichten.*

Onderstaande vragen gaan over het data-migratie proces en het overbruggen van kennisverschillen of kennisgrenzen. Ter herhaling;

- *Data-migratie betreft alles omtrent het artikelbestand, leveranciers, klanten en contracten. Dit kunnen dus bijvoorbeeld artikelprijzen, categorisering, contactgegevens of prijslijsten zijn.*
- *Het data-migratie proces is opgedeeld in 4 fases. Deze fases zijn gebaseerd op het uitstellen van deadlines, en zijn; 1) Mei 2019 tot December 2019, 2) Januari 2020 tot Juni 2020, 3) Juni 2020 tot December 2020, en 4) Januari 2021 tot nu. De fases zijn bedacht om als kapstok te dienen voor uw herinnering, zodat het verwerken van informatie overzichtelijk blijft.*

Zijn er nog vragen over de fases, data-migratie, het verloop van dit interview, of iets anders?

Als jullie het goed vinden zet ik de opnameapparatuur aan en dan kunnen we beginnen

- | |
|--|
| <ul style="list-style-type: none">• Voordat het interview begint zal worden uitgelegd dat het interview over het data-migratie proces gaat. Daarnaast duiken we dieper in het overbruggen van kennisverschillen/ kennisgrenzen. (Zie hierboven)• Daarnaast zal begonnen worden met het toelichten van anonimiteit, en dat de interviewee kan aangeven of iets wel/ niet mag terugkomen in de scriptie (bijvoorbeeld als ondersteunend citaat). Gegeven antwoorden komen niet herleidbaar terug in de scriptie. (Zie hierboven) |
| <ul style="list-style-type: none">• Voordat de vragen gesteld gaan worden wil ik (nogmaals) benadrukken dat de vragen toegepast worden op het data-migratie proces, en specifiek bedacht zijn om inzichten over het overbruggen van kennis verschillen te verkrijgen.• Daarnaast herhaal ik kort wat de fases inhouden en waarom het zo ingedeeld is.• Ook zullen 'uitdagingen' en de andere thema's (samenwerken met eigen/ andere afdeling, stuurgroep management, betrokkenheid, overbruggen verschillen benoemd worden om denkproces op gang te krijgen) |

Deel 1: Bespreken van voorbereiding en beantwoorden van vragen.

- De vragen zijn gemaakt om een beeld te krijgen van de context.

Deel 2a: Uitleg vervolg van sessie

- De volgende vragen zijn gemaakt om professionele uitdagingen tijdens het data-migratie traject te ontdekken. Nog belangrijker is het om te identificeren hoe de uitdagingen zijn overwonnen (doorbraken) of vertraagd (stagnaties) en waardoor . Dit is waar de grens-overbruggings-mechanismen aan bod komen.
- Uitdagingen kunnen van alles zijn, bijvoorbeeld verschillen in 'know-how', aanpassen van beeldvorming of besluitvorming, het herzien van bepaalde aannames, gevoelens van frictie in de samenwerking, ...,
- De bedoeling is dat jullie dit voor jezelf op papier gaan zetten en onderstaande vragen, per fase, beantwoorden.
- Vervolgens gaan we jullie antwoorden plenair bespreken, en is het doel om koppeltjes van uitdagingen en grens-overbruggings-mechanismen te identificeren.
- Wanneer we dit gedaan hebben bepalen jullie welke koppeltjes het meest belangrijk zijn geweest. (Indien de tijd het toelaat kunnen we ook bespreken wat volgens jullie in de toekomst van pas kan komen bij ERP trajecten. LET OP RELEVANTIE VOOR SCRIPTIE.)

Deel 2b: Warming-up vraag (plenair)

- **Kunt u/ kunnen jullie een voorbeeld noemen van een grens waar je tijdens het data-migratie proces tegenaan bent gelopen?**
Leg uit waarom dit volgens u een grens is.

Deel 3: Individueel beantwoorden onderstaande vragenFase 1; 05-2019 tm 12-2019

5.1 **Welke persoonlijke uitdagingen en/ of kritische situaties kwamen op uw pad?**

(uitdagingen op het gebied van beeldvorming, besluitvorming, aannames herzien, impliciete kennisbasis)

5.2 **Welke relatie was er daarbij met het overbruggen van verschillen in het begrijpen van kennis, informatie en data?**

5.3 **Hoe ben je te werk gegaan met het overwinnen van deze uitdagingen?** (Welke activiteiten, hoe is het gegaan)

5.4 **Wat waren bronnen daarbij: wie** (welke individuen,

- Volledig
- Relevant
- Duidelijk
- Valide
- (vriendelijk/ polit.cor.)

	<p>welke groepen), wat (een tool, een document), hoe: (een meeting met dialoog); hoe: een co creatie-werksessie (om iets nieuws te maken).</p> <p>5.5 Hoe kijkt u achteraf terug op de werking van deze hulpbronnen? (Wellicht toekomstig gebruik?)</p> <p>LET OP ANTWOORDEN 5.3-5.5 VOOR ONDERSTAANDE VRAGEN</p> <p>5.6. Doorbraken: wat waren doorbraken in het overwinnen van de uitdagingen?</p> <p>5.7 Welke relatie was er daarbij met het overbruggen van verschillen in het begrijpen van kennis, informatie en data?</p>	
<p><u>Fase 2; 01-2020 tot 06-2020</u></p> <p><u>Fase 3; 06-2020 tot en met 12-2020</u></p> <p><u>Fase 4; 01-2021 tot heden</u></p>	<p><i>Zie bovenstaande vragen 5.1-5.7</i></p>	<ul style="list-style-type: none"> • Volledig • Relevant • Duidelijk • Valide • (vriendelijk/ polit.cor.)
Deel 5: Samenvatten en afsluiten	<p>EXTRA</p> <p><i>Samen met deelnemers kort papieren/ flaps overlopen om kern samen te vatten/ conclusie te bevestigen</i></p>	
	<p>EXTRA</p> <p><i>Navragen of er vragen of opmerkingen over de gestelde vragen zijn, dan bedanken en afsluiten</i></p>	

Appendix 3: Job descriptions

Participating in:	Interview:	Job description:
Focusgroep	FG10 (X3)	Manager ACS & ACSBE & Hessing
Focusgroep	FG10 (X2)	Finance - <i>Nederland</i>
Focusgroep	FG10 (X1)	Manager AFS
Interview	Interview 2	Applicatiebeheer
Interview	Interview 1	Projectleider - ACS & ACSBE
Interview	Interview 7	Inkoop ACS
Interview	Interview 4	Inkoop ACSBE
Interview	Interview 9	Verkoop AFS
Interview	Interview 5	Sales ACSBE
Interview	Interview 8	Operations <i>Hessing</i>
Interview	Interview 6	Logistiek (<i>alle maatschappijen</i>)
Interview	Interview 3	Manager ACS

Korte toelichting:

ABIOM bestaat uit verschillende maatschappijen, genaamd ACS, ACSBE, AFS en Hessing.

ACS (loc. Nijmegen) = Abiom Communication Systems; houdt in de communicatie apparatuur zoals mobilifoons, portofoons, communicatie netwerken, etc. Zowel verhandelen als assembleren.

ACSBE (loc. St. Niklaas) = Abiom Communication Systems België.

AFS (loc. Nijmegen) = Abiom Fleet Solutions; houdt in het opbouwen van voertuigen (politie, ambulance, etc).

Hessing (loc. Houten) = 24 service verlening op communicatie apparatuur voor bedrijven als Schiphol, TATA Steel, Sluis Zaanstad.

