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# **The Socio-technical Borderland of Interaction**

An ERP module case study

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MASTER DEGREE PROJECT

# The socio-technical borderland of interactions - An ERP module case study

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## Abstract

In step with a greater demand for information quality and business capabilities, Enterprise Resource Planning (ERP) systems have gained a pivotal role in today's organizations and have thus been researched extensively. However, there is still a relative lack of ERP studies concerning themselves with the post-implementation phase of the system's life-cycle. Research has been preoccupied with implementation studies which have a tendency to 'take the system for granted' and view it as a stable phenomenon or a black box after it has been implemented. The purpose of this study is to investigate how the social and the technical system of an ERP landscape interact post-implementation, and seek the answer to how this network achieves and loses stability. With the help of Actor-Network Theory (ANT), and the concept of translation (Callon, 1984), our single case study of a large multinational company was able to show how these systems never truly stabilizes because of changing technology and interests, but that it is possible to achieve temporary stability by forcefully locking and consequently silencing the actors. It was also shown how this treatment of actors could induce weak irreversibility into the network and how the price for temporary stability had to be paid a-plenty at a later stage.

*Keywords:* ERP; Post-implementation; Actor-Network Theory; Stability; Irreversibility

supervised by

Berit HARTMANN

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*"And the vision that was planted in my brain  
Still remains  
Within the sound of silence  
...  
'Fools' said I, 'You do not know  
Silence like a cancer grows'  
...  
But my words like silent raindrops fell  
And echoed in the wells of silence"*

From *The Sound of Silence* by Simon and Garfunkel

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# 1 Introduction

Enterprise resource planning (ERP) systems are big, complex systems that impact entire organizations (Scott, 1999). A significant amount of the article introductions within the ERP domain focus on how problematic and expensive ERP investments can turn out to be (e.g. Dezdar & Sulaiman, 2009; Bahrami & Jordan, 2009; Hsu et al., 2015; Ram et al., 2013). For instance, both Krumbholz et al. (2000) and Zhang et al. (2005) refer to a Standish Group report that shows ERP projects on average cost 178 % more and take 250 % longer than planned for and only fulfill 30 % of promised benefits. According to Ram et al. (2013), the numerous failures and problems related to ERP projects also created a research interest in the field, which have led to a considerable body of ERP literature. However, even though knowledge and experience have increased, the rates of failure remain high (ibid). Despite this, organizations still consider these systems as essential (Su & Yang, 2010).

Investments in ERP systems are often motivated by increased integration and visibility (Dechow & Mouritsen, 2005). Grabski et al. (2011) explain they are adopted due to *"[...] management's need for timely access to consistent information across the diverse functional areas of a company"* (p.38). These systems consist of integrated software modules connected to the same database that address activities such as sales, finance, manufacturing, human resources and distribution (Robey et al., 2002). Newell et al. (2003) refer to the modules as packages, but define the ERP system similarly: *"[...] enterprise wide packages that tightly integrate business functions into a single system with a shared database"* (p.26).

ERP research has been dominated with system implementation studies (Dery et al., 2006a; Moon, 2007; Ifinedo et al., 2010; Haddara & Zach, 2011). It often determines the effects of an implementation and/or what is essential for it to become successful. These approaches have to assume that the implementation is over at a certain point in time in order to determine the success or failure. Even if this assumption would be viable, i.e. the implementation can truly be considered finished, they often ignore consequent effects. Trkman and Trkman (2014) could for instance show that, using an Actor-Network Theory (ANT) approach, even if the implementation is successful it can be followed by a low level of system usage.

Further, Information System (IS) research which encompasses the ERP domain as well, has been rather fragmented epistemologically (Kaniadakis, 2012; Orlikowski & Barley, 2001). Previously, technical studies dominated the field. These kind of studies, which highlight the Information Technology (IT) artifact, tend to focus on practical solutions and have a lot in common with other fields such as engineering and architecture (Orlikowski & Barley, 2001). In their review, Dery et al. (2006a) found that the ERP literature still tended to focus on technical aspects. This technocratic research has been criticized as an epistemology of the IS research, specifically in the context of ERP implementation (Kallinikos, 2004). As a response to this, social studies emerged in the field. It resulted in a shift from the former focus on technology and design with a prescriptive and simplistic rational management model, to focus more on the social system surrounding the IS development (Kaniadakis, 2012; Elbanna, 2006).

However, Lee's (2001) definition of IS research, endorsed by Hanseth et al. (2004) and Baskerville and Myers (2002), proposes that there is more to it than just the technical and social system:

"Research in the information systems field examines more than just the technological system, or just the social system, or even the two systems side by side; in addition, it investigates the phenomena that emerge when the two interact."  
(p.iii)

Thus, it is neither the social nor the technical separately that should be of interest to the research, but rather the construct they create when combined. Constructions are processes and whatever stability the construction finds, the stability is vulnerable and of temporary nature; the construction could at any moment reverse to a state of instability (Justesen & Mouritsen, 2011). However, a lot of the IS research perceives IT artifacts as stable and fixed (Orlikowski & Iacono, 2001) - a state of absolute irreversibility. Justesen and Mouritsen (2011) further explained that the study of Dechow and Mouritsen (2005) proposes: "[...] *that fabrication involves a curious notion of stability*" (p.173). In other words, if a black box was to be opened in order to explain how it achieved that status, stability is already somewhat assumed.

The purpose of this study is to investigate how the social and the technical system of an ERP landscape interact post-implementation, and seek the answer to how this network achieves and loses stability. We do this by adopting an ANT single case study methodology.

The remainder of the paper is structured as follows: the next chapter aims to give an overview of literature regarding the ERP research strands of CSFs and Organizational impact as well as previous studies utilizing ANT. This is followed by *section 3* which introduces the reader to ANT concepts such as actors, interests, translation and irreversibility. *Section 4* describes our method including a presentation of the case company, participants of the study and how the analysis was conducted. *Section 5*, 'MARS', is a combined empirical findings and analysis segment where data from interviews is presented and synchronously analyzed using ANT concepts. This is followed by a discussion, in *section 6*, where findings from the analysis are contextualized by previous literature and reflected upon. The paper finalizes with concluding remarks in *section 7* including the study's implications for research and practice as well as guidance for further research.

## 2 ERP research

Grabski et al. (2011) identified three predominant strands of research within the ERP domain: *Economical impact*, *Critical Success Factors (CSFs)* and *Organizational impact*.

The strand of *Economical impact* literature concerns the relationship between ERP systems and economic benefits. This strand is motivated by a large amount of papers that regard the impact of IT and ERP systems on firm performance (Hendricks et al., 2007; Poon et al., 2012) and highlight the link between different factors and internal or external economic benefits (e.g. Hayes et al., 2001; Hendricks et al., 2007; Morris, 2011; Rao et al., 2015). However,

seeing as we do not aim to *measure* company performance, the strand of economical impact is thus outside of the scope of this study and will hence not be discussed further.

## 2.1 CSFs

The strand of CSFs concerns factors that are thought to have a significant impact on the success of a manager or an organization (Grabski et al., 2011), and a large amount of the system implementation literature could be categorized into this strand (Zhong Liu & Seddon, 2009; Grabski et al., 2011; Bintoro et al., 2015). Earlier CSF research has focused on generating and identifying critical factors (Dery et al., 2006a), but more contemporary studies have examined previously established factors in greater detail (Grabski et al., 2011). However, it has been rather uncommon to focus on the usage (or post-implementation) of ERP systems, but this has been identified as a growing interest of researchers (Dery et al., 2006a; Grabski et al., 2011). Critique has been raised towards the literature because it encompasses much survey based research which often suffers from a weak underlying theory (Grabski et al., 2011).

One of few studies examining the effect of CSFs on post-implementation success is that of Zhu et al. (2010). The authors found that the quality of the ERP implementation as well as the readiness of the organization adopting it have a significant influence on the outcome of the project. The importance of a successful implementation for post-implementation success is further underlined by Peslak et al. (2008) who found that later system maintenance, i.e. improvements after the system has already gone live, is not positively correlated with an increase in use. The importance of the post-implementation phase is underlined with the argument that:

”[It] determines the ultimate success of the ERP initiative, and mainly comes from benefits that organizations can derive from the ERP deployment.” (Zhu et al. 2010, p. 274)

In a similar vein Ram et al. (2013) found that implementation success (project delivery) and performance improvements (post-implementation success) are two distinct, dependent variables. The study examined the criticalness of four major CSFs, namely project management, training and education, system integration and business process re-engineering. Only project management and training and education were found to have a statistically significant effect on the success of the implementation whereas only training and education and system integration were significant for post-implementation success. The authors also state that it is possible for some CSFs to have multiple roles where they in one step directly affect the implementation success while in a second have an indirect impact on post-implementation success. This is explained by the success of one CSF being a prerequisite for the success of another. However, the term success is still quite loosely defined within this strand and there seems to be a lack of consensus regarding exactly what it is.

In 2000, Markus et al. addressed the issue with measuring success and highlighted the two main difficulties. First, success is often defined differently and its definition depends on the perspective of the one measuring it. For instance, the system supplier’s main focus may



be to deliver the project within set the time-frame and expenditures, while organizations may want to achieve added value to the business as smooth as possible. Even though they only adopted the organizational perspective in the study, Markus et al. (2000) included five dimensions (e.g. success from the perspective of the technical, economical, managerial and from employees) in order to encompass as much interpretations as possible of the term success. Second, when to measure it is not clear. For instance, Trkman and Trkman (2014) studied a successful implementation which later suffered from a low level of usage. Markus et al. (2000) proposed that success should be measured at different points in time because they noticed a similar pattern in older studies, where declared success had diminished post-implementation, and stated that:

”The organizations that adopt ERP systems need to be concerned with success, not just at the point of adoption but also further down the road.” (p.246)

However, the implementation oriented CSF research still values early success highly as most factors are deemed 'critical' just because they have the ability to achieve this - so how critical are these factors? One line of reasoning claims that CSFs do not change just because the technology changes, since an ERP landscape is foremost a social system which is only facilitated by technology (Wallace & Kremzar, 2001). This implies that CSFs really are critical because they are still valid post-implementation, as they are foremost attributed to the social and hence not dependant on the maturity of the technology. An alternative view does on the contrary advocate that CSFs change when the technology changes, since technology has the ability to alter the social (Dery et al., 2006b; Grant et al., 2006). Hence, different CSFs then are relevant pre and post-implementation.

Through establishing success so early on, not all dimensions of success can be considered. Top management deems *usage* of the technology as their main goal (Amoako-Gyampah, 2007), which can only be fully evaluated later on. Usage is an important aspect to organizations since a lack of usage can result in huge costs (Markus & Keil, 1994) as well as not achieving the estimated returns on the investment (Yi & Davis, 2001). In order to accomplish a high level of usage, *user perception* has to be considered (Delone & McLean, 2003). Based on the fact that previous research found user perception to decrease post-implementation as compared with the implementation phase (Bhattacharjee & Premkumar, 2004), Abdinnour and Saeed (2015) set out to find out how that is. They applied a framework, where user perception was measured in terms of: acceptance; functionality of the technology; benefit of the technology; and appropriateness of the implementation speed. They found that it was the perception of functionality, benefits and speed that dropped, but no significant change in acceptance was found.

Earlier, one reason for the drop in user perception has been ascribed to *user resistance towards change* (Kim & Kankanhalli, 2009). It has become a highlighted issue with regard to IT system implementations because it involves big changes in existing social systems as well as technical systems (Gibson, 2003). Markus explained this phenomena theoretically in 1983, where he argued that it emerged from changes in the interaction between the social and the technical. If these changes involve a redistribution of power, the group who feel they lose power may start to resist the change. This is similar to what Marakas and Hornik (1996) argued for, that resistance is an answer to feeling threatened by the new system.

As has been shown, research within the CSF strand is predominantly focused on implementation studies and suffers from a lack of consensus regarding the relevance of these CSFs post-implementation. In addition, the definition of success within the CSF literature is an ambiguous matter where the same outcome could be regarded a success from one perspective but a failure from another. If one define success in terms of usage, user perception has to be considered. As user resistance has been attributed to user perception, and it emerges from experiencing a loss of power, there ought to be a potential risk that a successful implementation fail post-implementation if the system does not fully stabilize (because power is then continuously redistributed). Hence, more extensive research on ERP landscapes post-implementation may contribute to the strand and increase the understanding of how long-term success in organizations is generated.

## 2.2 Organizational impact

The last strand is that of Organizational impact. This stream within the ERP domain focuses on the effects ERP systems may have on different organizational levels. It has been found that implementation and integration of an ERP system can have rather large consequences for the organization's structure and decision-making as processes and activities become more efficient in reducing data redundancy and bypassing previous intermediate hierarchical levels (Seethamraju, 2007; Simon & Noblet, 2012). Grabski et al. (2011) included research about organizational change, management control and business processes as well as security and regulatory issues within this category.

In their study from 2004, Spathis and Constantinides, investigate how the implementation of an ERP system has affected the contemporary accounting practices and methods of 26 companies. The results indicated that prominent motives for the implementation were an increased demand for real-time information, information for decision support and integration of applications. In terms of what the implementation brought to the company, respondents most frequently stated that the new ERP system facilitated and increased the use of the company's internal auditing function, non-financial performance indicators and profitability analyses per business segment and customer. This led the authors to conclude that the outcomes were congruent with the motives. However, it was found that the ERP implementation had little effect on the companies for adopting more sophisticated management accounting techniques such as activity-based costing (ABC) and target costing (TC).

Chen (2012) found that, as accounting processes and practices change with an implementation, so does the job of accountants. They play a vital role in the implementation of an ERP system, as they with their understanding of internal processes are fit to come up with suggestions and revisions. After the implementation, tasks such as data input, data compilation, filing and preparations for financial statements decreased. At the same time, the importance of understanding internal processes, evaluating and verifying the new system and providing up-to-date information for decision making increased. The most distinct change was found for managerial accountants who after the implementation had to take on more management functions such as education and training and financial analysis whereas non-managerial accountants had more of an administrative role than before.

Research within all these strands often apply a positivistic research paradigm (Collis & Hussey, 2009), represented by survey-based data collection methods as a basis for statistical analyses. The implication of this is that respondents answer at a specific point in time and with reference to a current state of matters although the use of the system might be in its infancy. The findings then provide but only a snapshot of the ERP implementation's effects at this particular moment. This has lead research, especially in the field of IS, to perceive the systems as robust, investigated in a setting where they are seen as stable and fixed (Orlikowski & Iacono, 2001). Quattrone and Hopper (2006) describe this as:

”Research in IS and elsewhere has concentrated on the emergence of IT as black boxes. This helps clarify how IT systems acquire stability and become taken-for-granted but it neglects what happens when they achieve this status.” (p.243)

However, a view like this has lead researchers to draw conclusions based on results that are outdated as soon as they are discovered. This is because not only do they fail to account for what happens *when*, but also what happens *after*, such a status has been ascribed. The aim with our study is not to assume a point in time when the system will be seen as stable or even stop once stability has been achieved, but rather to follow the project through its different life-cycle phases and explore what happens afterwards. By doing this, we hope to contribute with new insight into the ERP domain.

### 2.3 Towards a more socio-technical view on information systems

As shown thus far, the ERP domain is broad and overlaps a lot of research areas and, since it often involves both technological and social aspects, it is not uncommon to find research from either the IT or organizational studies (OS) discipline. For instance, Grabski et al. (2011) stated that change management research on ERP implementations consists of research from these two disciplines. According to Orlikowski and Barley (2001), these disciplines stand much to gain from one another as the fusion of different perspectives would provide better explanations of socio-technological phenomena, e.g. IT systems. In OS research, technology has often been perceived as abstract and deterministic, and the role of human agency has often been ignored when it comes to the design and use. However, the interest in the role of agency in technological change has increased, and has been welcomed since this makes technology less abstract and allows for it to become a social object (ibid).

Dery et al. (2006a) identified an increasing number of articles about ERP system usage and maintenance, which indicates a growing interest in organizational issues. However, in their review they also found a noteworthy lack of articles concerning the work and organizational impact of ERP systems, both during and post-implementation. In turn, only some of these studies focus on power, resistance and workspace control related to ERP systems. Grabski et al. (2011) also identified this knowledge gap and stated in their conclusion about the future of ERP research that:

”There are also calls for increased research on ERP systems’ impact on how work is managed and organized, how sociological factors from the individual to the institutional level interact with ERP installations, and what are the implications on power relations and management control.” (p.67)

One approach that can contribute to the ERP domain, due to what is stated above in this section, is the sociological Actor-Network Theory (ANT). It explores networks of human and non-human actors with equal agency, where *"actors define and distribute roles and mobilise or invent others to play these roles"* (Elbanna, 2009, p.405). In these networks of actors no structure or power is given or final. Instead it is constantly in the making because it can be, and is, contested by both human and non-human actors (Law, 1992). In other words it renders agency both to the social and the technical, and address:

"[...] the kind of hybrid problems that we encounter today in an increasingly connected world where the global and local, the human and the technical, interact constantly." (Jolivet & Heiskanen, 2010, p.6748)

ANT has been applied within the IS and ERP domain in order to seek deeper knowledge and understanding regarding these intricate interactions described above. In a study by Elbanna (2010), ANT was used to depict how power struggles arose during a multi-module (finance/HR modules etc.) ERP implementation. ANT was used to show how networks and project management barriers surrounding the different modules were in constant change, being shaped and re-shaped by negotiations. The network surrounding the finance module successfully recruited top management support which significantly empowered the network. In turn, this had severe detrimental effects for the HR module network as it no longer had the political power to acquire resources necessary for the project.

Trkman and Trkman (2014) examined the development and governance of a website for a Slovenian primary school. By using ANT, the authors explained how a successful implementation could lead to a low level of later use. The findings suggested that although interests were misaligned the network surrounding the website found stability in a certain situation while being unstable in another. This was ascribed to actors diverging from the overarching, declarative interest and instead followed their own agenda. In a similar study, Bob-Jones et al., (2008) looked at an ERP implementation from the perspective of three networks; top management, project team and end-users. The implementation was by top management claimed to be a success as it was delivered on time and within the frame of the budget. However, end-users and administrators felt marginalized during and after the process and were left to "pick up the pieces" of the implementation, coping with it through improvisation and the creation of shadow systems.

ANT has also been used for studying how control is impacted and altered by the implementation of an ERP system. In their study from 2005, Dechow and Mouritsen looked at two different firms implementing an ERP system in the pursuit of management and control. The study tried to, by the use of ANT vocabulary, explain how different actors are interconnected and in turn how actors influence and are influenced by the system. It is shown how programming for one thing can both enable certain pathways while at the same time make others less viable or even render them impossible. Thus, decisions made by management in one instance can severely affect the process further on.

Justesen and Mouritsen's (2011) literature review of ANT and accounting research highlights a series of articles related to implementation of different accounting and management accounting techniques (e.g. Preston et al. 1992; Briers & Chua 2001; Jones & Dugdale, 2002). What these articles have in common is that they do not adapt a mainstream, rational way

to view implementation where design and implementation are completely separated. Rather, they view the implementation as an iterative process, susceptible to challenges and modifications where the outcome of the implementation can only be understood by the alliances and controversies that formed it. With *Science in Action* (Latour, 1987) as their backbone, Preston et al. (1992) do not only study historical documents but rather science in the making with the help of interviews and field observations. Other studies such as that of Jones and Dugdale (2002), seek to demystify management accounting practices by tracking previous processes and re-opening the black box. They claim that the management accounting practices (ABC in their case) in their current form are the result of not a single visionary, but instead a process of translations which by now has been mostly forgotten (i.e. black boxed).

### 3 Actor-Network Theory

The identity of the IS field has been widely debated, where issues regarding the IT artifact, dominating paradigms and the boundary of the field have been questioned (Hanseth et al., 2004). One definition of the field, endorsed by Hanseth et al. (2004) and Baskerville and Myers (2002), was proposed by Lee (2001). This definition (see section 1) is also the point of departure when Hanseth et al. (2004) argue for the unique contribution ANT can make in the IS field. The purpose of ANT is to allow for an analysis of the interactions between the social and technological, which is referred to in the latter part of Lee's definition. It does so by perceiving everything as, and a part of, socio-technical actor-networks and study the associations within. It depicts reality as it unfolds, without preconceptions, and could because of it offer new insight into areas where structures previously have been taken for granted, such as the previous compartmentalization of the technological and social system. Jolivet and Heiskanen (2010) state that:

"ANT thus provides a socio-technical approach to analyse controversies and concepts that helps to track the chain of micro-decisions and power relationships through which actors gradually agree upon, going from mere idea to its realization." (p.6748)

The origin of Actor-network theory dates back to the 1980s and the theory has been developed and advocated by scholars such as Bruno Latour, Michael Callon and John Law. Since birth, the theory has undergone much change as its developers have continuously changed fields, topics and concepts in pursuit of applying it, which in turn has rendered the theory wide and diverse, making it hard to review (Elbanna, 2010). However, the section below will advance with concepts and vocabulary common to ANT and central to this thesis.

#### 3.1 Actors

In order to explain the concept of actors, our point of departure is John Law's (1999) words describing ANT as "[...] a *ruthless application of semiotics*" (p.3). In its simplest form semiotics is "the study of signs", but the term encompasses a wider and far more colorful meaning. Essentially, semiotics is about communication: words, sounds, body language, etc.

It is these interactions that ANT cherishes; something can only acquire a meaning in relation to something else, a word is only understood because there are other words it can be related to. Applying ANT requires the researcher to erase all preconceptions of fixed or given entities and focus on these associations. Law (1999) famously described it as:

”Truth and falsehood. Large and small. Agency and structure. Human and nonhuman. Before and after. Knowledge and power. Context and content. Materiality and sociality. Activity and passivity. In one way or another all of these divides have been rubbished in work undertaken in the name of actor-network theory.” (p.3)

The implications of the above are that the researcher needs to follow the traces, i.e. look for associations and interactions in order to discover actors and networks. This makes the process of translation central to identifying actors and understanding networks (see also sub-section 3.2 below about translation). Callon and Latour (1981) define an actor as:

”Any element which bends space around itself, makes other elements depend upon itself and translates their will into a language of its own” (p.286)

Actors do not only convey, but impose their world on matters and others. Anyone or anything considered the source of an action is an actor, may it be human or non-human. In ANT, they are granted equal agency and are part of heterogeneous networks. However, an actor is always also a network (Law, 1992). To exemplify: a machine is built up by a network of different heterogeneous parts while at the same time being a part of a network made up of humans such as operators, users and repair-persons. However, in order for a network to become an actor, it has to be punctualized or black boxed.

According to Latour (1987, p.131), a black box is an integrated whole, in which multiple elements act as one. It has been used to refer to undisputed facts as well as unproblematic objects, which means it is derived from some kind of success. Latour (1999, p.304) explains the implications of this as:

”When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity. Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become.”

When a complex actor-network is black boxed and included in other networks, it becomes punctualized in those networks. Essentially, punctualization means that the network has been reduced down to a single point (Callon, 1990), measured only by its input and output, irrelevant from its internal composition. When the network has been reduced to this very point, it can be seen as an actor itself and linked to other actors in even greater networks.

## 3.2 Translation

Central to Actor-network theory is the concept of translation, which has been described to mean: ”[...] *displacement, drift, invention, mediation, the creation of a link that did not exist before*” (Latour, 1999, p.179). Translation draws on the work of Callon (1984) and

his study of scallops and fishermen at the St. Briec Bay. Translation came to be the name of a conversation strategy applied by three marine biologists to save a population of scallops inhabited in the bay. In essence, translation comes down to aligning the *interests* of actors in a network and thus creating a stable network with the ability to resist outside influence. Schiefele (1991) argues that interests can be broken down into two components: the feeling-related component and the value-related component. They can be compared to the, by behaviorists well known, concept of intrinsic motivation (Ryan & Deci, 2000). Feeling-related interests, or *feeling-related intrinsic valences of an object*, can be described as:

”Association of an object or object-related activity with positive feelings, especially enjoyment and involvement” (Schiefele, 1991, p.303)

*Value-related intrinsic valences of an object* on the other hand is more properly described as the personal significance one attributes to an object, such as advancing one’s own competence, development or insight (Schiefele, 1991). However, just as a human actor can have such interest, so can a non-human actor. The interest of the non-human actor is to achieve the status it was meant to achieve, to be used the way it was intended to be used or solve what it was meant to solve, and by the process of translation interesting other actors and making itself indispensable to them (Tatnall & Gilding, 1999).

If we were to revisit Callon’s (1984) study of the fishermen and the scallops, the study discerned four different phases of this alignment, or ‘moments’ of translation. The first step of the translation process came to be known as *Problematization*. Problematization was the process of framing the nature and problems surrounding the scallops. The biologists attempted to establish their research project as an ‘obligatory passage point’ (OPP), a course of action that would align interests by guaranteeing the best outcome for all parties involved. In doing so the researchers also made themselves indispensable to the other parties as their research would be the key to understanding how the scallops reproduce. In a second step, *interessement*, or the processes of locking actors into their roles as proposed by the OPP-program, occurred. In this step, the focal actors attempt to protect the identity they have prescribed for a certain actor from outside influence. The third moment was phrased *enrolment* and referred to a process where the biologists, through a series of strategies (physical violence, seduction, transaction, consent without discussion), tried to connect and augment the roles proposed by the OPP-program. The final step was *mobilization*, where the biologists sought to protect the different spokespersons (fishermen, scallops etc.) from the act of betrayal as this would diminish the authority of the spokespersons and seriously jeopardize the project. Thus, mobilization refers to the different methods used by the focal actors to protect their initial interest and ensure the continued stability of the network.

However, the biologist were ultimately betrayed by the scallops, who refused to reproduce and the fishermen who acted against their spokesperson and fished the water of St. Briec Bay. Although spokespersons had been assigned to the different groups of actors, and these had indeed been made mobile, the project failed as they were not protected from betrayal or stayed mobile for long enough. The translation process and the establishment of the survival of the scallops as an OPP had invested the biologists with power, but it was soon lost after the failure of the translation became apparent and ultimately forced the researchers to re-think their conversation strategy (i.e. their translation). In 1986, Latour explained the nature of

power in a way that also captures the application of semiotics:

”Power is always the illusion people get when that are obeyed...people who are ‘obeyed’ discover what their power is really made of when they start to lose it. They realize, but too late, that it was ‘made of’ the wills of all the others.” (p.268)

The translation failed as the actors were no longer were enrolled into the roles ascribed to them by the researchers. The degree to which a translation might fail, like the previous one just did, can be seen from the concept of *irreversibility*. In his later work Callon (1990) described irreversibility as contingent upon two things:

”(i) the extent to which it is subsequently impossible to go back to a point where that translation was only one amongst others (ii) the extent to which it shapes and determines subsequent translations” (p.149-150)

In other words, a state of strong irreversibility makes the network durable and protects it from the influence of competing translations whereas weak irreversibility makes the network susceptible to destabilization.

## 4 Method

This thesis has been conducted in the form of a single case study, as it provides a more in-depth look into a certain phenomenon at a single organization (Yin, 2009). It was the best choice due to the complexity of the socio-technical phenomenon in focus, the thesis time restriction and the ANT approach which demands as much information as possible through relatively unstructured data collection. Because of this, singularity is beneficial in ANT studies (Justesen & Mouritsen, 2011). According to Eisenhardt (1989), case studies are used to either describe, test theory or generate theory. Since we do not only describe, and not test any specific theory, the latter describes this case study the best as we strive to gain new insight about ERP landscapes post-implementation. We do however not claim to be able to generate a general theory from this single setting, but do contribute to a cumulative theoretical knowledge from which it is later possible.

The application of ANT has methodological implications since it is more to it than what is usually labeled a theory. Excluding theory, it has been described as a philosophy, toolkit, approach or methodology. Law (1992) explains that:

”Actor-network theory is analytically radical in part because it treads on a set of ethical, epistemological and ontological toes.”(p.383)

The ontology of ANT is not coherent with neither relativism nor realism. Reality does not only exist in the mind, but also in the outside world through representation (Latour, 1999). Since it is present in the world as well as in the mind, there is no need to distinguish one from the other. As representation could be both human and non-human, it is the collective of both that constructs reality. It is something constantly in the making and should be studied as it unfolds. Preconceptions about power and structure are then to be avoided. Latour (1996) describes how meaning is granted:



”Instead of opposing the individual level to the mass, or agency to structure, we simply follow how a given element becomes strategic through the number of connections it commands, and how it loses its importance when losing connections.” (p.372)

What elements deserve to be studied are not agreed or decided upon a priori, but rather emerge as the research process carries forward. Eisenhardt (1989) also highlights the importance of not considering any theory or hypothesis in the beginning of a theory generating case study, but does also acknowledge that it is not possible to be completely blank. However, trying to start as close to null as possible decrease the bias of the findings. As for our study, we tried to start out without any preconceptions about what actors would prove to be most influential. Apart from our initial interview with the Business Area Manager, our interviewee sample was based on what social science methodology has come to call snowball sampling. Although we had a fixed starting point, this technique allowed us to find actors, not because we thought they were important but rather because they came up during conversations with other actors.

## 4.1 Case company and data collection

We were granted access to a large multinational company, from here on referred to by the pseudonym *EngieCorp*, which had implemented a couple of new information systems in the past years. The most recent system, MARS, is the focus of this study. Our study was conducted between January and May 2016, but the study regards the period from when MARS went live in 2012 until April 2016. Globally, EngieCorp has close to 200 000 employees and manufactures and sells products in three business areas. Since we are to keep this company anonymous, we cannot specify this in more detail. Our research started off at the Swedish branch, as the initial interviews were conducted here. The Swedish branch encompasses sales and customer units from two of the three business areas as well as support functions such as: customer service, finance and accounting, human resources, communication and marketing. The Swedish branch also serves as the head office for other Nordic countries, and support functions are shared within this area. The products are mainly sold to retailers, which in turn sell to both businesses and consumers. This branch reports to the European headquarters (from here on referred to as HQ), which in turn report to the global headquarters (Global HQ).

The data was gathered from semi-structured interviews stretching different hierarchical levels within the organization (see table 1). A total of six interviews were conducted. Initially, we familiarized ourselves with the organization and its IT-solutions on a more general level through two informal, introductory interviews. Through these, we could better plan upcoming interviews. Finally, two follow-up interviews were conducted. These interviews were necessary in order to clarify matters that emerged throughout the writing process - to make sure we had understood the interviewees correctly and also to fill gaps that had been missed or overlooked during the initial interview. The interviews lasted for 60 minutes on average and were fully transcribed with help of the software *f4transkript*. However, informal interviews and (due to recorder issues) the follow-up interview with the Business Controller was not transcribed. Instead, notes were taken during the informal interviews and after the follow-

up interview (since it was by then we first realized that the interview had not been recorded).

**Table 1 - Interviewees**

Position	Branch	Nickname	Interview	Follow-up
Business Area Manager	Swedish	AM	Phone	Phone
Business Controller	Swedish	BC	Phone	Phone
Business Analyst	HQ	BA	Phone	e-Mail
Project leader of MARS	Global HQ	PL	Phone	e-Mail

The *Business Area Manager* (AM) is responsible for the profit of one business area in Sweden and has worked for the company since 2006. The *Business Controller* (BC) was hired at the Swedish branch in 2010, but resigned during this study. Because of this, the follow-up interview was conducted after BC had left the company. In 2012, BC was educated in MARS in order to become the Swedish main user (Super-User) of MARS. The interviewed *Business Analyst* (BA) has a similar Super-User role as BC, but works at the European Headquarters since two years ago. Instead of using MARS mainly for data input as BC, BA consolidates sales data from all European branches. Both do however also use the data for analysis, but on different organizational levels. The final interviewee, the *Project leader of MARS* (PL), has worked as business administration manager in Sweden for ten years, but became general manager of finance in Europe in 2011. PL then became responsible for, among other things, the MARS project in Europe. Since January 2015, PL has been working at the global headquarters and is today responsible for the strategic financial planning of the European market.

EngieCorp uses a budget and composes it through a bottom-up procedure. Each Business Area Manager in every European branch has to submit their estimations, for which they are accountable, for the next period. These submissions are then merged to a European level budget at HQ. Each year there are three major budget events (not including PR budgets). Since the company has a broken fiscal year, the budget concerns the period between April and March. The annual budgetary process starts somewhere in November-December, and the original budget is then submitted in January. In late June, it is revised and updated with estimations for the next nine months. The final budget event takes place at the end of December, and concerns nine months of actuals and three months of estimations.

## 4.2 Our analysis

As we were applying ANT as a methodological tool for data screening, the processes of data collection and data analysis came to be closely intertwined. The collected data in one step allowed us to see new paths of analysis while such analysis simultaneously guided the direction for subsequent collection of data. Thus, the direction of the thesis was not specified explicitly in advance, but was rather a product of where the connections lead us. Firstly, in order to produce a meaningful ANT study, we set out to acquaint ourselves with ANT, the ontological stance it encompasses and its vast array of sophisticated vocabulary. We started

out broadly, with ANT as our guide for how to tell the story of how MARS has affected the organization and the implications this has had for the interactions, relationships, connections and different actors within that very same organization.

However, merely describing this event by the use of ANT terms was not our goal. Instead, we looked to other studies which had been made, both studies related to ERP systems, but also studies concerning themselves with management accounting, project development and information systems from an ANT perspective. This helped us to put our data in a context, facilitating the process of writing analysis and discussion. In addition, interview transcripts were imported into the program *f4analyse*, in which we individually name and color coded the texts into different themes. This provided us with a better overview of our empirical material and served as a powerful tool in the analysis process. The themes were created to fully capture the process from before, during and after the implementation. The common themes we had categorized the data into were: *Before Mars*, *Purpose of MARS*, *Implementation*, *post-implementation* and *Associations*. Paragraphs were occasionally categorized into more than one theme, since it could refer to more than one at once.

## 5 MARS

### 5.1 Forming the alliance

In 2011, the implementation process of a new ERP module in EngieCorp started. The new module, MARS, was to serve as a supportive tool for preparing budgets, reporting, consolidation and decision-making. It was in the light of the shortcomings with the old ways of working in Excel that MARS was presented to the European branches. MARS' interest was to: "[...] *standardize, simplify and consolidate*" (PL). The Project Leader of MARS explains why they started to develop it in the first place:

"One reason was basically to leave the old Excel and dinosaur world and replace it with a modern system. Then we could consolidate the information and control flows and so on. The other main reason was to support the business and get the sales departments to [...] use the information that we have about profit."

The interest of HQ was to automate the consolidation, support operations with better information and increase the visibility of transactions which would allow them to control the flows. These interests emerged from the limitations of Excel, as it had introduced a lot of issues in the past:

"[...] there were very large differences in the reports from different countries. Because we got, as I said, a huge file and you always had corrections - you should correct the formula in this cell like this and that, and not all countries did this or they thought they should not change it that way, so what was reported differed a lot from the actual result." (AM)

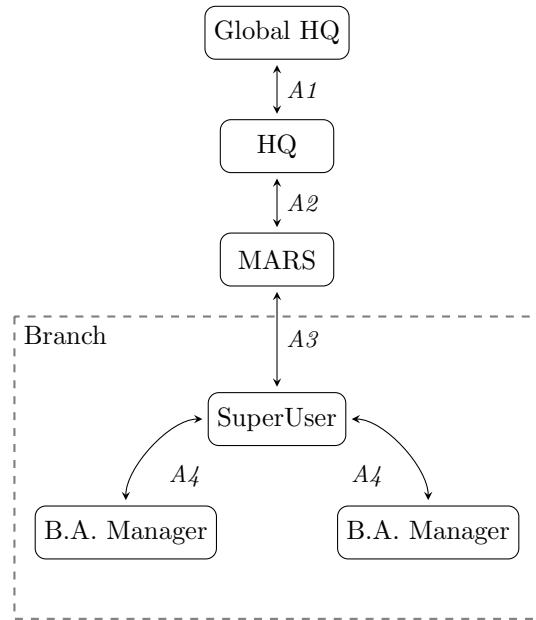
HQ wanted a new actor, MARS, which would replace Excel with all its issues and inefficiencies and meet their interests by only depicting one "reality" (see A2 in Fig. 1). As the problem had

been identified, HQ started working on the solution. They made themselves indispensable in the process through developing it on their own which allowed them to single-handedly decide upon the characteristics of MARS, and only introduced it to others later. BC explains:

”It was not a question about: would you consider this system? Is it really good for you? But rather: here you go! Live, fast! [...] so the power in its entirety resides with [HQ] in this case.”

During this problematization process, HQ identified relevant actors (see Fig. 1) and discovered the need for primary actors, namely the Super-Users, which were to be educated in the program and responsible for data input and financial reporting at each branch (see A3 in Fig. 1). As intended, the introduction of MARS was going to re-define the role of Excel. It was no longer going to be put to use, which also would re-define the role Business Area Managers as they had been preparing budgets with the help of it. Instead, budgets had to be prepared and reported in collaboration with the respective Super-User because they would have no direct access to MARS themselves (see A4 in Fig. 1). Finally, since the European (i.e. HQ’s) consolidation was going to be consolidated once more at a global level, the Global HQ had to be considered as well because information still had to be reported in a way compatible with their requirements (see A1 in Fig. 1).

**Figure 1 - Actors and associations within the MARS network**



Excel was successfully problematized, and the solution had been decided upon without the influence of identified actors. Dery et al. (2013) could in their analysis see how involving

actors in the customization of a new HR module facilitated the interessement process. In this case no actors got involved, which then potentially could hinder the interessement of these actors. However, at this point we did not notice any competing interests. As MARS was presented, AM was very positive and saw an opportunity to acquire more specific information usable in the day-to-day work and in planning ahead:

”Numbers retrieved from different systems could differ and the differences were very big when we still used Excel. [...] And when they told us about MARS, they said this would be one and the same system which would supply everyone with the same information, and you could use it for budgets and simulations all the way down to per month and per product so to speak, and that sounded very, very positive.”

BC was also positive but more restrictive: *”I thought it sounded positive, but I did however realize that these kinds of implementations are never free from issues.”* He explained the benefits of the system as:

”If you can fetch the data directly from the system you have come a long way. Then you have one source of error less and also it goes pretty much faster, work-wise. So the point of the system from the start was to [have] one source of data [...] and to have actuals and budget in the same cube, the same database - which you then can retrieve in an easy way. Then you can make your own reports [...] very easily without having to make your own special constructions. So basically the system was to make reporting faster and evaluation easier.”

The common ground of HQ, AM and BC was that they all wanted Excel to be replaced. It was referred to as a part of a *”dinosaur world”* and a source of errors and big differences. Due to all problems Excel had introduced in the past, the interests were already aligned which allowed for a smooth interessement and enrollment process. It shows through the argumentation and attitude of the actors - problems of Excel were highlighted and MARS was the key to solve them. The positive attitudes toward MARS support this as well since it could be interpreted as a positive feeling towards the association of an object. This *feelings-related valance* is according to Schiefele (1991) one of two components of interest, and since it is positive it shows that MARS interests them (i.e. their interests match). The other interests shown in the quotes can be related to the other component of interest, viz. the *value-related valance*. We can see that different actors attribute personal significance to MARS since different possibilities were emphasized by different actors (see table 2). At this point, these interests do however instantly align since they are ascribed directly to MARS, in a similar manner as expectations.

At the center of the network was the interest of replacing Excel, but it was still very reversible due to all the promises made by HQ. As it had generated new interests (or expectations), these had to be fulfilled in order to keep the network in a stable, unchallenged, state.

**Table 2 - Interests**

Actor	Interest
Business Area Manager	- Access to more detailed information - Able to simulate
Business Controller	- Faster reporting - Easier evaluations
HQ	- Faster consolidation - Visibility - Business support
MARS	- Standardize - Simplify - Consolidate
Global HQ	- Reports on time

Before MARS went live, HQ executed the education of Super-Users. They had appropriate candidates selected from the finance and accounting department at each branch by the respective financial manager. These employees were brought together and trained in using MARS. As the system went live, this education and knowledge would allow the Super-Users to protect the identity of MARS. Since these actors were supposed to be accountable for data input, and the relevance of MARS relied upon this, they had the power to either make or break the project. Actors would define MARS based on the output, and the output was dependent on the input. This marks the temporary end of the interestment and enrolment stage.

## 5.2 The rocky road to stability

In 2012, the Global HQ insisted on MARS being ready before next year's annual budget process started:

"We had to meet the budgetary process which starts in November-December. [...] And as always with system implementations, maybe we were not 100 % ready. We had to prioritize and some of the functionalities were excluded in order to meet the time criterion, you know the constraints with time, resources and quality."  
(PL)

Due to the strict time limit set by Global HQ, the functionalities of MARS had to be reduced if the project was not to breach the deadline. The main characteristic of MARS that HQ chose to push through was its ability to gather and consolidate data. However, at this point even the foundation of MARS was struggling as it suffered from speed-related issues. AM recalls that:

"[...] once it came it was very slow which made it into a big joke, everyone complained about this program. Every time [Super-Users] were supposed to upload something they went hysterical. [...] It took a very, very long time to compose

the budget due to... well it was something in the system that caused it to not work at all as it should”

Even though hardware limitations had some to do with the limited speed, the main cause turned out to be related to the infrastructure - the branch offices’ internet connection. Some office buildings had: *”[...] the same connection as I have in my living room”* (PL). This resulted in a continued use of Excel as budgets were still to be prepared in Excel but, instead of sending the file to HQ, the data was transferred from Excel to MARS by the Super-Users.

Even though HQ had decided to develop MARS themselves in order to customize it in alignment with their own interest, the Global HQ’s interest was imposed on HQ which in turn altered the short-term outcome. However, as MARS went live, this new unexpected actor (the internet connection) was the one re-defining the role of MARS and Excel. It was not enrolled in the network, since HQ had missed to identify this actor during the problematization, which resulted in the power of MARS being challenged. The internet connection did not allow for the MARS-way of reporting, but did allow for the way of Excel. This made Excel prevail as a central actor in the new network even though HQ had made promises of its disassociation.

As functionalities were reduced, the one (or two) remaining was also affecting the work of HQ the most. The consolidation had been automated which meant less work for them, but did on the other hand result in more work for AM and BC. Even though it was not in HQ’s interest to make the trade-off in the first place, not adhering to the demands of Global HQ could result in unwanted consequences:

”I remember we were late with the reporting of a budget one time. That was not very impressive - [Global HQ] was not happy then. I think I had to apologize like 300 times (haha).” (PL)

In other words, it would benefit HQ to listen to the interest of the Global HQ. Thus, HQ initially concentrated on the consolidation functionality of MARS, appealing to both themselves and Global HQ since both of their interests could be somewhat met. It did allow for faster consolidation that in turn would guarantee that reports were sent on time.

However, this came with the cost of neglecting other interests, betraying the actors who had previously been appealed by and enrolled through the coming of, for now, overlooked capabilities. Even the promised disassociation and re-definition of Excel, which was the central interest of the network, had failed. Initially, the continued use of Excel was instructed by HQ, but Business Area Managers and Super-Users extended the period of association some budget events. This can be interpreted as an objection towards MARS itself and towards HQ as Super-Users and Business Area Managers had been marginalized and seen their interests by-passed. Thus, the translation which had previously been successful in creating an alliance between the actors fell apart as Business Area Managers and Super-Users started to re-define their own roles within the network. This made the network regress to a previous state and re-opened the process of interessement and enrolment.

During 2013, HQ’s work of recruiting the offices’ internet connection succeeded. The bandwidth had been upgraded which re-defined the internet connection’s role and mobilized it in the network. It was robust enough since the physical updates induced irreversibility, as it was

highly unlikely that it would assume the previous state once again. At the end of the year, HQ had also been able to integrate the SAP database with MARS. These two occurrences both re-defined MARS and Excel once again. As the internet connection now was aligned with MARS, it did support it rather than challenge its power. It allowed it to be operated at a greater speed, which in turn would allow for faster reporting (an interest of Super-Users). It also opened up the possibility to prepare budgets in MARS without reducing efficiency, which in turn implied a reduced need for Excel. As MARS was integrated with SAP, all actual values could also be fetched by MARS itself, which also would reduce the time spent on preparing budgets.

Instead of simply offering a substitute to Excel, MARS did now meet both of the Super-Users' interests - faster reporting and faster evaluation. When the new annual budget process started in December 2013, MARS fully replaced Excel as a mean to prepare budgets. As Super-Users had seen all their interests met, without any competing translations for their allegiance to MARS, they had once again been enrolled into the network and indeed been mobilized. This also, drastically, decreased the distance between Super-Users and managers. AM explains that:

"When you are in the middle of the budgetary process you feel very vulnerable if [BC] is not there. Then I did not get anywhere [...] And I cannot do it on my own, I cannot sit and play [with MARS] myself so to speak."

Because Super-Users no longer would transfer the data from Excel sheets to MARS, Business Area Managers now had to prepare the budget in collaboration with Super-Users, directly in MARS. This cut off a lot of the ties to the old system Excel, and fulfilled the interest of disassociating it.

However, as a result of the SAP integration, how to account for items became more predetermined and detailed which reduced the leeway for Business Area Managers. This took away many of the possibilities for Branch Area Managers in the different branches to, as had been done earlier, tuck numbers away and hide them inside opaque accounting items. PL explains:

"They were rather free to report any way they wanted to since we used Excel, an old system that accepted quite a lot. [...] There was basically no internal controls for the information I reported. And that is a freedom all countries and branches had, and of course when we change that and tell them to report in a whole different way, and add this connection to SAP [in 2013], then they suddenly have to follow a predetermined mapping. [...] And that made them experience losing power, to lose the way you could hide things in. So this has opened up a whole new discussion we did not have five years ago." (PL)

The changing of working routines and shifts of dependence and power led to verbal resistance from the Business Area Managers, manifesting itself through ongoing discussions with HQ. However, they were silenced as no compromise was made. Even though it was theoretically still possible to add plugs in the budget, the preparation of it was now involving two people. Since the Super-Users had been mobilized, they were also now in a perfect position to protect the identity of MARS, which made it hard for Business Area Managers to object through action. This was because, ultimately Business Area Managers had to report numbers and figures on a regular basis and the only way to do it was through MARS. HQ's interest (to



standardize) did once again prevail over managers', which let HQ enjoy what they had hoped to accomplish:

"[...] we can control in a completely different way, we can get a discussion about the reality. Not the story they want to tell." (PL)

At this point, MARS had almost all of its interests met (see table 3), but the *ability to simulate* was still not supported and some aspects of *simplify* were not yet sufficient. It did allow for easier preparation, consolidation and evaluation of budgets and actuals, but it was still not efficient in creating *accessible information* for the operational side, i.e. the Business Area Managers. Even though more specific information could be retrieved, it was only available through requesting it from the respective Super-User. However, due to the integral role of the Super-Users and the gateway they had become for Business Area Managers to simply conduct routinely job-tasks, the network found itself in a stable state. Arguably, at this time also the managers were enrolled and mobilized as they were being 'locked' into place by the Super-Users. However, they had not openly 'accepted' their roles ascribed to them by HQ. Rather, they were still resistant, but their resistance had been suppressed and for now they had no way for immediate retaliation.

**Table 3 - Interests met**

Actor	Interest met
Business Area Manager	- (Access to more detailed information) - <del>Able to simulate</del>
Business Controller	- Faster reporting - Easier evaluations
HQ	- Faster consolidation - Visibility - <del>Business support</del>
MARS	- Standardize - (Simplify) - Consolidate
Global HQ	- Reports on time

### 5.3 Post stability

At the end of 2014 HQ had finally checked off enough marks on their list of priorities to allow MARS to be supplemented with a new, long sought after, feature for increased business support:

"It enables the user to enter a price card for each of their products and that is the part that enables us to do some simulation on profitability. [...] It was not available from the beginning. And it was... I think it truly marked the point

where this system represented a real added value to the operational side, the business side. It was useful before for reporting purposes, but [...] the benefits were quite limited and they were limited to the budget.” (BA)

The capability could be seen as a device of intersement which would encourage the use of MARS and align the interest of Business Area Managers and HQ further. As the new capability introduced itself, the setting changed to look more like the one originally proposed by HQ during the problematization phase. The Business Area Managers who had previously seen their interests being bypassed, gotten silenced and were told to be patient suddenly found themselves in a position where they were being listened to.

Even though MARS was now more or less aligned with the initial interest of Business Area Managers, this did not make for quite the breakthrough that HQ had hoped for. The Business Analyst believes that in some aspects MARS’ reputation was stained in the eyes of Business Area Managers and that this has led them to not actively participate to a very great extent in recent development of MARS.

”We get most of the resistance from the business side and sometimes it means that they are not involving themselves as much as they should [...] They simply do not believe that MARS can deliver something that is reliable” (BA)

Needless to say, the Business Area Managers were still not convinced about MARS. It seems like being silenced and forcefully ‘locked’ had altered their interest (as stated in table 2 and 3) since they did not act accordingly. The functionalities now provided were not fully utilized and when told to give opinions and feedback for improvements, the Business Area Managers objected with the same tactic as they previously had been subjected to - silence. Re-defining roles of previously silenced actors became harder than originally planned for. Business Area Managers had previously been forced into place within the network, and to transform that into voluntarily accepting their roles did not fully work. To a certain degree, Business Area Managers now had the possibility to object through action, which they did (i.e. not fully utilizing the function and not providing feedback). Through rejecting this once wanted ability, the interests of HQ (i.e. providing business support) could not be completely met as MARS was not actually supporting the business. Due to this, and because managers no longer could be completely forced into place, the network could not be considered mobilized anymore. Ironically, the very action that once brought stability to the network, silencing, was what made the network less irreversible and now ultimately destabilized it. In effect, whatever stability gained from silencing turned out to be of just temporary nature.

”[...] we make new releases every quarter. We add functionality and quite strictly implement it and educate people regarding this new functionality.” (PL)

Further, what the above also suggests is that an implementation does not simply end with stability. Rather, the translation process is something that continuously advances and regresses because of the complexity of the ERP landscape: unexpected actors introduce themselves, new updates are implemented, functionalities do not work as intended, formerly regressed actors object, etc. The translation process does not just end abruptly, no matter if it is a success or failure, but are continuous and leap between the different ‘moments’ of translation. We do not consider the current state of matters the ending of this story, even though it was

four years ago since MARS went live. The plans for the future with MARS do involve rather big changes, with individual interfaces as the next major change on the agenda.

”[...] our vision is that Super-Users do not need to compose budgets, instead that will only belong to the business side [...]” (PL)

In other words, the role of Business Area Managers will become even more central in the future. However, as managers are to be granted access to the system directly (and responsible for data input), the entire network could fail if they are not recruited as an ally by then.

## 6 Discussion

Our analysis shows that the intentions for, and consequences of, implementing MARS are in line with previous research in the organizational impact strand. We found that, just as Spathis and Constantinides (2004) found, incentives to develop and implement ERP systems were to integrate the business, acquire better quality data and improve decision support. Likewise, the effects of the implementation in our case are similar to those found by Chen (2012), namely a reduction in menial tasks such as data filing, data compilation and time spent for preparation as well as an increase in capability for financial analysis. Although the aforementioned studies apply a positivistic research paradigm while ours does not, and while it would be hard to generalize based on the findings of a single case study, we still argue that this makes for an interesting finding due to the time-span between the different studies.

Some ANT studies explain the construction of black boxes by opening them up and tracing the process backwards (Justesen & Mouritsen, 2011). This involves a notion of stability (Dechow & Mouritsen, 2005), as the translation process is perceived as something *”[...] ending up with the black-boxing of the network as stable and robust from which actors cannot escape”* (Dery et al., 2013, p.235-236). However, our study could show that even though networks stabilize, it is not this stable and robust construction mentioned above, which is granted by so many (Preston, 1992; Dugdale, 2002; Dery et al., 2006a; Moon, 2007; Ifinedo et al., 2010; Haddara & Zach, 2011). On the contrary, it turned out to only be a temporary state. In other words, the translation process does not just abruptly end after it succeeds or fails. This finding suggests that the translation process is not a set timeline starting with problematization and ending with mobilization, rather the different moments of translation described in Callon (1984) can all be seen to be in constant flux where roles are defined and re-defined continuously. However, we do not claim that Callon (1984) intended or even advocated that translation should be seen as a linear process leading to stability, but suggest that the process is continuous. We suggest this because MARS never received the status of an undisputed fact or an unproblematic object and could thus never be completely black-boxed (Latour, 1986).

Closely related to the above are the ever changing circumstances that were a recurring phenomenon during our study. Even when the study came to an end, more changes were to come. Due to the fact that we applied ANT, and did not stop once stability was achieved in contrast to other studies (see previous paragraph), we were able to not only see how Business Area Managers were restricted and silenced in order to achieve stability, but also how the

very same actors later found a way to retaliate through low utilization and omittance of feedback. Because we did not stop, we can now contribute with one explanation to why an ERP landscape does not fully or truly stabilize. Since human actors have the ability to feel and remember, forcing them into a role and consequently silencing them could destabilize the network.

Human actors' ability to feel, i.e. their emotions, could alter their interest. In our case, it did appear to alter their feelings related valences and in turn their value related valences, i.e. Business Area Managers' interests changed during the translation as an effect of HQ's treatment. Further, because they have the ability to remember, they might act according to their new interest once given the opportunity. Business Area Managers did this in our study as their role became increasingly central when they were supposed to utilize MARS more. When this opportunity was provided, it also hindered the interest of HQ and MARS to be met, which did make the network regress to a previous stage in the translation process (i.e. destabilize). Thus, silencing actors might prove fruitful in achieving a short term irreversible effect such as *making* a decision or successfully *deliver a project on time*, but should be considered with caution when applied to a process which is prone to change: especially if the silenced actors are also the end-users.

What previous research has shown is that user perception (Abdinnour & Saeed, 2015) often decrease post-implementation as compared with pre implementation (Bhattacharjee & Premkumar, 2004). It has been explained by a gap between functionality and what is needed in the organization, initial unrealistic expectations or change resistance from users (Soh & Sia, 2005; Wei et al., 2005; Kim & Kankanhalli, 2009). As Business Area Managers went from a positive to negative attitude towards MARS and did not utilize it as planned, their user perception can be interpreted as decreasing. Hence, the explanations above may apply and not be a cause of HQ's behavior. However, we argue our finding suggests one explanation as to why user resistance may rise in the first place, which in turn then would reduce the user perception.

Even though the meaning of user resistance is rather straightforward, why it occurs is not. Markus (1983) describes it as an interaction between the technical and the social, which can be seen when the power distribution changes within an organization due to the implementation of a system. Resistance can then emerge when this redistribution results in a loss of power. Because of the application of ANT, we did study these interactions and redistributions. In turn, we could see how the Business Area Managers' loss of power was due to technological changes and HQ's treatment, which strengthens our argument about our finding serving as one explanation to user resistance. In other words, silencing a user can result in user resistance. This is a relevant finding because user resistance has been described as a prominent reason for failure and there still is a gap of knowledge in how information system resistance originates for decision making (Kim & Kankanhalli, 2009).

Also, we can see how our study can be compared to the findings of Bob-Jones et al. (2008) where the project was deemed a success by top management but not by the marginalized end-users and to Trkman and Trkman (2014) where although a successful implementation, the system was followed by low levels of later use. However, what distinguishes the study of Trkman and Trkman (2014) from ours and that of Bob-Jones et al. (2008) is the size of the implementation and the redistribution of power that follows. In the case of Trkman

and Trkman (2014), the implementation concerned merely a website and not an ERP system which in turn meant that the changes were not as grand as in the other two studies. Also, in Trkman and Trkman (2014) no significant signs of power redistribution is shown which could further help to answer why the network was kept in alignment. On the contrary, Bob-Jones et al. (2008) describes a situation where decentralized control (which in the university setting had been built up over centuries) was transformed into more centralized control. This meant that power which had been inscribed into local university barons now had lost its meaning. This observation is more in line with what we found in our study as we could see how managers were restricted, stripped of power and silenced in order to achieve stability. Thus, it is possible that the smallness of the implementation stands in direct correlation to the ease of aligning the network as the size of the implementation ought to have an impact on the degree to which power is redistributed.

Further, our analysis shows how the influence of users was deemed more important post-implementation than before. The user influence in the development of MARS was close to nonexistent, but users showed positive attitudes towards MARS during this period anyway. Later, they were still not allowed any influence as HQ did not compromise, but that resulted in user resistance. Hence, it seems like user influence is critical post implementation but not as important pre and during the implementation. One explanation to this could be that as long as the concerned actors felt that their interests were being met, there was little need for influence. However, as soon as the interests fail to be met, the urge for change is born. If then change (to ascertain one's own interest is being met) is denied, the lack of influence will cause resistance. When this logic is applied it would indicate that it is not necessarily the maturity of the ERP system per se that determines the importance of user influence, but rather the nature of the changes to come. However, to complicate matters further, the maturity of the ERP system may in turn also influence the nature of changes.

Ram et al. (2013) argued that CSFs do not work in a vacuum, isolated from other CSFs, but are interdependent. It means that for instance some factors important to the pre and during implementation phase might have an influence on factors decisive for the post-implementation phase. Even though this implies that user influence still could be important in earlier phases as well, it does not change the fact that user influence is important post implementation. However, that being said, it is still possible that user influence has the ability to influence other factors such as acceptance, understanding and knowledge of the system which could foster a sense of inclusion among the participants. In turn, if the managers had been allowed influence to a greater degree, it is possible that this had positively affected their feelings and value related valences as they were being involved in the projects and had the ability to better understand it and thus reap benefits from it in a whole new way. Consequently, just as silencing had a negative effect on these valences which resulted in resistance, inclusion could have had the opposite effect which could have stimulated an environment of collective understanding and problem-solving. This line of reasoning is in line with Dery et al. (2013) who could show how the involvement of users during the early stages of an ERP module facilitated the process of interestment.

## 7 Concluding remarks

The purpose of this study was to investigate how the social and the technical system of an ERP landscape interact post-implementation, and to answer how this network achieves and loses stability. Our single case study demonstrates some interesting and important contributions adding to the literature of ANT as well as the CSF strand within ERP research. We accomplished this by applying ANT and adopting its indiscriminating view on humans and non-humans, rich vocabulary and powerful ability to trace interactions.

We found that the network never truly stabilized because the translation process did not just abruptly end after reaching mobilization, rather it is a circular notion in constant flux. Stability was at one point achieved under the circumstances of forcefully locking and consequently silencing actors whose interests were not yet met. However, as we did not end our study once stability was achieved, we could show how this was just momentarily as the translation that led the network to stability soon reverted to a previous stage. The reason for this turned out to be the continuous technological changes post-implementation and because the interests of locked and silenced actors changed.

When technology changes, but not in conformity with the expectations of human actors (i.e. value related valances cannot be fulfilled), objections and the will to influence may arise. Hence, technology can alter the social as human actors wish to be granted more power or reclaim lost power. However, technological change was not the reason that the interests changed. These actors were consequently silenced and forcefully locked into place within the network by HQ which, because they were human, altered their feelings related valances and in turn their value related valances. In other words, their interests changed due to how they were treated and the fact that they had emotions. When this is combined with the human actors' ability to remember and in turn retaliate, it adds a dimension which non-human actors lack. Further, this could imply that if the original translation fails, the process up to re-mobilization could prove even more burdensome due to the human actors' recollection of previous events. As for ANT research in general, this would imply that studying a phenomenon and its success expressed as the degree to which the translation process is successful might prove futile if not its impact on irreversibility is also considered.

Our paper also contributes to the CSFs literature by highlighting the importance of looking beyond the implementation as, in grand, implementation CSFs have been prioritized. Instead, we argue that our study shows the importance of not only *delivering* the project, but rather *maintaining* the project in a satisfactory manner. This is especially important since the ERP landscape does not enter a stable and constant state when the system has been implemented, but continues to change. Also, the majority of the project's life-cycle is not made up by its implementation stage but rather its post-implementation stage, making this more interesting to organizations. We could see how user influence was deemed important in the post-implementation, as it led to user resistance when HQ did not accommodate with respect to the issues raised. Interestingly enough, even though users had no influence in the development and design of the system, it was met with positive attitudes. Our explanation to this is simple: when the actors concerned feel that their interests are being met, user influence is of lesser importance. However, when things start to change in a way detrimental to their interests, the will to protect the interests appears and user influence importance rises.

## 7.1 Implications for theory

In terms of scientific implications it is our argument that this study has several for both ANT and CSF literature. As for ANT, we claim that our study shows that being too preoccupied with achieving mobilization can be an uninspired task due to the elusiveness of the translation process. Although mobilization has once been achieved, this does not mean that the network will stay mobilized forever or even for very long. Thus, it is not always achieving mobilization that is the key to success. We argue that, to some degree, the cost of achieving this mobility could be proxied by the irreversibility of the network where a high cost would equate to a low degree of irreversibility. The implications of this is that the translation process should not be viewed as a process of linearity with the ultimate goal of achieving mobilization. Instead, all the actions undertaken and all the choices made in the name of mobilization during the different moments of translation will have an impact on the irreversibility of the network and consequently its durability.

Our study has implications for CSF research as well. We found that influence was deemed more important to users post-implementation than pre-implementation. As such, neglecting the wills of end-users post-implementation could result in a lack of usage and hence hinder long-term success. Since the criticalness appeared to be changing, at least if one disregard eventual interdependencies, this finding also support the view earlier presented that CSFs do change with changes in technology. Hence, technology has the potential to alter the social. The CSF research has with its implementation focus been too shortsighted and made a successful implementation the number one priority. When success is determined so early on, stability is assumed to follow. What we could show was that this not the case, which in turn questions the criticalness of these factors. They may be important for the delivery of the project, which is an important part, but to us it seems that the post-delivery part is even more so important, especially for organizations. This because the implementation itself makes up for only a fraction of the time the adopting company is tied to the system. Thus, it is our belief that the CSF literature stands much to gain from a shift away from a narrow implementation focus in favor for a more holistic view.

## 7.2 Implications for practice

Due to previous studies often telling the tale of either a successful or less so implementation it is our meaning that this paper has important implications for practice as it highlights the difficulties with creating and especially maintaining an aligned network around a project such as this. For managers of varying hierarchical levels our study implies that, in terms of project delivery, full alignment of the network is not necessarily a must. However, if the implementation makes up for but a fraction of the project's life-cycle, neglection, discrimination or silencing of actors during the implementation might have severe consequences for its future success. In turn, this means that, which ever so often is the case, constraints regarding money and time intended to guide the project might deter it rather than support it as it fails to account for how silencing might cause resistance and consequently affect future usage. Thus, a reason for why so many ERP and IS projects fail (Krumbholz et al.,2000; Zhang et

al., 2005) could be found in the shortsightedness of management only focusing on project delivery and not project sustainability.

Our study suggest that it is, as seen during the problematization phase, better to align proactively than reactively and to convince or seduce rather than to coerce. Proactivity seems especially favorable since research has found later maintenance of the system to not be positively correlated with an increase in use (Peslak et al. 2008), indicating that once employees have decided to not use the system, it might prove hard to regain their interest by improving it. This is reflected in our findings as well where Super-Users who were given training and education in the system, made aware of its benefits and given centrality (convinced) were much easier aligned and kept aligned as opposed to managers who were coerced.

Another implication of the study is that many of the previously established success factors which has been deemed critical are perhaps not fully critical when seen from a full life-cycle perspective. Arguably the criticality of such factors is subjective and contingent on the intent of management. However, if the intent is to implement an ERP system or similar, caution should be considered when applying importance in accordance with previous studies. On the contrary, practitioner might want to assign a greater deal of importance to factors which are more closely related to the later stages of the project's life-cycle and has a greater impact on the actual usage of the system or at least implementation factors which have an influence on post-implementation factors.

To summarize, we urge practitioner to carefully evaluate: how the real value of the system is not generated during the implementation but rather after it has gone live; how silencing or discrimination of actors (especially end-users) might have to be paid a-plenty at a later stage; and how guidance from previous and contemporary CSF literature often fails to account for the post-implementation viability of the system.

### 7.3 Limitations

Our paper can be seen to have several limitations. Firstly, the study was conducted in the form of a single case study which in turn makes it hard to generalize about the findings. It is also possible that, although we tried to start without any preconceptions, the results are biased. Not only because in the end it is up to us to interpret the respondents, but also due to the fact that some questions related to events which occurred several years back in time. Because the respondents' answers then are based on simple recollection, it is possible that they might have been biased. Our study also concerned a large multi-national company, but due to time and resource restrictions we were forced to limit ourselves to interviewing a certain number of unique respondents (4). It is possible that a smaller company where we had the ability to capture a greater portion of the actors would have made the findings more representative. In addition, our data was solely based on interviews as no observations were conducted. The utilization of both interviews and observations would have been ideal as it would have let us better capture the complex dynamics and micro-decisions among actors. In turn it would also have allowed us to see two perspectives, our own perspective from the observations and the perspective of actors based on the interviews.



## 7.4 Further research

Apart from our already stated implication for practice and theory we can see how our study gives rise to new and interesting avenues for further research. In our case, silencing had a dual role where it in one instance allowed for stability but in another caused destabilization. Thus, further research could investigate how and if technology stabilizes under different conditions other than silencing and whether these conditions instill a lengthier stability or not.

We also suggest further research on how human and non-human actors relate to each other. It is evident in our study that human actors have additional dimensions that made them more sensitive and harder to keep aligned. Because of this we call for more research on this matter that could increase the understanding of how the meaning of ERP systems is not only granted, but also changes.

Our study also proposes a relationship between the size of the implementation, the redistribution of power and the ease at which the network is aligned. However, more research is needed in order to investigate this proposed relationship further. This could for instance be done by comparing smaller projects to larger ERP projects, the hierarchical consequences of the project and the perception of its outcome. Such studies could for instance take factors such as company size or level of multi-nationality into account and investigate if distance between actors is an impeding factors in facilitating network alignment. Kim & Kankanhalli (2009) states that there is still a gap in how information system resistance originates in decision making. We found one possible explanation for this to be the silencing of actors. However, the area still deserves more attention and we urge future research to narrow this gap.

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