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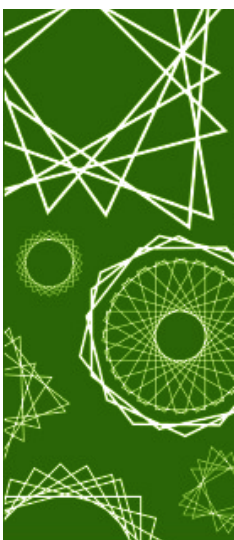

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Version Transitioning of Enterprise Systems in Software Ecosystems: A Grounded Theory Approach

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This paper presents an emerging theory of version transitioning from an old to a new version of a pre-packaged enterprise system among consultant companies in a software ecosystem. The emerging theory proposes the key categories of Perceiving, Pushing, Implementing, and Increased experience as stages in the transition process, and the categories of Technology impact, Supplier impact, Customer impact, Strategy impact, and Market impact as key contextual categories impacting the transition process. The emerging theory proposes an iterative nature of the transition process in which each stage in the process is undergone multiple times by the consultant companies. The integration of the emerging theory with existing adoption and diffusion theories provides an initial step towards a formal theory of version transitioning in software ecosystems.

1. Introduction

While early implementations of enterprise systems in the '80s and '90s relied on development by a software vendor to fit the individual company, pre-packaged enterprise systems have now become dominant within the past decade [1]. In tandem, the delivery model of enterprise systems is increasingly evolving from two-party (vendor-customer) configurations to loosely coupled networks [2], also referred to as software ecosystems [3].

These ecosystems typically consist of a vendor, also referred to as a keystone [4] or a hub [5], which develops the core of the enterprise system, and a number of partners, also referred to as niche players [4], or spokes [5], who deliver a range of products and services complementing the core system delivered by the vendor [6]. Among the services delivered by the players in an ecosystem is consultancy on the implementation of the enterprise system at the customer organisation which includes solving problems, offering related and required knowledge, assisting with configuration, and deriving value from the enterprise system package [7]. The implementation consultants performing these services are thus an important part of the ecosystem, and previous research suggests that having competent implementation consultants is among the critical success factors for successful implementation of enterprise systems [8, 9].

Furthermore, the inter-linked nature of ecosystems suggests that the success of adoption of innovations in the ecosystems is dependent on adoption of all actors in the ecosystem rather than adoption at any single actor [4]. Previous research has addressed multiple perspectives of enterprise software ecosystems, including the motivation for forming the partnerships [2], coupling and control [5, 10], value creation [6], and competitive advantage [11; Anonymous, 2011].

However, not much research has addressed the process of adoption of new versions of enterprise systems packages released by the vendor into the ecosystems, which precedes the implementation of enterprise systems in customer organisations. Therefore, this paper investigates the transition to a new version of a pre-packaged enterprise system in an ecosystem of a large software vendor for the purpose of uncovering the paths in the transition process from the perspective of the implementation consultants.

The paper is structured as follows: 1) background presentation of the research setting; 2) methodology of the research; 3) the emerging theory; 4) the emerging theory in the context of the research; 5) discussion of the findings and theoretical integration; 6) conclusions; and 7) implications for practice and future research.

2. Background of the research setting

The enterprise system vendor in the study is a major global player in the market for enterprise systems. The vendor followed the consolidation of the enterprise systems market in the early 2000's [12] and acquired a number of enterprise system solutions resulting in a portfolio of systems primarily targeted at small and medium enterprises (SMEs). The vendor releases a new major version of its enterprise systems approx. every 2-3 years, and so-called service packs with bug fixes and

other improvements are sometimes released in-between the major releases. The particular enterprise system in vendor's portfolio included in this study has gone through six major releases.

The vendor sells and implements the enterprise system only through an ecosystem of partner companies, and the partner companies thus handle all implementations in customer organisations. The partner companies can broadly be categorised into two different types: Independent Software Vendors (ISVs) and Value Added Resellers (VARs).

The ISVs develop reusable software modules for the enterprise system, called 'add-ons'. There are several hundred add-ons available that complement the core enterprise system in areas ranging from generic horizontal functions such as payroll, online banking, and shipping to specialized vertical solutions such as education, veterinary medicine, legal companies, and furniture manufacturing.

Any individual or community with a developer license can extend the enterprise system and develop add-ons, but only add-ons that are developed by certified partners and have undergone quality assurance are listed as official add-ons on the vendor's website. The vast majority of add-ons are thus developed by certified ISV partners. Nearly all implementations in customer organisations include one or several add-ons to complement the core enterprise system package. The business model of the ISVs is thus to sell licenses for the add-ons to customers through the VARs, who in turn get a share of the license fee.

The consultants at the VAR companies take on the implementation of the pre-packaged enterprise system at the customers. The consultants make customisations to the enterprise systems by request from the customers but, unlike the ISVs, the customisations are customer specific and seldom reused across different customers. The VARs generate the majority of their revenue from invoicing the time spent on implementation and customisation, and only a smaller part of their revenue is generated from getting a part of the license fee. On a typical implementation of the enterprise system only 1-2 consultants are involved, depending on the amount of customisation needed. Some of the partner companies have characteristics of both an ISV and a VAR, meaning that they develop reusable add-ons which they sell to VARs, and they have a staff of consultants implementing the enterprise system together with the add-ons from themselves. Figure 1 illustrates the different value chain paths of the players in the ecosystem.

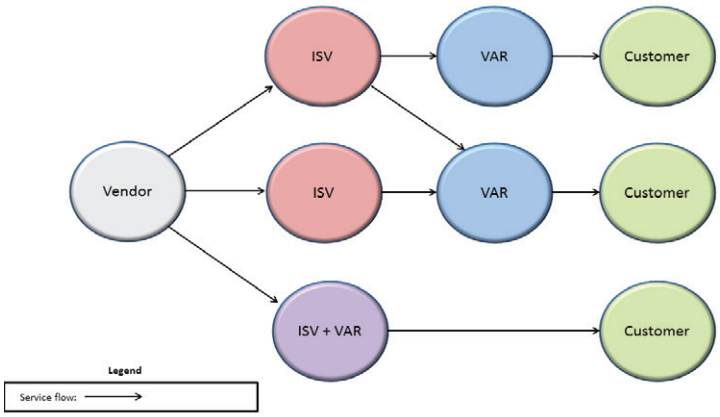

Figure 1 - Value chain of the software ecosystem

3. Methodology

The study was carried out using a Grounded Theory approach [13] as the frame for data collection and analysis. Grounded Theory is a 'data centric' inductive methodology for analysing (primarily qualitative) data for the purpose of building or extending theory [14], and the method has been evolved and applied to multiple research studies in the field of information systems [15].

The method stands out from many other research methods by emphasising that researchers rid themselves of theoretical pre-conceptions about the area of inquiry and that theory should emerge from the data – not through deduction or hypothesis testing [16]. The substance of this tenet has fuelled debate, not only among researchers using the method, but also between the two founders of the method, concerning the risk of forcing theory from the data instead of allowing the theory to emerge [17]. The details of this debate is beyond the scope of this paper, but the implications forces a stance on the use of existing theoretical literature in the study. The approach to existing literature in this study was a 'middle of the road' approach, where a general orientation within the literature of adoption of technology and diffusion of innovations was present prior to the analysis of the data, but no pre-existing theoretical constructs were forced on the data. A detailed comparison with existing literature was not conducted until after the emerging theory was present.

Urquhart et al. [18] provides five guidelines for conducting Grounded Theory in the IS field: Constant comparison; Iterative conceptualisation; Theoretical sampling; Scaling up; and Theoretical integration. Besides providing a guide and support for IS researchers embarking on conducting Grounded Theory, the five guidelines also explicate the essence of the method.

Constant comparison is the process of constantly comparing instances of data to a particular concept or category for the purpose of exposing theoretical properties of the concepts and categories. This guideline was followed by constantly comparing all the coded instances of data to other coded instances of data.

Iterative conceptualisation suggests that researchers should increase the level of abstraction and relate categories to each other to expose the different relationships between theoretical constructs. This should be done through the process of theoretical coding [19], or axial coding [14]. This guideline was

followed by going through several iterations of the coding process, resulting in the same instance of data being re-coded several times in the iterative process of splitting and merging codes. Furthermore, theoretical memos were written as the analysis progressed and the memos were used for generating theoretical codes used for coding the data and for relating the codes to each other.

Theoretical sampling stresses the importance of deciding on analytical grounds where to sample from as the research progresses [20]. This approach helps saturate the categories of the emerging theory and ensures that the theory is actually grounded in the data [21]. This guideline had a significant impact on the research, as agreements with interviewees and consulting companies could not be made prior to initiating the research study, but had to be established as the data analysis played out. Furthermore, the data for the study was collected from respondents in companies of various roles in the ecosystem, different sizes, and with various degrees of experience with the new version of the enterprise system.

The guideline of Scaling up proposes the grouping of higher level concepts into broader themes to help escape the descriptive level of analysis and help contributing to the generalizability of the emerging theory. This process was aided by extensive use of the theoretical memos and by iteratively visualising the emerging theory through the use of diagrams in order to reach a substantive theory rather than mere description.

Theoretical integration calls for integration of the developed substantive theory with other theories in the same or similar fields in order to create a formal theory [22] that extends beyond the substantive area in which the theory originally emerged. In this study the substantive theory was related to other theories within and outside the IS field by reviewing literature on theory addressing adoption of technology and diffusion of innovations.

3.1. Data collection

Three types of data were collected and analysed as part of the research: Documents; observations; and interviews. Documents, primarily from the vendor, were used in the beginning of the study for gaining background information about the new version and to gain insight into the documented differences between the old and the new version.

Two types of observations were made during the study. The first type consisted of participatory observations [23] where the observing researcher participated in three presentations and four workshops with consultants concerning the new version. The second type of observations came from in-depth experimenting with a demo version of the new version of the enterprise system, provided by the vendor.

All interviews conducted in the research were semi-structured [24] with the initial interview guides being explorative and open-ended, but as the research progressed, the interview guides became more focused on saturating the emerging categories, and thus varied significantly from the initial interview guides. 12 interviews with consultants and managers in the partner companies in the ecosystem were carried out as part of the research. Additionally, two interviews with representatives from the vendor were conducted for three reasons: First, to provide the background information on the ecosystem; second, to saturate concepts and categories based on the principle of theoretical sampling; and finally, to triangulate statements from the interviews with the consultants. A total of 14 face-to-face interviews were carried out between December 2008 and March 2011. Each interview lasted approx. one hour on average, and all interviews were recorded and fully transcribed to allow detailed coding of the data. An overview of the conducted interviews is shown in Table 1. Due to reasons of non-disclosure agreements, the country in which the study was conducted is not revealed, and the names of the vendor, partner companies, and respondents are replaced by aliases.

Company alias	No. of employees	Company type	Interviewee title
Partner 1	28	ISV + VAR	CIO
Partner 2	1100 global/250 local	VAR	Unit Manager
Partner 3	50	VAR	Consultant
Partner 4	14	VAR	Chief Consultant
Partner 5	1	VAR	Consultant
Partner 6	39000 global/250 local	ISV + VAR	Product Manager
Partner 7	50	VAR	Chief Consultant
Partner 8	180	ISV + VAR	Consultant
Partner 9	1800 global/80 local	VAR	Product Manager Consultant
Partner 10	23	ISV	CEO Product Manager
Vendor	90000 global/1000 local	Vendor	Product Marketing Manager Partner Technology Advisor

Table 1 – Participating companies in the study

3.2. Data analysis

In following the guideline of iterative conceptualisation, the analysis of the data began after the first two interviews were

conducted with the consultant in Partner 3 and the CEO of Partner 10. The interviews were analysed using open, axial, and selective coding [14] and the coding process was aided by the use of the ATLAS.ti software [25]. Open coding consisted of conceptualising the text in the 246 pages of transcripts of the interviews on a line-by-line basis by marking each line, or occasionally a few words, and assigning a particular concept to that piece of data. While during the stage of open coding, theoretical memos were written to stimulate theoretical sensitivity. The process proceeded to the phase of axial coding in which the concepts were grouped into categories and the concepts and categories were related to each other, resulting in a total of 41 concepts in three categories. Finally, the phase of selective coding entailed the selection of core categories to which other categories and concepts were related. After the first iteration of coding, the concepts and categories were far from saturated and many new questions arose.

The collection and analysis of the remaining 12 interviews focused on saturating and extending the concepts and categories by selecting companies and interviewees based on the guideline of theoretical sampling. A non-sequential iteration of open, axial, and selective coding continued through the remaining analysis, and by the end of the final iteration of coding, more than a thousand instances of data had been coded into 22 overall concepts in 9 categories, and numerous theoretical memos of various lengths had been written through the coding process. The final concepts and categories included in the emerging theory were discussed with other researchers to improve reliability of the study [26]. The appendix shows the distribution of concepts across categories along with examples of coded data that led to the concepts.

4. The emerging theory

The theory emerging from the analysis of the study revolves around the version transitioning that the consultants go through, as illustrated Figure 2. The figure shows the categories and concepts emerging through the analysis of the study and how they interact with each other, and depicts the paths through the transition process that the consultants go through

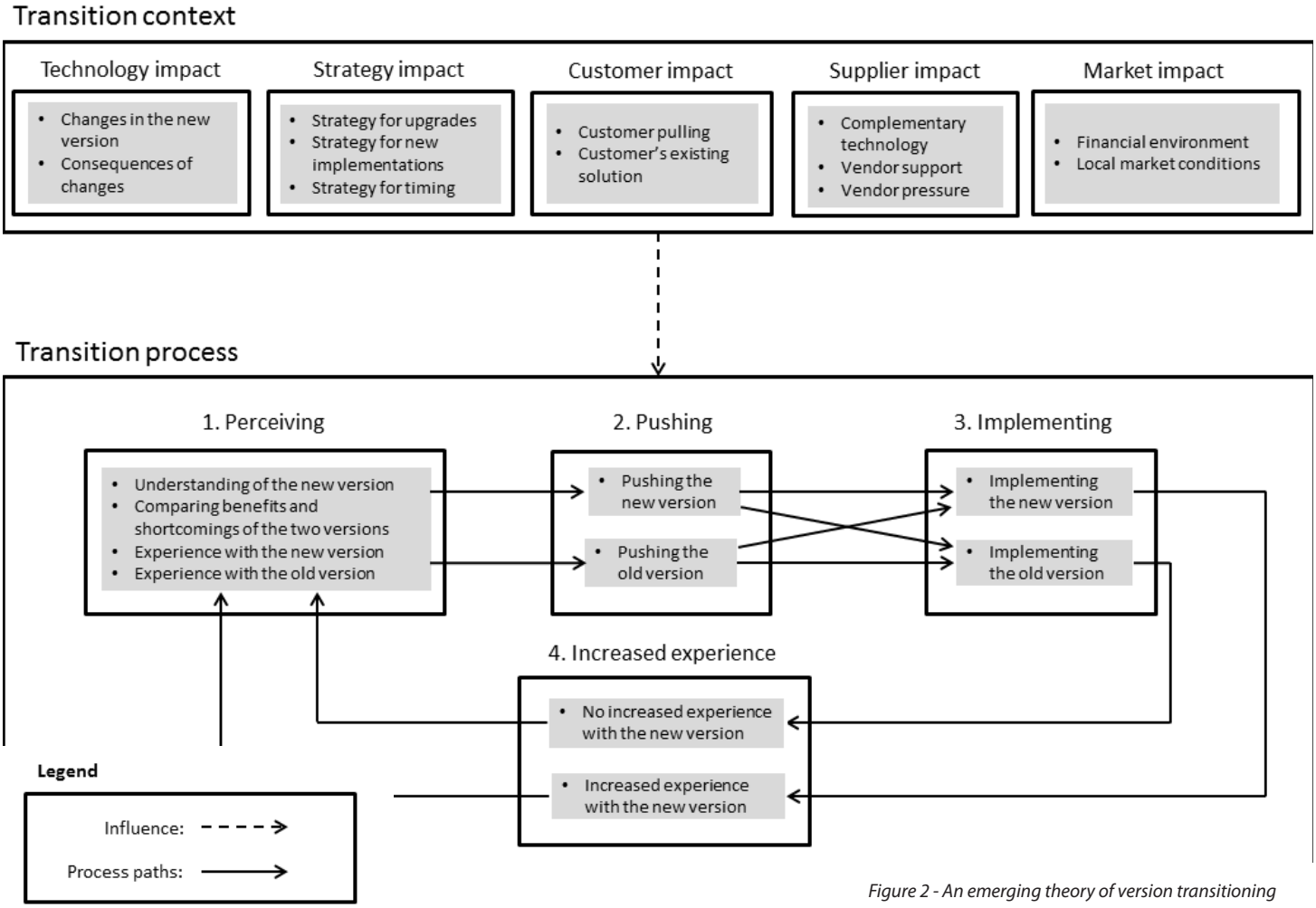

Figure 2 - An emerging theory of version transitioning

every time they are faced with the prospect of selling an implementation of the pre-packaged enterprise system (lower part of Figure 2), and the transition context that influences the process, (upper part of Figure 2). The presented categories and concepts are not proposed as being exhaustive, and only the most central and saturated concepts are presented. In the text describing the emerging theory, both concepts and categories are typeset using italics but only categories have their first letter capitalised.

4.1. The transition process

The process of transitioning to implement a new version begins with the category of Perceiving (stage 1). The category includes the concept of an understanding of the new version in which the consultants attempt to understand the changes that have been made in the new version of the pre-packaged enterprise system as compared to the old version. The concept of understanding of the new version is closely tied to the concept of comparing benefits and shortcomings of the two versions in which the consultants compare advantages of one version over the other in different areas. The concepts of experience with the old version and experience with the new version conceptualise the consultants' experience with implementing the two versions respectively.

When the consultants face the prospect of selling an upgrade or a new implementation to a customer, the Pushing (stage 2) is initiated. At this stage the consultants are either pushing the new version or pushing the old version when discussing implementation with the customer, depending on the outcome of the Perceiving stage.

Once the customer has decided which of the two versions to buy, the process moves to Implementing (stage 3) in which the consultants are either implementing the new version or implementing the old version for the customer. Even though the consultants push one of the two versions at the Pushing stage, the customer may still decide not to follow the push from the consultants. The paths from the Pushing stage to the Implementing stage may thus cross, as illustrated by the crossing of the paths in Figure 2.

Once the implementation is carried out, the consultants go through the stage of Increased experience (stage 4). If the consultants were implementing the new version in the Implementing stage, increased experience with the new version is gained, which in turn influences the Perceiving stage at the concept of experience with the new version. If the old version is implemented, no increased experience with the new version is gained and no influence is exercised on the Perceiving stage. On the other hand, if the consultants were implementing the old version in the Implementing stage, experience with the old version is gained and the Perceiving stage is influenced at the level of experience with the old version, causing pushing the old version at the Pushing stage.

4.2. The transition context

The transition process is influenced by a number of contextual categories. The category Technology impact contains concepts related to the impact of the technology of the new and the old version on the transition process. The concept of changes in new version refers to the changes in the technology of the new version in itself, such as architecture and hardware requirements compared to the old version. The consequences of changes refer to the derived consequences of the technological changes, such as increased cost of implementation or speed of implementation.

The category of Supplier impact reflects influences from the other players in the ecosystem, the vendor and the ISVs, on the transition process of the consultants in the VAR companies. Complementary technology conceptualises the impact relating to the dependence on compatible add-ons of the core enterprise system package. The category also includes the concept of vendor support, such as providing formal training for the consultants, service packs, and documentation of the new version. The concept of vendor pressure reflects the pressure communicated by the vendor in an effort to persuade the consultants to start selling the new version.

Strategy impact includes the concepts related to the strategies applied by the consultants, which influences the transition process. The concept of strategy for upgrades refers to the strategy imposed by the consultants when selling to existing customers that already have a previous version of the enterprise system, and the strategy for new implementations refers to the strategy for selling to new customers with another enterprise system or no enterprise system at all. Another central concept of the Strategy impact is the strategy for timing concerning at what point in time, after a new version is released, the consultants will initially consider selling it to customers.

The Customer impact category groups concepts relating to the customers' influence on the transition process. The concept of the customer's existing solution denotes any existing solution that a customer may have. The concept influences the transition process, e.g. through the Pushing category by determining which of the two versions the consultants try to push. The customers also form and express perceptions of the new and the old version conceptualised as customer pulling for one of the two versions, potentially influencing the paths of the transition process from the Pushing stage to the Implementing stage, as previously explained in the section on the transition process.

The final category influencing the transition process is Market impact containing the concepts financial environment and

local market. Financial environment reflects influence of the financial climate at any time of the transition process, and local market conceptualises conditions in the local market that may impact the transition process.

5. The emerging theory in the research context

In the following section, the categories of the emerging theory and their interaction are discussed in detail in the context of the research from which they emerged. In order to provide insight into the context for the transition process, the categories of the transition context (upper part of Figure 2) are addressed first and second the categories of the transition process (lower part of Figure 2).

5.1. Technology impact

5.1.1. Changes in the new version The new major version of the pre-packaged enterprise system studied here was launched in late 2008. The changes and additions in the new version included, among other things, a new the front-end client with a new user interface, a change in the keyboard shortcuts, a change in the way of generating and developing customised reports, and the possibility of using a different software development tool compared to the old version. Closely linked to the new front-end client was a change from a two-tier to a three-tier architecture, entailing a requirement for a new database server if the new front-end client was going to be implemented. The new version maintained the possibility of running the old front-end client from the previous version on the new version alongside the new front-end client, although the vendor announced that from the next version this possibility would be discontinued. The first release of the new version had a number of stability issues and lacked some keyboard shortcuts. To remedy these shortcomings the vendor released a service pack in the autumn of 2009.

5.1.2. Consequences of changes When addressing the consequences of the changes in the new version, some consultants suggested that the new version was more expensive to implement due the higher license fees and higher hardware requirements of the new architecture: "The new server requirement is probably one of the biggest barriers for the new version, because the old server was free." (CIO – Partner 1).

The change in shortcuts was also pointed out as a major change between the two versions by many consultants: "From the very first versions I have known, postings have always been control-F5. It has never been otherwise in any version. Now it is suddenly completely different, so the change in the shortcuts is major", said Consultant – Partner 9.

However, the largest consequence of the change between the two versions was attributed to the new front-end client. Many consultants even pointed out that the change to the new front-end client was one of the largest between any two versions in the history of the enterprise system: "It was a shift in paradigm when we went from DOS to Windows. This is a bigger change", said Product Manager – Partner 9.

5.2. Strategy impact

5.2.1. Strategy for upgrades The partners in the ecosystem expressed different transition strategies as being suitable for selling a new implementation to a new customer respectively selling an upgrade to an existing customer. Some of the consultants feared the new front-end client would be difficult for existing customers and end-users to adjust to: "Unless they were new customers we didn't recommend [the new front-end client]. We did implement the new version but not with [the new front-end client]." (Consultants – Partner 8). Others saw the new front-end client as an opportunity for the existing users to replace previous customisations of the interface, made by the consultants, with the users' own personalisation. Some of the consultants also emphasised the importance of the first implementation of the new version being at an existing customer: "Know your customer. It is very important when you make a transition of technology at this level that you know your customer" (Unit Manager – Partner 2).

5.2.2. Strategy for new implementations The new front-end client was generally perceived as easier for new customers to adjust to: "[The new customers] are ready for change. They know that they have to adjust to a new user interface", said Consultant – Partner 8, and Consultant – Partner 9 added that: "Many new users think [the new front-end client] looks good".

The issue of new versus existing customers was intensified by the vendor advising that the new front-end client should only be sold to new customers while existing customers should keep the old front-end client when upgrading to the new version. "When you as a consultant hear that they [the vendor] only recommend it to new customers how much do you really believe in it then? […] I think that announcement has pushed the whole thing by a full year." says CIO – Partner 1.

5.2.3. Strategy for timing "Every consultant says "no thanks" every time something new comes along […]. Very few [of our consultants] go with the first release of a new version. Let the others take the beating first and then we join in later", says Chief Consultant - Partner 7, as an example of a strategy of beginning to sell the new version to customers late. The vendor's Product Marketing Manager confirms that this is a strategy of many consultants: "[The consultants] are very conservative. They stick to what they know", and elaborates that many of the owners of the smaller consulting companies are close to retirement and do not want to make the investments to carry out the version transitioning. Other consultants had a transition

strategy of making the version transitioning as early as possible: "I am always in favour of implementing the newest version, if it makes sense for the customer" (Consultant – Partner 5).

The issues with the first release of the new version were also frequently mentioned as a reason for late transition timing: "We said, we don't want to touch [the first release] and so we waited for the first service pack. When that came we evaluated it and found that now it was working and then we could begin to move existing customers [to the new version]", said Consultant – Partner 8. Finally, the difficulties of understanding the technological changes in the new version were perceived as a cause for late transition timing by some respondents.

5.3. Customer impact

5.3.1. Customers pulling Even when the consultants did not feel completely ready for implementing the new version, some of the customers still had a positive impression of it, and asked that the consultants implemented the new version instead of the old: "It was actually the customer that asked for [the new front-end client]. I was not ready to implement it yet because i did not feel I had a complete overview of how to do it, so I just had to catch up" (Consultant – Partner 8). At other times the customer chose the old version over the new, even when the consultants were pushing for the new version.

5.3.2. Customer's existing solution As described above in the section about Strategies for upgrades, the strategies deployed by the partners were different when selling a solution to an old compared to a new customer. This entailed that the customer's existing solution became an import concept in the transition process of the new version, especially since most customers already had an existing solution: "They always have something", said Product Manager – Partner 9.The partners also explained that the existing solution was also generally used as reference when implementing a new version: "[The customer's] existing solution fulfils an existing need that we also fulfil with the new version. You cannot implement a new version that does not fulfil that need", said CEO – Partner 10. Moreover, the frequent occurrence of customized implementations entailed that upgrading from previous versions to the new version of the system required considerable consultant resources to ensure that customer specific customizations would be compatible with the new version.

5.4. Supplier impact

5.4.1. Complementary technology As the new version of the core enterprise system package in the study included substantial changes to the architecture and a new front-end client, some of the frequently used add-ons were not fully upgraded to work with all aspects of the new version before late 2010, nearly two years after the new version was released.

The vendor's Product Marketing Manager and many of the consultants explained that regardless of the customer type nearly all implementations included one or more add-ons to complement the core package: "I cannot imagine carrying out an implementation without any add-ons" (Unit Manager – Partner 2). This was especially the case for vertically specialised customers but also more horizontally oriented customers, such as small trade companies, required a number of add-ons, such as payroll and online banking, in order for the solution to meet their requirements. This entailed that the consultants were dependent on the ISVs to deliver new versions of the add-ons that were compatible with the new version of the core package: "One of the major factors in this has been that some of the add-ons we always implement when we are selling have not been ready for [the new front-end client]. And many of the add-ons have only been ready within the past three months so we have not been able to deliver the solutions we wanted", said Product Manager – Partner 6.

The ISVs in turn were depending on the vendor to deliver documentation for the code and executable code before being able to upgrade the add-ons: "[The ISVs] have been waiting for some fundamental elements from [the vendor]" says Unit Manager – Partner 2, linking the concept of complementary technology to the concept of vendor support.

The ISVs also appeared to be driven by a demand from the VARs before they began to upgrade their solutions: "There is no doubt that the ISVs have massive expenses associated with this transition […] they are very demand driven, so when we ask for [an upgrade of an add-on] they evaluate it carefully if they haven't already [upgraded it]" (Unit Manager – Partner 2).

5.4.2. Vendor support The vendor supported the transition from the old to the new version in a number of ways. First, the vendor provided service packs which included updates and technical fixes for the new version. Second, the vendor offered a vast amount of documentation in the form of white papers, web casts, blogs, and implementation guidance for supporting the various steps in the implementation process of the enterprise system. The vendor also provided formal training and certification for the consultants, aimed at explaining the new features and underlying technology of the new version.

Finally, the vendor ran a number of projects together with key ISVs and VARs prior to the release of every major version. The projects were primarily aimed at testing the new version in a real-world customer company. However, for the partner companies it also served as an opportunity for testing the new version before it was released, while simultaneously getting special support from the vendor.

In addition to the regular projects, the vendor also organised a special workshop for six selected consulting companies 14 months after the initial release of the new version, specifically aimed at explaining the potential benefits of the new front-end client: "Then we participated in [the workshop]where we

went more in-depth with the ideas and that was really an eye-opener. The ideas are extremely well-thought, but extremely poorly communicated to the consultants." says CIO – Partner 1.

5.4.3. Vendor pressure The vendor applied a lot of pressure on the consultants to make the transition to the new version: "[We] push a lot for things to change – perhaps too much. They feel stressed and then they rely on what they know." says the vendor's Product Marketing Manager. However, some of the consultants also indicated that the pressure from the vendor was necessary in order for the ecosystem to speed up the transition.

firmed by documentation. The consultants also suggested that the local market was somewhat saturated, meaning that most implementations were either upgrades of existing customers with an older version or customers that had another enterprise system.

In summarising the contextual impact on the transition process of the consultants in the study, Table 2 illustrates the distribution of the expressed barriers and enablers. Note that pressure from the vendor is categorised as both a barrier and an enabler, as findings from the study indicated this as both hindering and enabling the transition process.

Contextual categories	Barriers	Enablers
Technology impact	Poor stability Changed keyboard shortcuts Higher license fees Increased hardware requirements Poor fit between existing users and new front-end client	New front-end client was "future proof" New front-end client appeals to new customers and users Less need for customisation of user interface
Supplier impact	Pressure from the vendor Lack of add-on compatibility	Pressure from the vendor Support from the vendor
Customer impact	Pull for old version Pull for new version with old client	Pull for new version
Market conditions	Financial crisis Saturated market	Market leadership

Table 2 – Barriers and enablers of transition to the new version

5.5. Market impact

5.5.1. Financial environment Some respondents pointed out that the financial environment had a substantial impact on the transition from the old to the new version: "There is no doubt that the timing has been bad, because right after the release, the financial crisis came crashing down and that means that none of the consultant companies has been willing to make the required investments in training and so they cling to the old version because they know they can make some money on that […] I don't think we would have made the investment [in upgrading the add-ons] if we had begun half a year later.", said CEO – Partner 10, referring to their participation in one of the vendors projects prior to the initial release.

5.5.2. Local market conditions "[In other countries] the product does not have the same market share as it does here. [In our local market] any company that considers acquiring an enterprise system will consider [our products]. They may not end up buying them but the will consider them. So we do not have to put up big posters in the airport like many others have to", said the vendor's Product Marketing Manager, indicating a market leadership in the local market, which was also con-

5.6. Perceiving

This section describes the stages of the transition process of the emerging theory in the context of the research study and exemplifies the contextual impact on the transition process.

5.6.1. Understanding the new version The initial understanding of the new version was hard for some of the consultants: "It is rather complicated to get [the new version] running and it is something we have never done before, because the whole technology is different." says Product Manager – Partner 9. Especially the changes in the new front-end client caused a great deal of difficulties in understanding: "It is a new technology and a new way of thinking" (Product Manager – Partner10).

5.6.2. Comparing benefits and shortcomings of the two versions The benefits expressed by the consultants were primarily related to the increased usability of the new front-end client in terms of possibilities of personalisation for the individual user: "The users can put their personal touch on [the new front-end client] to achieve the approach that is best for them and that part is really cool", explained CEO – Partner 10, and the consultants generally perceived the new front-end client as more "future-proof" that the old client: "It is the only way to

go. The [old front-end client] is old in the worst kind of way. It is just not up to date on how you do things today. That goes for the technical aspects as well as the usability. You cannot display a graph in the old client. I mean, we are talking 2010 and you cannot display a graph. What is going on?" said Product Manager – Partner 9.

Many respondents pointed out that the development of reports was easier in the old version: "We have had a report generator that all consultants are world champions in using. Then [the vendor] decided that when you run the [new front-end client] you have to use this new technology […] and that part should have been done differently" (Product Manager – Partner 6). The conversion of old reports to fit the new version was also perceived as a challenge: "One thing is that it takes a long time but is also extremely boring. Nobody wants to do it. It really has to be an emergency before I do it", said Product Manager – Partner 9.

Finally, all the consultants explained that the stability issues and bugs in the first release of the new version had significant negative impact on the transition: "The first release should never have been released because it was straight out unusable." (Product Manager – Partner 6).

5.6.3. Experience with the new version The experience with the new version was limited for many of the consultants: "Even though we have been working with the new version since 2007, we still have more experience with the old version" explained Product Manager – Partner 10. The consultants also pointed out that experience with implementing the new version entailed a more positive perception of it: "Once I get [the new version] under my skin then I think it will be fantastic. So if the customers are buying from me, then they will get [the new version]" (Consultant – Partner 5).

5.6.4. Experience with the old version Many of the consultants in the ecosystem had substantial experience with implementing previous versions of the pre-packaged enterprise system: "Many of the consultants have been in the business for 20-25 years", explained the vendor's Product Marketing Manager. The consultants pointed out that regardless of which version was implemented, it typically took in excess of two years before a new consultant had in depth experience of how to implement the system. The extensive experience with the old version and the lack of experience with the new version caused many of the consultants to push for implementing the old version at the customers.

5.7. Pushing

5.7.1. Pushing the new version During the study, several examples were found of partners pushing the new version to the customer: "So we asked [the customer] if they were interested in [the new version]. […] So I would not say it was the customer that initiated it. We initiated it and convinced them", said Consultant – Partner 3.

5.7.2. Pushing the old version The respondents explained that when the customers ended up choosing the old version it was often due to a push from the consultants: "I don't believe it is the customers that choose the [old front-end client]. It is the partners. And when we are under pressure we do the same thing. We say, let us start out with [the old front-end client] and then we can switch over to [the new front-end client] later[…] If [the customers] had a 100% free choice then I think they would always choose [the new front-end client]. It is definitely the partners that push the old one to the customers and then promise them that they can upgrade later. And we all know that is probably not going to happen once you have begun the implementation", said CEO – Partner 10. The Product manager of Partner 9 also confirmed that they were driven by a demand for the new version rather than pushing it: "We are driven by customers asking for [the new version]" (Product Manager – Partner 9).

5.8. Implementing

5.8.1. Implementing the new version Some of the implementations did result in a the new version with the new front-end client being implemented: "[The customer] was in the process of implementing the new version with the old client but then they saw [the new front-end client] and did not want to have the old one implemented" said Chief Consultant – Partner 4.

5.8.2. Implementing the old version The partners explained that the push for the new version did not always result in the new version being implemented and when it did, it often did not include the new front-end client. The vendor's Product Marketing Manager supported this impression by explaining that one year after the new version was released, only very few customers' had purchased a license for the new front-end client.

5.9. Increased experience

5.9.1. No increased experience with the new version The respondents stressed that if the consultants did not implement the new version they could not gain any experience with it: "They are not world champions when they are done with [the training courses] because you only become that through working with practical cases and it is only customer implementations which gives that" (Product Manager – Partner 6). Due to various contextual factors, little new experience was gained when the old version was implemented at a customer: "[…] when you have done 50 implementations [of the old version] then there is not much new" (Chief Consultant – Partner 7).

5.9.2. Increased experience with the new version The consultants explained that the first couple of implementations with the new version gave them a significant increase in experience: "We knew this was new territory but also that this is the way the wind is blowing. So it was an option for us for getting to know [the new version]. And we succeed with it through blood, sweat, and tears and gained experience", says Chief Consultant – Partner 3, when referring to his first participation in an implementation of the new version.

6. Discussion of findings

The findings from the study indicates that poor stability of the first release of the new version, and other barriers associated with the technology of the new version, were some of the main barriers for transition of the new version among the implementation consultants in the ecosystem. Many consultants considered the first release too unstable to implement in customer organisations, and thus the ISVs had little incentive to upgrade their add-ons to be compatible with the new version. When the service pack was released by the vendor and the new version was considered mature enough to implement, the lack of upgraded add-ons was evidently perceived as a barrier, causing inertia in the version transitioning. The study thus illuminates some of the challenges of software ecosystems in respect to transitioning to a new version of a pre-packaged enterprise system by highlighting the dependence on complementary technology, in the form of add-ons, in order for the consultants to deliver a complete solution of the enterprise system package to the customer. The findings thus support the importance of addressing business strategies from a network perspective rather that looking at individual companies in isolation [27].

The influence of increased experience on the Perceiving stage of the transition process suggests a reinforcing effect in the transition process once initial experience is gained with implementing the new version. The crossing paths in the transition process between the stages of Pushing and Implementing (see Figure 2) further indicate that the customer's pull for one of the two versions can change the pursued transition paths of the consultants, hence enabling or hindering the transition to the new version of an enterprise system. The findings are thus consistent with previous suggestions that neither a technology-push nor a customer-pull perspective in isolation is sufficient for understanding adoption and diffusion of innovations [28]. Instead, a more integrated perspective is needed. To reach such an integrated perspective the guideline of theoretical integration in the Grounded Theory methodology may help integrating the emerging substantive theory with existing diffusion theories as an initial step towards creating formal theory [13].

6.1. Integrating the emerging theory

Previous research on adoption of innovations has addressed the stages in the adoption process of innovations. The adoption process in diffusion theories has been conceptualised differently by different researchers, but a particularly useful approach for integrating the transition process may be the two-stage adoption process of Initiation and Implementation as suggested by various authors [29-31]. In this view, the Initiation stage consists of activities related to perception, information gathering, and attitude formation leading to the decision to adopt, and the Implementation stage consists of events and actions pertaining to modifications in both the innovation itself and the organisation and utilisation of the innovation [29]. The emerging theory of version transitioning from the research thus resembles both of these aspects, in that the categories of Perceiving and Pushing are comparable to the Initiation stage and the Implementing category is comparable to the Implementation stage.

Integrating the transition process part of the emerging theory with the stages of Initiation and Implementation may thus provide an appropriate lens through which to scale up the emerging theory and reach a higher level of generalisation. As described above, the first three of the four stages in the emerging theory are readily comparable to the stages of Initiation and Implementation. However, the stage of Increased experience in the emerging theory falls between the categories in the two-stage conceptualisation. Preserving the relationship between Increased experience and the grounded categories of Implementing and Perceiving, the integrated theory suggests iteration between the categories of Initiation and Implementation, as illustrated in Figure 3.

While the transition process stages of the emerging theory may thus be integrated with innovation adoption stages in existing diffusion theories, the context categories of the emerging theory should be compared to contextual, rather than processl, factors from existing theories. Existing diffusion theories suggest a number of contextual factors that may enable or inhibit the diffusion process. While several of these contextual factors may be comparable to the contextual factors of the emerging theory of version transitioning, Orlikowski's [32] study of adoption of CASE tools as a process of organisational change may be particularly suited for theoretical integration with the contextual factors of the emerging theory.

Orlikowski proposes three contextual categories which influences adoption and use: IS Context, Organisational Context, and Environmental Context. Integrating the contextual categories of the emerging theory with these contextual categories provides a suitable foundation for integrating the theory and generalising the context categories. In this perspective the categories of Supplier impact, Customer impact and Market

impact can be compared with the Environmental Context, the category of Strategy impact with the Organisational Context, and Technology impact with the IS Context, all of which influence the adoption stages. Furthermore, Orlikowski (ibid.) also proposes that the contextual categories themselves are influenced by the adoption process as it progresses as depicted in Figure 3.

Although the purpose of theoretical integration in the Grounded Theory methodology is not to apply the integrated theory back to the data set from which parts of the theory emerged, the integrated theory of version transitioning has more explanatory power compared to the emerging theory. First, the division of the transition process categories into Initiation and Implementation provides distinction between the "planning" activities (Initiation) in which the consultants, often prior to the release of the new version, would form a perception and strategize about the transition to the new version and the "action" activities (Implementation) in which the strategy for transition to the new version would be executed and subsequently revised based on increased experience. Second, extension of the emerging theory with the reciprocal relationship between process and context fits and extends the emerging theory to assist in understanding of the mutual influence on the players in the ecosystem, including the push/pull configuration between the VARs and the ISVs in regards to development of compatible add-ons and the mutual influence between VARs and their customers in regards to selection of the new or the old version. Finally, the division of the contextual categories of the emerging theory into Environmental, Organisational, and IS context provides a clearer view of which overall areas the contextual categories of the emerging theory are attributable to, which, in turn, provides general indications for if and how the categories can be influenced by the actors in the ecosystem.

7. Conclusions

The study of transition from an old to a new version of an enterprise system in an ecosystem context has provided an opportunity for theorizing about the transition process that partner companies undergo, and the contextual factors that influence and are influenced by the transition process. The emerging theory thus provides us with initial understanding of how actors in software ecosystems experience enterprise system version transitioning, and also illustrates the substantial effect the phenomenon has on the consultant companies in the ecosystem. The emerging theory suggests the transition process is an iterative process in which the actors repeat each stage in the process multiple times before the transition is complete, as opposed to traditional adoption theory in which the stages are only undergone once by each adopter for a particular innovation [30]. Although the introduction of a new version of a an enterprise system in the ecosystem will eventually lead to the discontinuation of the old version, the process resembles that of a gradual transition rather than adoption at one particular point in time, and aligns with the perspective that "as innovation develops and diffuses, learning occurs; the old and the new exist concurrently, and over time these are linked together" [33].

8. Implications for practice and future research

The research presented in this paper suggests that managers in software vendor companies orchestrating ecosystems indeed need to pay close attention to the dependencies on complementary technology in software ecosystems. Just as important, the interconnectedness of players in the ecosystem also entails that there is little gain in releasing inferior or unstable releases of new versions in the expectation that bugs and shortcomings can be fixed along the way, as rejection in any part of the ecosystem causes a barrier for transition in other parts. Finally, managers and consultants should consider the reinforcing effect of experience gained from implementing new versions of pre-packaged enterprise systems as indication of the value of facilitating trial of implementations through,

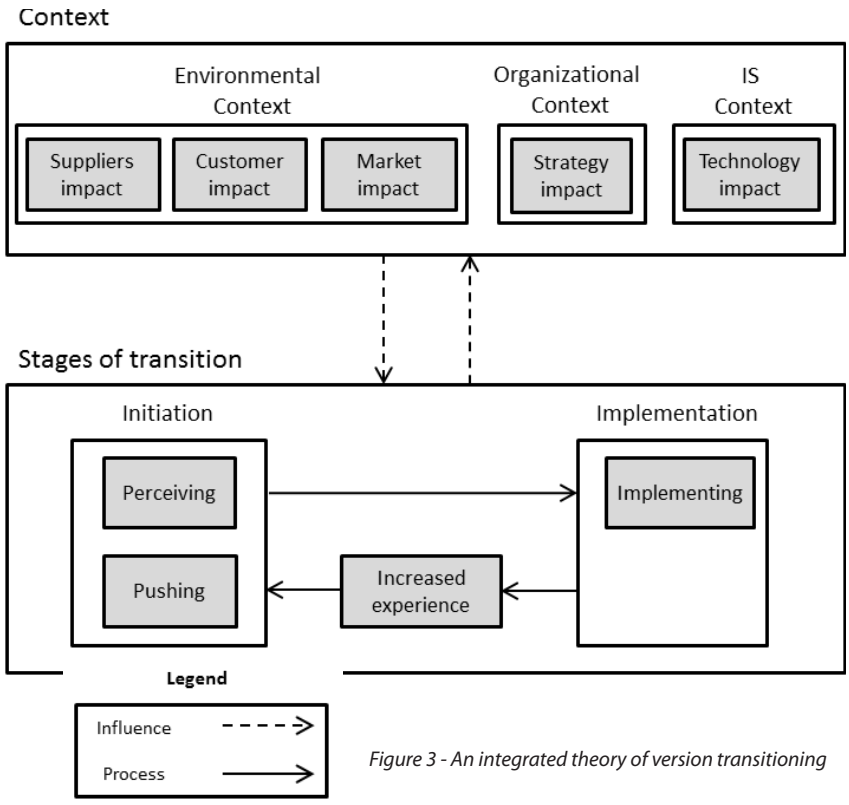

Figure 3 - An integrated theory of version transitioning

e.g. wider investment in formal adoption programs and influencing of potential early adopters among customers.

The inherent limitations of building theory from the study of transition of a single new version in a single ecosystem suggest that future research should look into version transitioning and adoption in other software ecosystems. Version transitioning in other types of ecosystems with different configurations of actors should be investigated to further extend the current integration of the emerging theory into a more generalizable formal theory. Furthermore, the research presented in this paper leaves room for future studies of the effects of supporting the simultaneous use of two different front-end clients on the same version of an enterprise system as a means of allowing partial and even more gradual transition to a new version. Finally, the ambiguous findings of the effects of vendor pressure on the transition process suggest further research in this area. Future studies may thus benefit from a holistic network perspective on the influence applied by the different actors in software ecosystems.

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10. Appendix

Transition process		
Categories	Concepts	Examples of data from the study
Perceiving	Understanding of the new version	"It is seriously a different way of thinking"(Product Manager – Partner 10) "You have to understand the concept of [the new version] to see the point" (CIO – Partner 1)
	Comparing benefits and shortcomings of the new version	"Much of the key functionality from [the old version] was not there" (Product Manager – Partner 6) "[The new reporting tool] has some tools that are much smarter than the old reports" (Consultant – Partner 3)
	Experience with the new version	"I only have experience from one implementation" (Consultant – Partner 3) "It was very new to me" (Chief Consultant – Partner 7)
	Experience with the old version	"[…] and I had much experience with the old version […]" (Consultant – Partner 5) "[…] the classic version that we are used to […]" (Product Manager – Partner 6)
Pushing	Pushing the new version	"So we asked [the customer] if they felt like trying out [the new version]" (Consultant – Partner 3) "[…] and that convinced them" (Unit Manager – Partner 2)
	Pushing the old version	"The are many that offer the old version" (Product Manager – Partner 6) "[The new version] was not interesting for us to try to push […]" (Consultant – Partner 8)
Implementing	Implementing the new version	"We have actually carried out a relatively large project of [the new version] where 30 users got [the new version]"(Chief Consultant – Partner 4) "The is not doubt that when you are implementing [the new version] then […] "(CEO – Partner 10)
	Implementing the old version	"I was once in an implementation of [the old version]…" (Consultant - Partner 5)
Increased experience	Increased experience with the new version	"So we got our pilot project and a lot of experience" (Chief consultant – Partner 4) "Part of implementing [the new version] at the customer is also a matter of training for us […]" (Unit Manager – Partner 2)
	No increased experience with the new version	"[…] when you have done 50 implementations [of the old version] before, then there is not much new" (Chief Consultants – Partner 7) "[…] most of it you do not get "into the spine" unless you do implementations [of the new version]" (Consultant – Partner 9).
Context		
Categories	Concepts	Examples of data from the study
Technology impact	Changes in the new version	"The change in the keyboard shortcuts is huge" (Product Manager – Partner 9 "[The vendor] chose to use a new technology for the reports in the new version" (Product Manager – Partner 6)
	Consequences of changes	"Developing a report [in the new version] takes longer than in the old version" (CEO – Partner 10) "It takes half a day to install the old version in the new it takes at least three days" (Consultant – Partner 9)
Supplier impact	Complementary technology	"One of the major factors in this is the [compatibility] of the add-ons we always offer in the implementation" (Product Manager – Partner 6) "That is a little special about our business because we nearly always use add-ons for both payroll and online banking" (Consultant – Partner 8)
	Vendor support	"I think the information [the vendor] provided was OK. They put up some good examples on blogs…" (Chief Consultant – Partner 4) "[…] also in relation to the attention we get from [the vendor]" (CIO – Partner 1)

	Vendor pressure	"We pressure, pressure, pressure the partners" (Product Marketing Manager – Vendor) "[…] in order to keep a certain status with [the vendor]" Product Manager – Partner 6)
Customer impact	Customers pull	"[…] so it was actually the customer that asked for [the new version]" (Consultant – Partner 8) "The customer would not implement the old version" (Chief Consultant – Partner 4)
	Customer's existing solution	"Their current system[…]" (CEO – Partner 10) "[…] and because the system they had was out dated […]" (Consultant - Partner 8)
Strategy impact	Strategy for timing	"We want to be on the newest technology" (Unit Manager – Partner 2) "Only very few go with the first release" (Chief Consultant – Partner 7)
	Strategy for new implementations	"We have had the approach with selling to the new customers" (CIO – Partner 1) "All new implementations are [the new version]" Unit Manager (Partner 3)
	Strategy for upgrades	"Most of the times where we implement the new version are new implementations" (Product Manager – Partner 9) "Whether we recommend existing customers to upgrade is a totally different matter" (Chief Consultant – Partner 7)
Market impact	Financial environment	"There is no doubt that the timing in the market has been very unfortunate" (CEO – Partner 10) "[…] but then the financial crisis struck and now it is on hold" (Chief Consultant – Partner 7)
	Local market conditions	"Because [the local market] is so small […]" (CIO – Partner 1) "[…] and perhaps that is because of [the local market] and the wide spread of [the enterprise system]" (Unit Manager – Partner 2)

Keywords:
Grounded theory, enterprise systems, software ecosystems, implementation consultants, adoption, diffusion of innovations

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A Process Management Perspective on Future ERP System Development in the Financial Service Sector

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Most organizations use Enterprise Resource Planning (ERP) systems, which provide a platform for integrating processes and data. Even though competitive pressure forces financial service organizations to permanently improve their business processes, there is a lack of research regarding the use of ERP systems within financial services. Focusing on the insurance sector, we are interested in current and potential process management issues with regard to ERP systems. We examine strategic IT trends by conducting semi-structured expert interviews with participants in IT-strategic decision making. We present current trends and identify two main issues: the IT-independent management of processes and the need to engage in service-oriented architecture (SOA). From a practitioners' view, the use of ERP systems has to be considered critically in the insurance sector. Further research on the identified issues has to take into account the sector-specific characteristics.

1. Introduction

Enterprise resource planning (ERP) systems provide a platform for integrating processes and data [10]. Most organizations use ERP systems, regardless of whether it is a manufacturing or service organization [7]. Only few articles are concerned with ERP systems in particular sectors and we are not aware of articles regarding ERP systems especially within the insurance sector (cf. [28, 1]). Research within the service sector reveals different applications of ERP systems compared to, for instance, the manufacturing sector [7]. Regarding information system activities, the observed sector may play an important role [9] and empirical research in the financial service sector is considered especially interesting [36].

A general issue of ERP systems implementation is the organizations' choice to customize systems or adapt to generic processes [19, 10]. Furthermore, competitive pressure forces financial service organizations to permanently improve their business processes [16]. Business process management (BPM) provides an established basis for process improvement. Researchers' and practitioners' interest in BPM has been increasing for decades, resulting in several standards [25] and process management maturity models [32]. A challenge for BPM with regard to ERP systems is providing a fit between the system and continuously changing business processes. Considering the increasing usage of ERP systems in the financial service sector and the need for continuous process improvement, we state the following research question:

How will current and potential process management issues evolve with regard to ERP systems in the financial service sector?

Due to the particularity of financial services as the most highly regulated sector [34], we focus on the insurance sector. We conducted 15 semi-structured expert interviews [12] with participants in IT-strategic decision making. The main contribution of our study is twofold. First, we present the current maturity of ERP systems and BPM in the examined organizations. The maturity assessment provides the basis for interpreting the results within the insurance sector and to identify gaps

and dependencies in the use of ERP systems and BPM. Second, to answer our research question, we provide current strategic IT trends and their impact on ERP systems and BPM, identifying current and potential management issues.

Section 2 provides the applied definitions of ERP systems and BPM and presents research and characteristics of the financial service sector. In Section 3, we present our research method and the study's context. Section 4 provides our findings. First, we present the organizations' maturity regarding ERP systems and BPM. Second, we provide the strategic IT trends in the examined organizations. In Section 5, we discuss our findings in the context of the insurance sector and provide the study's limitation and opportunities for further research. We conclude the article with a short overview of the main results and the contribution for practice and research.

2. Theoretical background

2.1. Derivation of applied definitions

Table 1 shows the definitions of ERP systems and BPM applied in our study. We used these definitions in order to provide a basic common understanding while avoiding limitations on specific aspects. We asked all participants for questions or comments regarding the definitions.

ERP systems are commercial software packages enabling data integration across an organization [15, 10]. Furthermore, ERP systems are defined as enterprise-wide (standard) software systems to integrate and optimize transactions and core business processes across several functions [1, 19]. Because standard ERP systems lack specific functions for the service sector [7], we explicitly broadened the definition of [19] to non-standardized, that is, individual ERP systems.

BPM is concerned with the efficient management of business processes and their continuous improvement [35], providing a set of structured methods and technologies [2]. Current research provides an extensive overview of several BPM standards across the phases of the BPM lifecycle [25] and several BPM maturity models exist to assess organizations' maturities and provide guidance for their improvement [32]. Our applied definition focuses on the continuous improvement of processes across the BPM lifecycle [35] emphasizing the iterative and incremental approach to demarcate BPM from business process reengineering [25].

ERP system	An enterprise resource planning system is an integrated software for supporting main processes and important administrative functions in an organization.
BPM	Business process management is concerned with the iterative and incremental optimization of business processes. The optimization of business processes is represented in a continuous lifecycle. The lifecycle encompasses the process analysis or diagnosis, process design, process enactment, and continuous control.

Table 1. Applied definitions

2.2. Related research in the financial service sector

Information systems activities and the use of ERP systems differ across sectors (cf. [9, 7]) as well as the requirements and skills regarding BPM [5]. Hence, within financial services, the sector specific characteristics have to be considered. Although there is much research regarding ERP systems (e.g., [1, 14]) and BPM (e.g., [25, 32]), research combining these topics in the financial service sector, especially in the insurance sector, is scarce.

Insurance companies are highly information-intensive [3] underlying several regulations [6]. An issue regarding BPM in service organizations is the difficulty to precisely define the deliverance of the service which poses a challenge on ERP implementation as well [7]. Depending on the provided products' complexity, extensive training is necessary to explain the products to the customer [6]. According to the framework of [22], we consider insurance services as expert services with a high customer interaction and a high number of configurational choices, which additionally impede service (process) definition.

Highly regulated sectors face the challenge of providing transparency through reporting [30, 24]. The financial service sector, as the most highly regulated industry [34], with a continuing trend towards increasing regulation [4], has to conform to several directives posing additional requirements on information systems [23]. Furthermore, financial service organizations have numerous legal partners and need detailed information for operative and strategic operations [7]. Regarding insurance organizations, for instance, the directive 'Solvency II', likely coming into effect in 2014, demands increased transparency to guard insurance organizations and their customers against various economic risks [11]. Thus, insurance providers will face new requirements to deliver necessary reports and already prepare for the upcoming requirements (e.g., [20]).

To assess the future development of ERP systems from a process management perspective, we first need a basis to assess the current maturity of ERP systems and BPM in the insurance sector. The sector-specific maturity assessment is necessary since – for instance, regarding BPM – different sectors are at different maturity levels [5]. Based on the current situation of an organization and its specific capabilities, maturity models help to guide necessary improvements to arrive at a mature state or maturity level, respectively (cf. [32]). Our approach to maturity assessment is described in Section 4.1.

3. Research Approach

We conducted 15 semi-structured expert interviews [12] between September 2011 and January 2012 to understand the IT-strategic challenges within the examined organizations. We applied this interview technique for posing open questions and following up on new aspects [26].

We structured the interview guideline into four main sections regarding: 1) the developments and IT trends in the organizations and in the service sector in general; 2) the usage of ERP systems; and the maturity and application of 3) BPM and 4) data quality management within the organizations. The guideline was reviewed by researchers and practitioners and we conducted two test interviews.

The 15 interviewees stem from twelve insurance providers and two other insurance-related organizations. For the analysis with regard to the organizations' ERP systems and BPM, we focus on the 12 insurance providers. For the analysis of IT trends, we consider all participants. The insurance providers are presented in Table 2 ordered by their premium income and number of employees. We chose the participants with respect to their influence on potential IT trends in the respective organizations. Whenever possible, we conducted the interviews with CIOs/Heads of IT, since they are the main drivers for IT innovations [8]. Most participants are heads of IT departments or belong to middle or executive management. Of the participants involved, 13 of 15 are involved in IT-strategy decision making as decision makers or direct advisors (Table 2). All participants are experienced, with a minimum job experience in the financial service sector of 11 years and a mean of 19.8 years. We recorded and transcribed the interviews and returned them to the participants for communicative validation [12] resulting in minor wording adjustments.

Organizations' premium income in millions Euro		Organizations' no. of employees	
< 1000	4	< 1000	4
1000–5000	4	1000–5000	4
5001–10000	2	5001–10000	2
> 10000	2	> 10000	2
Total	12		12
Participants' position regarding IT-strategic decision making			
CIO/Head of IT (national)			5
Directly reporting to CIO/Head of IT (international)			3
Directly reporting to CIO/Head of IT (national)			4
Other executive board members			1
Other participants from insurance sector			2
Total			15

Table 2. Examined organizations and participants

We analyzed the interviews with regard to our research question by iterative descriptive and interpretive coding [29]. Statements regarding, for instance, IT trends, applied definitions, and maturities, were categorized accordingly. We applied a software tool [21] especially for meaning condensation and interpretation of statements [26]. According to the interview's structure, we asked the participants about general and sector-specific developments and IT trends. We coded the IT trends based on IT trends derived from current studies (e.g., [8, 31]) and further IT related strategic developments that were addressed by participants. More than one code could be attached to a statement to identify duplicates of and interdependencies between IT trends. The statements regarding the use of ERP systems and BPM within the respective organizations were coded based on the maturity levels (cf. Section 4). The question on the ERP systems considered the system's current and future development. The questions on BPM considered the current and future application of BPM across the lifecycle (cf. Table 1). Furthermore, we asked about the interdependencies of ERP systems and BPM.

4. Findings

4.1. Maturity of ERP systems and BPM in the examined organizations

In this section, we provide an overview of the examined organizations' maturity regarding the ERP system and BPM in order to interpret our further results within the given sector and organizational context.

4.1.1 ERP maturity. We assessed the maturity of the ERP systems based on their implementation stage. We focused on the integrated support of administrative and service-specific functions, since service organizations' standardized ERP systems lack the support of service- specific functions and instead focus on administrative functions, for instance, finances and human resources [7]. To keep the categorization simple and generalizable across standard and individual products, we defined four maturity levels, presented in Appendix A.

Of the examined insurance providers, 10 of 12 rely on standard ERP systems (Figure 1). All organizations at maturity level 2 are currently integrating different ERP systems across organizational sites due to mergers and acquisitions (M&A). In these organizations, a standard ERP system was already implemented at least at one site. Regarding these organizations, the maturity can be interpreted as an indicator for the still-necessary activities towards an integrated organization-wide platform rather than a statement about the actual quality of the ERP systems within the different organizational sites. The organizations with integrated administrative support (e.g., accounting) and insurance-specific functions (e.g., product development, claims processing) – and therefore at maturity level 4 – had to

integrate standard ERP systems with other existing systems. In one case, the system had to be highly customized, entailing increased maintenance.

Two organizations used individual ERP systems. In one organization, the existing individual system is considered up-to-date. The other organization with an individual ERP system is on the brink of implementing a standard ERP system for resource management. The pros and cons of the implementation of standard ERP systems are presented in Section 4.2.3.

In 10 cases, the existing ERP systems are currently enhanced or the participants think it necessary to further develop the systems. However, only in one further organization, the sustainability of the existing ERP system is questioned.

4.1.2 BPM maturity. We assessed the organizations' BPM maturity, applying the BPM Maturity Model [33] and the according maturity levels (Appendix A) because it focuses on BPM as a holistic management practice [32]. Since the BPM maturity encompasses several capability areas, it is possible that organizations show different development across capabilities. Therefore, organizations' BPM maturity could be assigned between two levels if the maturities of capability areas differ.

All organizations are beyond the documentation of first processes (Figure 2). In the organizations at Level 1-2, processes are partially documented, but process adjustments are caused by, for instance, IT projects, and not conducted in a process-driven manner. Besides modeling processes, organizations at Level 3 rely on process improvements based on employees' suggestions or utilize centralized know-how for process improvement. However, the initiatives are rather sporadic and the organizations lack controlling methods to measure improvements. The seven organizations on higher maturity levels derive measures and control process improvements. For instance, the organization at Level 5 continuously controls the process lifecycle by applying process release management.

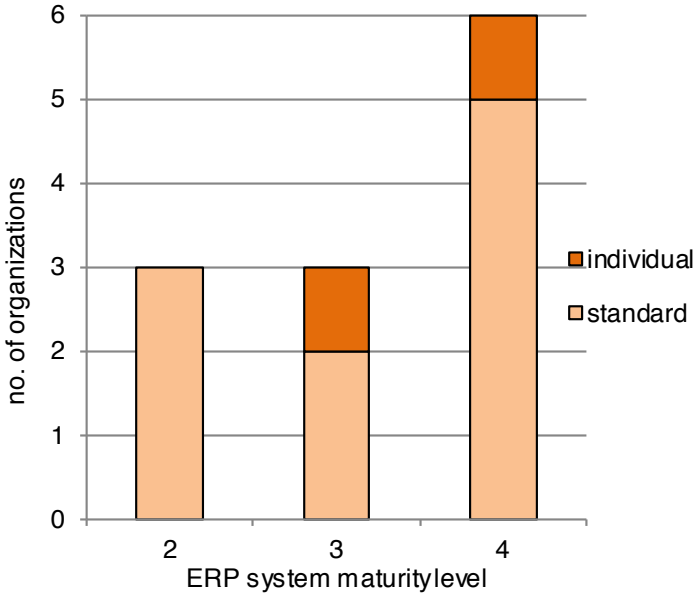

Figure 1. ERP system maturity of the examined insurance providers

4.1.3 Interdependencies between ERP systems and BPM. Implementing a standard ERP system has process implications and it is recommended to adapt to standards [19, 10]. This is corroborated by the participants. With the exception of one organization in which the ERP system was highly customized to be adaptable to different sites, the organizations stick to given standard processes and avoid customizing. Comparing the maturities for each organization (Appendix B) shows that ERP system and BPM maturities tend to correspond. However, the impact of standard ERP systems on BPM and business processes should not be overrated since standard ERP systems are implemented to support administrative functions. Three participants from different organizations at different ERP maturity levels (2 and 4) emphasized that process assessment and improvement mainly aim at other systems with service-specific functions or processes. Furthermore, processes that are not supported by IT should be considered for improvement and additional IT support.

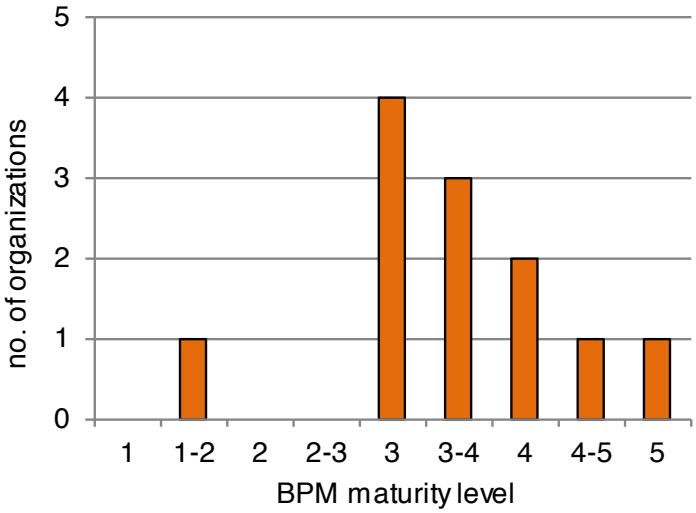

Figure 2. BPM maturity of insurance providers

4.2. IT trends in the financial service sector

4.2.1 IT trends overview. We identified five prominent IT trends and their interdependencies within our study's context. In this article, we focus on the four IT trends related to BPM, omitting the data analysis trend, which is addressed in [13]. A list of the remaining IT trends and the number of supporting statements is provided in Appendix C. Most of the trends are mentioned by the participants without further explanation, for instance, within an enumeration of trends. The

relevant trends are provided in Figure 3 including the number of participants who addressed and supported them. Other IT trends, for instance cloud computing, were not considered relevant by the participants. Cloud computing was addressed by five participants. Three of them explicitly demarcated cloud computing from relevant trends. The other two participants emphasized the need for private clouds, however questioning if their applied solutions really are cloud computing.

Of the participants, 13 of 15 addressed the trend of integrating standard and individual systems and 12 participants addressed the trend towards standardized systems. The need for this integration results from the increasing orientation towards standardized systems and the high rate of individual software in the financial service sector. Considering the statements linking system standardization with ERP systems, the standardization trend is not limited to ERP systems. The need for integrating different software systems gives rise to the demand for modularized systems and service oriented architecture (SOA), respectively. Apart from system integration, SOA is referred to in combination with process automation to provide the possibility for defining service processes that can be combined independently. Additionally, standardized systems are referred to as a means of supporting process standardization and automation. The participants see BPM as important in order to analyze and optimize processes prior to automation to prevent the automation of poor or flawed processes. Similarly, BPM is considered important for analyzing processes and identifying service processes for modularization and integration across different systems.

4.2.2 Integration of standard and individual software. The integration of standard and individual software is the primary topic within the examined organizations. Due to the lack of support for main business processes in the insurance sector, standard ERP systems may play a rather negligible role being applied for basic resource management. Even if they are used for comprehensive resource management, organizations applied other systems to support insurance-specific processes. Besides the necessity to integrate the organizations' internal IT landscape, external systems have to be integrated as well. The IT landscape has to be aligned to the changing organizational conditions. In this context, seven participants address M&A and at the time of the study, five of the examined organizations dealt with system integration due to M&A.

Regardless of the application of individual software, it is necessary to integrate standard systems because the organizations apply different standard software for different functional areas. In addition, integration is necessary to provide a system-independent availability of processes and data.

Due to the shortcomings of standard ERP systems in supporting service-specific processes, there is much individual development compared to the administrative functions. The replacement of existing individual systems with standard software is not possible or not desirable, leading to a coexistence of standard and individual software.

4.2.3 System standardization. The trend towards the application of standard software has to be examined critically. Within the service sector and our examined organizations, mostly

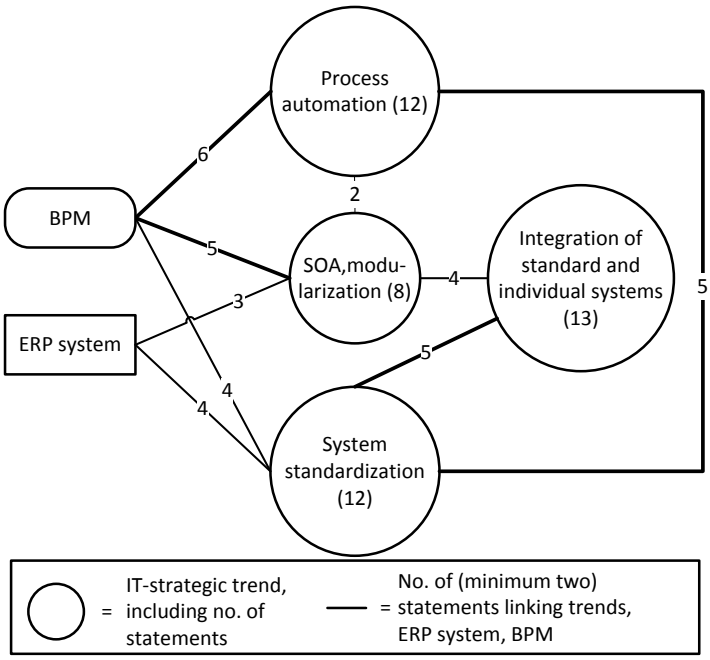

Figure 3. Identified IT trends and interdependencies

standard ERP systems are used (Figure 1) and one of the organizations with the individual ERP system currently implements a standardized solution for its resource planning. Complementary, additional standardized and individual systems are applied. In the context of our study, the trend towards standardization is closely linked to ERP systems. We explicitly asked for the strategic goals for the implementation of their respective ERP systems. Hence, we consider reasons for implementing standard and individual ERP systems in the following.

The main reason was standardization within an organizational group (Figure 4), where standard ERP systems have a consolidating impact. Considering the functional areas that should be supported within the examined organizations, accounting is ranked first. More detailed inquiries showed that the systems were also applied for managing further resources, that is, material, time, and employees. Standardizing accounting was in all cases mentioned in combination with standardization within an organizational group. Process standardization as a strategic goal was also mentioned in two of three cases along with standardization within an organizational group. Another strategic goal was the support of controlling by ERP systems. Regarding the sustainability of standard ERP systems,

the vendors are expected to provide regular maintenance and updates, including the system's further development to fulfill sector-specific requirements. This overlaps with the reduced maintenance effort from a customer perspective. The efficient maintenance is related to standardization within an organizational group as well.

The trend towards standardization is limited. Regarding individual ERP systems, their focus was on insurance-specific functions. Participants emphasized the support of organization-specific functions, for instance, the mapping of organization-specific processes and products. Due to the products' complexity, integration into a standard ERP system is not considered possible and flexibility for product development should be maintained. Whereas standard ERP systems were applied for administrative functions, the question remains to what extent insurance-specific functions were supported by standard or individual software.

Aside from organizations that systematically apply individual systems to support organization-specific functions, other organizations simply lack alternatives to replace existing individual systems. The challenge for the standardization of insurance-specific functions is the heterogeneity in the insurance sector, especially concerning the complex product development and distribution channels. There seems to be a lack of well-proven standard systems that can be applied across the organizations within the insurance sector. The standardization of processes and products poses the threat of losing competitive edge.

4.2.4 Process automation. Participants considered the automation of processes with regard to the improvement of core business processes, that is, processes that do not follow standards and therefore cannot be mapped on standard software. Process automation is closely related with BPM because it is necessary to (re)design processes before automation to gain sought advantages. A sophisticated process management approach is necessary to define, model, and map processes for automated execution. Furthermore, the processes have to be monitored continuously. In addition, participants considered data quality important for process automation.

4.2.5 Service-oriented architecture (SOA). SOA is no new trend, however, due to our qualitative approach, we are able to examine the underlying issues and solutions organizations are considering. The trend towards SOA affects the IT landscape and business processes. With regard to the challenge of adapting ERP systems to changing business processes, SOA provides a possibility to improve ERP systems' flexibility and to reuse processes.

Based on an existing IT and process landscape, participants emphasized service orientation for system integration and the gradual modularization of existing processes. The application of modularized processes has the advantage of the redundancy-free provision of processes to several user groups. The possibility of reusing processes has a positive impact on the service provided to user groups. Furthermore, it supports the application of multi-channel distribution. Processes should be reused and provided internally and externally, for instance to sales staff and end customers. Furthermore, two participants considered SOA important for process automation since defined services can be combined flexibly to different processes. Because of the reuse of processes, format and media discontinuity and manual rework can be avoided.

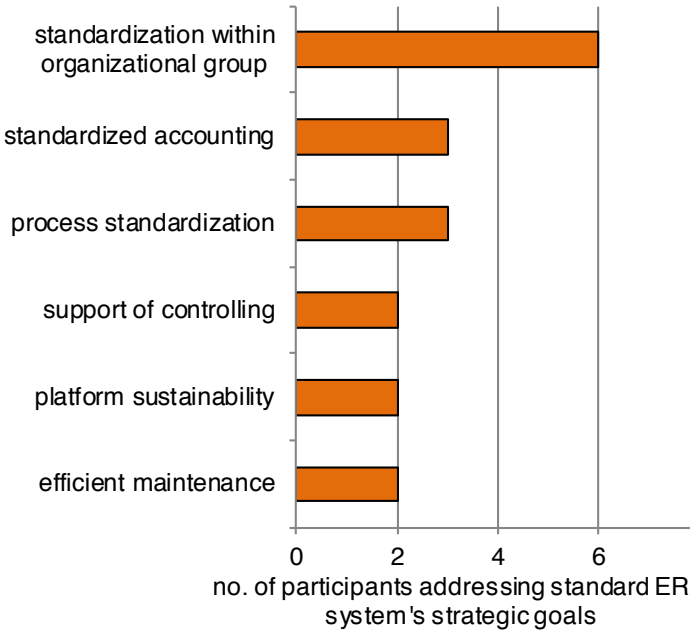

Figure 4. Strategic goals of standard ERP system implementation

5. Discussion

5.1. ERP systems and BPM in the insurance sector

5.1.1 Maturity within the insurance sector. The ERP maturities (Figure 1) indicate that insurance organizations are able to integrate ERP systems in the IT landscape. Nevertheless, we did not encounter a full integration (cf. [7]) based on standard ERP systems. Hence, we corroborate the lack of integration and the resulting lack of benefits for the insurance sector.

Considering the BPM maturities (Figure 2), almost all examined organizations are at advanced levels. This is interesting regarding the highly information-intensive [3] sector and the difficulty to precisely define the deliverance of the service [7]. Although processes might not be defined on a detailed level, it is possible to derive performance measures.

The interdependency between ERP systems and BPM in the insurance sector, from our participants view, is rather weak due to the predominant use of ERP systems for administrative functions. However, since both maturities within one organization

tend to correspond (Appendix B), efforts in BPM might have a positive impact on ERP systems and vice versa; even if ERP system are used for administrative functions and process improvements aim at other processes. Further research is necessary to understand to what extent, for instance, efforts in BPM increase process awareness resulting in improved ERP system usage or using ERP systems for administrative processes enables organizations to improve or focus on BPM.

5.1.2 Considerations for the insurance sector. The partial integration of ERP systems as a "basic accounting tool" in insurance organizations might be an "unnecessary and costly investment" (cf. [7, p. 214]). We argue that the benefit of ERP systems in financial services has to be further examined in the light of the currently increasing regulations and upcoming trends.

Regarding BPM, especially process automation is a challenging trend for insurance organizations. Due to the expert services and the resulting high customer interaction [6], process automation has to take into account several distribution channels as well as customers and employees. The latter includes the sales force, which has an important role for insurance organizations [6].

5.2. IT trends and resulting management issues

With respect to our research question, we see two main issues for insurance organizations: the need to manage processes IT-independently and the need to engage in SOA.

5.2.1 Manage processes IT-independently. The integration of processes is necessary for system integration. Processes have to be managed IT-independently to allow continuous adaptation to changing IT-landscapes. Especially with respect to M&A, the main challenge is to align the continuously changing organization and IT landscape with the organizations' processes. Standard ERP systems are applied to consolidate processes within administrative functions. These findings are corroborated by the use of standard ERP systems in banking and service organizations in general [5, 7]. Due to the trend towards standardization, standard ERP systems will gain increased importance for administrative functions. Since standard ERP systems are by now technically robust [27], their application may be a competitive necessity. In contrast, organization-specific core business processes are still beyond the scope of standardized ERP systems within the insurance sector. Hence, despite the increasing importance of ERP systems, the IT-independent management of processes is necessary to capture all relevant processes in the insurance sector. Processes should be identified systematically and organizationally-driven to avoid suboptimal improvement, that is, improving single systems instead of business processes. Organizations need to examine, to what extent existing IT is capable of supporting these processes, including processes that might be not supported by IT, yet.

5.2.2 Engage in SOA. To support business processes sustainably with IT, the examined organizations coping with the integration of standard and individual software engage in SOA. In this context, the trend towards system integration is a driver for SOA, and IT-independent process management is a prerequisite. In this context, SOA might support the alignment of information systems, which is critical to achieve the intended organizational objectives, especially after M&A [17]. We see the need for organizations and vendors to engage in SOA to provide the flexibility for this alignment regarding individual as well as standard systems. Hence, we corroborate the current need for further research in SOA from a BPM perspective [37].

The examined organizations only standardize systems and processes to improve efficiency and if no organization-specific differentiation relevant for competition is lost. The standardization within insurance-specific functions is associated by a loss of flexibility, especially concerning product development and maintenance of existing products and insurance policies. Modularization simplifies the implementation and integration of standardized systems, reducing individual systems to necessary organization-specific core services. However, the examined organizations approach SOA carefully as it has to be conducted with regard to IT and process issues. SOA supports process automation regarding the need to manage administrative and core business processes conjointly and across several user groups. Especially automation of core business processes promises more efficient processes while maintaining organization-specific processes and thus entails a competitive advantage.

SOA addresses several issues [38] that turn out relevant in the examined insurance organizations: That is, the reuse of services, for instance within processes that are accessible for different stakeholders, monitoring and improvement of processes, especially in conjunction with BPM, and increasing flexibility in service and functionality provision while standardizing processes. ERP system vendors should aim for system modularization in order to gain appeal in the service sector, especially since holistic standardized support of functions is not possible due to the complexity and heterogeneity of the sector. Although SOA will have a high impact on the ERP market [1], the impact on insurance-specific processes and therefore organization-specific processes should not be overrated due to the current standard ERP systems' utilization for administrative functions.

Current literature provides a SOA maturity model for assessing SOA approaches – from rather IT-related to business and service driven approaches [38, 18]. Especially from a BPM perspective, the maturity model might be an adequate approach to assess and support service organizations' that engage in SOA.

5.3. Limitations and further research

Our results are relevant for the majority of organizations in the insurance sector, since most organizations use ERP systems. Nevertheless, our study has the following limitations: Due to the number and selection of organizations and participants, the generalization of our results is limited. The particularity of the financial service and especially insurance sector [6] further limits generalizability to other sectors. When aiming for a detailed maturity assessment, the criteria may have to be adjusted for small- and medium-sized organizations, in which operative requirements can be addressed at the executive board level without the necessity for a dedicated BPM team. There are several ways to arrive at a high process management maturity level [32].

Further research will examine the role of data quality management and its interdependency with BPM. In this context, we expect the regulations of the insurance sector to influence the management issues with regard to ERP systems. Additionally, further research should examine the maturities across sectors. For instance, several case studies exist on BPM but BPM maturity assessments for sectors are scarce. In this context, interdependencies between maturity frameworks and assessments might provide further insight into process orientation and IT and business alignment in service organizations.

6. Conclusion

We assessed the ERP system and BPM maturities within the insurance sector. Furthermore, we identified IT trends and related current and potential process management issues with regard to ERP systems. The identified trends may be familiar. The results are, however, very interesting since assumed trends, like cloud computing, seem not that relevant within this specific sector. Considering the process and IT alignment, ERP systems are applied to standardize functions across organizations. While this standardization focuses on administrative functions, process improvement and automation focus on core business processes. Therefore, organizations should engage in SOA for a holistic process and IT alignment.

Our study contributes to currently evolving research in ERP systems, BPM and SOA within the insurance sector, additionally emphasizing the need to consider sector-specific characteristics in IS research. Furthermore, we provide research opportunities for maturity assessments within the service sector.

The practical contribution of our study addresses users and vendors of ERP systems. Vendors have to consider sector-specific issues as well and provide modularized systems to facilitate system integration.

Potential ERP system adopters should assess the benefit of current standardized ERP systems critically and based on the organization-specific processes, not vice versa. Practitioners aiming at improving processes for competitive advantage should be aware of the necessity to manage processes IT-independent. This is a prerequisite for SOA, especially when applying individual systems.

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Appendix A – Maturity levels (excerpt)

ERP system maturity levels	
1	No ERP system available
2	Support of administrative functions, low integration, different non-integrated ERP systems
3	Integrated support of administrative functions
4	Support of administrative and insurance specific functions

BPM maturity levels	
1: Initial	None or very uncoordinated and unstructured (ad-hoc) attempts; mostly reacting to acute issues, often requiring significant rollback and rework; high level of manual interventions and workarounds; minimal employee involvement, low reliance on external BPM expertise.
2: Repeatable	Limited documentation of processes, standards and practices; first attempts with structured methodology and common standards, varying across different lines of business; increased involvement of top management; extensive use of simple process modeling.

3: Defined	Focus on management of early phases of process lifecycle; use of elaborate tools, combination of different process management methods and tools, more extensive use of technology for delivery and communication of BPM.
4: Managed	Structured team that maintains standards; exploration of process controlling methods and technologies; formal process management positions; widely accepted methods and technologies; continuous extension and consolidation of process management initiatives and process orientation.
5: Optimized	Governance framework is in place; process management/data quality management is a part of managers' activities, accountabilities and performance measurements; wide acceptance and use of standard methods and technologies; approach to BPM incorporates customers, suppliers, distributors and other stakeholders; established business process lifecycle management; process management becomes the way business is done.

Appendix B – Comparison of maturity levels

Organization	BPM level	ERP level
#1	1,5	2
#2	3	3
#3	3	4
#4	3	4
#5	3	2
#6	3,5	2
#7	3,5	4
#8	3,5	4
#9	4	4
#10	4	3
#11	4,5	3
#12	5	4

Appendix C – Other mentioned IT trends and number of supporting statements

Data analysis (8); mobile applications (including Tablets, Smartphones) (4); online portals (2); IT outsourcing (3); cloud computing (2); digitalization and paperless office (2); green IT (1); social analytics (2); social communications and collaboration (1)

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Reference Model Maintenance Based On ERP System Implementations

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Conceptual reference models in the narrow sense are detailed descriptions of information processes in commercial domains such as retail, manufacturing, etc. They serve many usages such as business process reengineering, information systems development or business software selection. Hence, it is necessary that reference models offer the latest domain knowledge. Al-though there is much literature on the initial reference model creation, hardly anything has been said about the maintenance of reference models. This paper introduces a procedure model for updating reference models with regard to the implicit knowledge that is implemented in ERP software. The model uses the domain-specific know-how acquired by software development companies. Based on implemented ERP functionality, the procedure model derives domain practices for the maintenance of the reference model.

1. Introduction

Many companies have introduced Enterprise Resource Planning (ERP) systems in order to stay competitive and to improve and change their business strategies [21; 26; 2]. These are defined as information systems that support integrated core business processes on a single integrated database [28]. In general, ERP software is standard software, also named COTS (commercial off-the-shelf) software, which has been developed as general domain software for one or many different domains in consideration of "best practice." ERP systems offer a broad spectrum of functionality and various alternate supported processes. They offer customizing mechanisms for the specific need of each company [15; 31]. Hence, these standard systems are very flexible due to customizing possibilities and can be adapted to market needs of individual companies [8; 23]. Furthermore, individual companies are able to gain from the ERP inherent processes and structures by adopting these "best practices" [18; 31].

Implemented "best practices" originated from previous ERP projects as the ERP manufacturer has im-plemented domain know-how from various ERP do-main projects or working groups consisting of ERP ma-nufacturer and users from various companies. ERP ma-nufacturers also gain their knowledge from academic li-terature in terms of reference models and descriptions of industry and case scenarios [17; 29; 30]. In this context, reference models offer valuable domain knowledge that is used e.g. for the creation and further development of standard software. Models are established as interface definitions or frameworks (e.g. [3; 7]). Therefore, they standardize the outside view of company functions ("What"?). Particularly in the academic context, reference models are created as abstract descriptions of the inside view of processes ("How?"). In this article, the latter are reckoned as reference models in the narrow sense due to their higher level of domain and company details. Normally, reference model design and software development exist separately from each other, although the implementation of functions and business processes may be based on the model. Ideally, the reference model is fully representable in the ERP system. However, individual customer requirements go far beyond these standardized reference models that are generally applicable. A study among 27 ERP manufac-turers shows that approximately 50% of new features in standard EPR system products result directly from cus-tomer requirements [29]. In particular, so-called reference customers are at the forefront of this ERP maintenance and provide important and current requirements to the software houses.

Although reference models are very important for the development of ERP systems, their maintenance and updating seem to be very difficult. The problem does not occur with reference models in the larger sense, especially interface definition models. They are deve-loped by consortia of companies, because the members have an active interest in establishing intercom-

pany communication standards. However, reference models in the narrow sense, especially domain-specific models, are excluded from these knowledge-gaining feedback cycles because companies do not have an active interest in providing their specific process implementations to the public. Having this in mind, the article strives for a procedure model that allows maintaining reference models according to the recent domain knowledge that is implemented in standard ERP systems. The article introduces a procedure model for the analysis of ERP inherent domain and process know-how and its alignment with and incorporation into domain reference models.

2. State of Research in Reference Modeling

Numerous authors have published works on the usage of reference models as tools for the development of organizations and applications (see e.g. [10, 11] for an overview). Assuming that domain knowledge can be explicated universally for a certain class of companies, reference models are a good starting point for the development of individual business processes [5]. The aspect of reuse in reference modeling especially aims at cost reduction in the context of individual modeling and implementation projects. On the one hand, this is achieved by time saving resulting from the reuse of a large base of models, and on the other hand by an implicit reduction of risk by applying reference model inherent business processes that have been proven and used many times already. As the reference model offers very detailed and generalized information from a domain, its initial development costs exceed the costs of developing an individual model [12]. Hence, a prerequisite for the realization of cost benefits is the actual multiple reuse of such a reference model. Reference models have to be adapted to each individual need in order to gain a competitive advantage from its usage. This differentiation between a universally valid reference model and the company-specific organizational model is generally directly reflected in the standard ERP systems: these systems offer relatively stable and generalized system cores, which are adapted in individual customer projects through parameterization and customization to the respective requirements [29]. For that, it is reasonable that ERP software vendors use reference models as a conceptual reference point for their ERP products. The models can serve as requirement definitions but they can also be an important part of the system documentation through their abstraction from details of implementation. For this case, three central requirements exist: First, reference models have to offer additional value. Second, they have to provide a fine-granular level of detail. Only with an adequate description of the respective application standard of the represented company class are reference models usable as conceptually functional blueprints. Third, reference models have to be maintained in order to describe the recent state of the art in process design, e.g. in goods and materials management. Old, out-dated reference models may display traditional processes and structures within the company class, but are not considered relevant e.g., technological innovations and changes. In the context of scientific discussions, researchers addressed the reference model design [1, 14, 27], and the variant management in the context of the adaptive reference modeling [9, 16]. In addition to the technical development of languages and procedure models for reference modeling, a number of reference models have been developed that respectively review domain knowledge (e.g. [6, 22]). However, the maintenance cycle for refe-rence models in the narrow sense has not been addressed so far.

3. Research Objectives

With regard to domain-oriented reference models, many models suffer from a lack of updates or are only updated in small proportions beyond the initial development project. As the cause of this development, two key problems could be identified: lack of methodic support of the incremental updating of reference models, as well as restricted access to current domain information. Process implementations with outstanding performance that are not to be standardized are considered a competitive advantage. Hence, a publication of that know-how is not in the interest of such organizations. Such process knowledge is usually barely acquirable for (academic) reference model developers unless they have an institutionalized knowledge exchange with domain experts (e.g., within a research project).

The aim of this paper is the development of a procedure model for domain-oriented reference model maintenance based on the analysis of ERP systems. It is primarily a design-oriented approach, which derives an artifact from an identified problem (Section 4). The artefact is distributed as a possible solution to the problem (see [13]). The case example in section 5 represents and explains an extract of the evaluation.

4. Procedure Model for ERP based Reference Model Maintenance

4.1. Conditions

Contrary to research for reference model initiations, domain information for reference model maintenance will not be gathered directly by application partners (or affiliated via BPM methods), but indirectly deduced from existing domain-oriented ERP software. The procedure model is based on the assumption that the functional information can be derived from the user inter-face. It draws upon methods that allow such a derivation for process models and data models in the opposite direction out of ERP systems (e.g. [4, 25]). Appropriate ERP systems offer market stability in terms of a high user

base on the one hand but also flexibility in order to react to changes from their respective application companies on the other hand. The procedure model requires three conditions.

C1: There is an initial reference model, which allows for deriving structured problems and task descriptions.

C2: The ERP producers have an active interest in the evaluation of their systems by third parties.

C3: There are an appropriate number of systems available for the reference model maintenance.

Condition 1 implies that a reference model exists, which prestructures the investigated domain to a sufficient extent and sufficient granularity.

Condition 2 has to ensure that ERP vendors participate in the system evaluations because "living" systems (with sample data) have to be accessed. In research projects for reference model creation, information supply by application partners is normally specified through the project descriptions. However, for the maintenance of reference models, researchers have to live without any formal contracts or responsibilities of application partners. As information is gathered through the actual use of the system, a usability report can be created in addition to the reference model. This usability report offers additional value to the ERP manufacturer.

Condition 3 is derived from the postulation that a reference model represents an abstraction from individual cases. Therefore, several systems are subject to investigation. The number depends on the research focus. For example, the procedure model offers the opportunity to revise only small parts of the reference model.

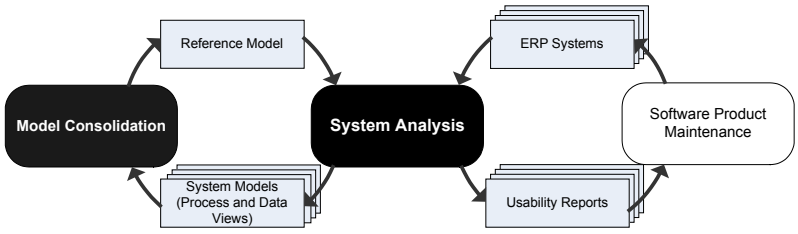

Figure 1: External View of the Procedure Model

4.2. External View (Procedural Model)

At the top level, the procedure model is formed as a double loop (cf. Figure 1), which covers the reference model maintenance and the enhancement of the respective ERP systems.

It is important to notice that the procedure is not a closed, exclusive procedure for maintenance and further development. It is an addition on the sides of the model and software product maintenance. For example, important inputs for reference model maintenance can also be attributed to case studies or expert interviews [1]. On the side of the ERP system the procedure subordinates, e.g. the use of new technologies or the competitive analysis as a driver for further development. The initial reference model is the starting point of the procedure. The two core processes of the procedure are the system analysis and the model consolidation (black boxes in Figure 1). As the software product maintenance is a consequence of reference model maintenance and/or system analysis, it is not the focus of the article.

4.3. Internal View

In the context of ERP system analysis (cf. Figure 2), a set of case studies will be examined. The cases are typical scenarios of the domain and serve as a background skeleton for the analysis. Coarse granular tasks, as well as context parameters (data, preferences, etc.), have to be derived from the initial reference model. In that way, a uniform context for the analysis of each system is assured.

Modelers try to solve the cases with the help of the accessible ERP systems by searching for alternative solution paths within each system. Solution paths should be formally documented. The interaction patterns will be formalized as process models with suitable description languages (preferably with the process description language of the initial reference model such as event-driven process chains (EPC) or UML diagrams). Data requirement derivations based on data entry masks and attributes will be formalized with the help of data modeling languages such as Entity Relationship Models (ERM) or UML diagrams. It should be stressed in this context that the identified data structures are only extracted from the user interface - an analysis of actual data patterns of the underlying persistence layer cannot be conducted. As a disadvantage, the analysis based on user interface findings does not disclose the full potential of an ERP system. As an advantage, the superficial examination regards the actual system behavior whereas the underlying data structure does not. For

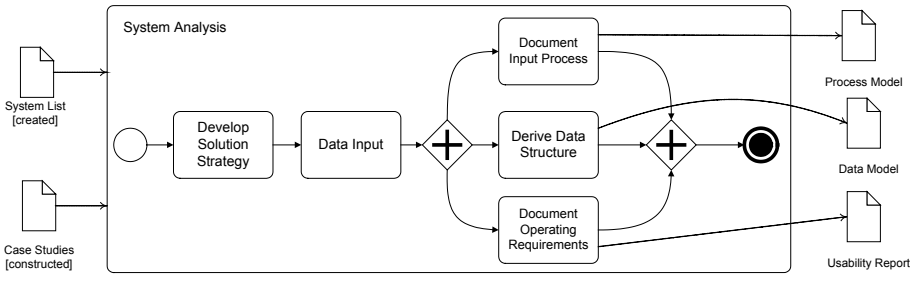

Figure 2: Refinement of Sub Processes of System Analysis

that, development decisions based on platform inherent reasons are ignored.

The derivation of the data and process structures from the input sequences and UI screens is due to heuristics. Control and user interface models are allocated to model structures. Table 1 shows a corresponding excerpt of heuristics for the derivation of process structures and data structures from ERP systems.

4.4. Model Consolidation

Within model consolidation, modelers have to decide, which model structures to add to the reference model. According to Pfeiffer and Gehlert [20], after the removal of language and structural conflicts, a semantic model comparison is accomplished, which discloses extensions or reductions in the reference model. This step usually has to be performed manually because an uncritical adoption of findings from the ERP systems may risk the reference model quality. Fast moving conceptual fashions may risk the quality of the reference model. Hence, for every new insight, modelers need to decide in a critical discourse whether or not a new change should be incorporated into the reference model. In this way, new model structures are integrated into the reference model and obsolete parts are eliminated. Due to the domain-specific characteristics of each reference model and its individual objectives, it is not possible to define universally valid semantic adoption criteria in advance. In critical discussions, model maintainers and domain experts have to decide on the adoption of new model elements based on the number of appearances in the ERP systems or the importance of the individual ERP system in which the domain knowledge appears.

5. Applying the Procedure Model

5.1. Reference Model Selection

Using the example of a reference model from retail, such an approach is explained subsequently. The retail-H was originally published in 1996 and slightly updated in 2004 [6]. It is a domain-oriented reference model for the construction of ERP systems in retail that offers very detailed functional and process models as well as data models. For instance, the retail-H subdivides the article construct into three specializations, Article Supply, Article Storage and Article Distribution.

Derivation of Process Structures		Derivation of Data Structures	
Model Structure	Operational Pattern	Model Structure	UI Pattern
Activity	Individual input mask Completed with save operation Input must be terminated …	Object Class / Entity type	Element has a dedicated input mask Element is existence independent Element has complex data type Element is referenced by other elements …
Sequential Activities Flow	Successive input masks Existence dependencies …	Attributes / Object property	Element is specified by input Element has primitive data type Element is existence dependent Element is instantiated once …
Exclusive Branching	Certain input fields will be locked after selection …	Relationship types/ Association	Feature is specified with search field via selection field Feature is presented in a list

Table 1: Heuristic Derivation of the Model Structures (Excerpt)

In addition, different types of articles are to distinguish, depending on the property of purchase or sale. Besides Single Articles, which must be provided with appropriate attributes like article description, price, suitability for storage and so on, there exist Article Variants (e.g. two colors of same trousers), which refer to different articles, but same article description, etc.

Article Product Group serves as a collection group for multiple articles of one product group that are not sold on an individual basis. Articles, classified as Article Season are articles that are not sold regularly, but only bought and sold at a specific time. In these cases, additional logistical information has to be stored within the master data. Articles with a recursion relationship are allocated to Article Sets that are individual compilations of sales units consisting of diverse single articles. On the supply side, a recursion relationship is allocated to Article Lots, which means a collection of sales units to an obligatory total purchase amount. Article Displays consider articles that are combined for sale (e.g. in cardboard stand-ups), but are sold individually. Article Empty characterizes a multihierarchy bill of material (BOM), e.g. eleven 1-liter Coca-Cola bottles consisting of the actual product, eleven empty bottles and the packaging case. This differentiation is necessary for returning bottles, for example.

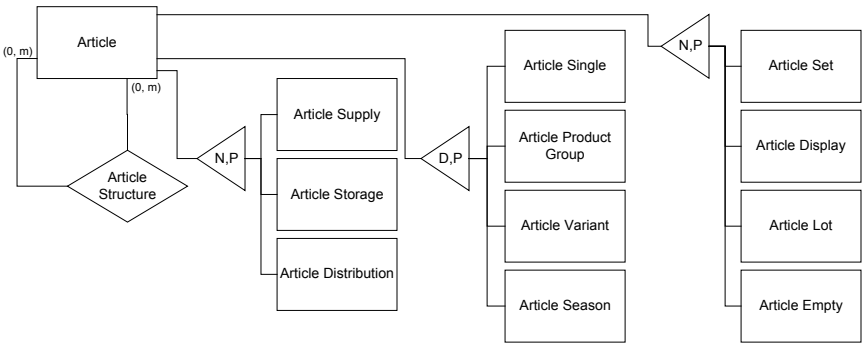

Figure 3: Reference Model Excerpt – Specialization of the Construct Article (cf. [6])

5.2. System Analysis Accomplishment

Two modellers collected and evaluated processes and data in a row of ERP systems independently on requirements derived from a case study. Exemplarily, the procedure will be

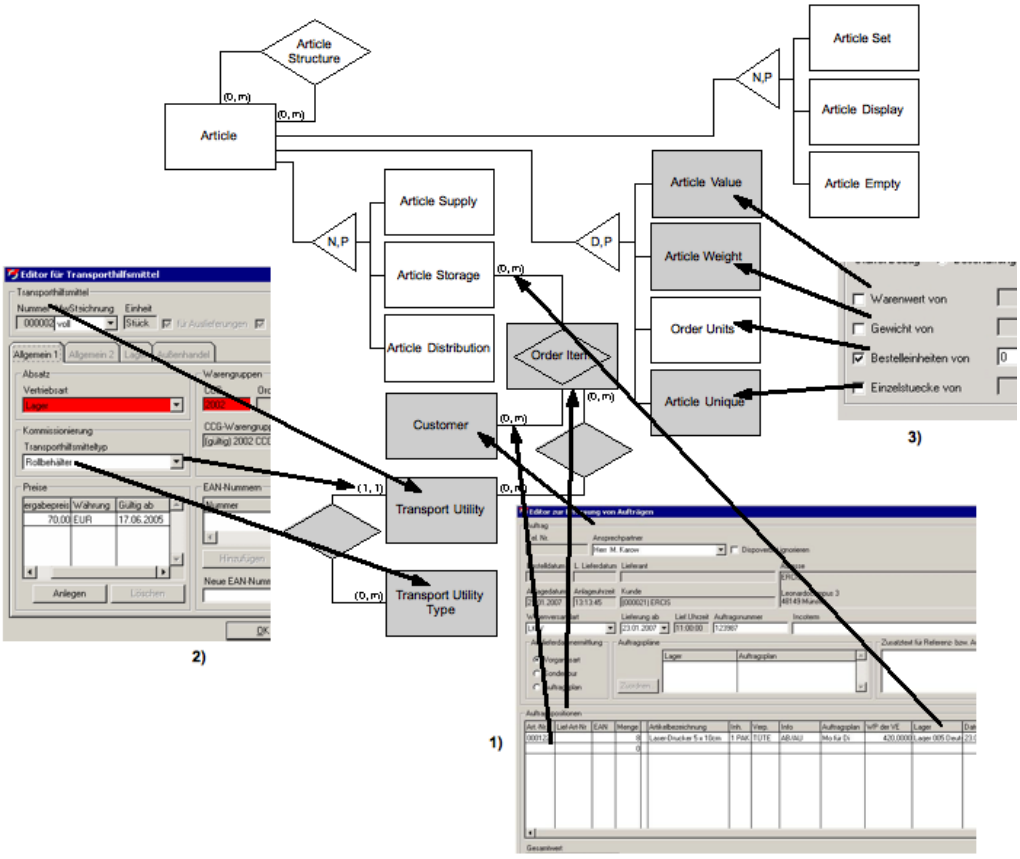

Figure 4: System Analysis of an ERP System (System A) with Specialization on Food Retailing (Excerpt)

demonstrated on two systems (A and B), which were analyzed in order to update the reference model. Figure 4 shows an excerpt of the system analyses for the derivation of the article data model from different masks of system A as an example of the procedure. Within the data model, new entity types are displayed in light grey and the original reference model constructs are displayed in white.

On the mask Order Item ("Auftragserfassung", cf. 1 in Figure 4) it is possible to allocate numerous articles to each inquiry. In parallel, several Order Items can be assigned to each Article Storage (note that each article instance can only be sold once). Each Order Item can be transported with one or many Transport Utilities. Transport Utility Types can be trucks, trains, planes, etc. (cf. "Editor für Transporthilfsmittel", 2 in Figure 4).

In addition to article units, that are called "Order Units" in the present system, it is also necessary to use Article Value, Article Weight and Article Unique (for actions or special orders). All three article types are derived from the analysis of the mask "article setting up" (cf. 3 in Figure 4). Each article type is not handled as an attribute but as its own entity type because specific additional information such as monetary units or certain grading may be necessary depending on every specific article.

5.3. Model Consolidation

The reference model will be enhanced based on the results of the system analyses. Therefore, all findings from the ERP systems (see both left models in Figure 5) will be consolidated and suitable extensions to the existing reference model will be incorporated into the maintained reference model (see right model in Figure 5).

In food retailing (ERP system A), there are different requirements for buying and selling. Weight articles such as cheese and value articles such as a 100 Euro collection of one Euro articles are traded. Unlike unit order articles, they are not counted with specific amounts but in accordance with their weight or value. They are substitutes for article groups without accurate inventory management. For example, weight articles are articles that are stored and sold with regard to their weight (e.g. wheels of cheese). Unfortunately, they suffer from shrinkage of weight by evaporation, which in turn requires intelligent mechanisms of deduction. Unique articles, which are sold only once (e.g. promotional articles), have to be treated differently because retailers do not want to enter much article master data (e.g. supplier data) and do not want to store the data for a long time in their ERP systems.

ERP system B is particularly suitable for the production, especially job production. As such, value and weight of articles are of great importance. Furthermore, succeeding articles are necessary in order to define sub-sequent articles once an article is not produced any-more. Also alternative articles have to be specified. These articles can be used for production alternatively to the original articles. Article sets can either be Selling Sets consisting of fixed product bundles or Price Sets consisting of fixed article quantities from a variety of articles.

These identified entity types can be used for the ex-tension of the retail-H reference model. It is possible either to add enhancements that are noted simultaneously in different ERP systems only (here: Article Weight, Article Value; dark grey entity types in the right model of Figure 4) or to add all enhancements that can be significantly contribute to the reference model according to expert opinions (Article Weight, Arti-

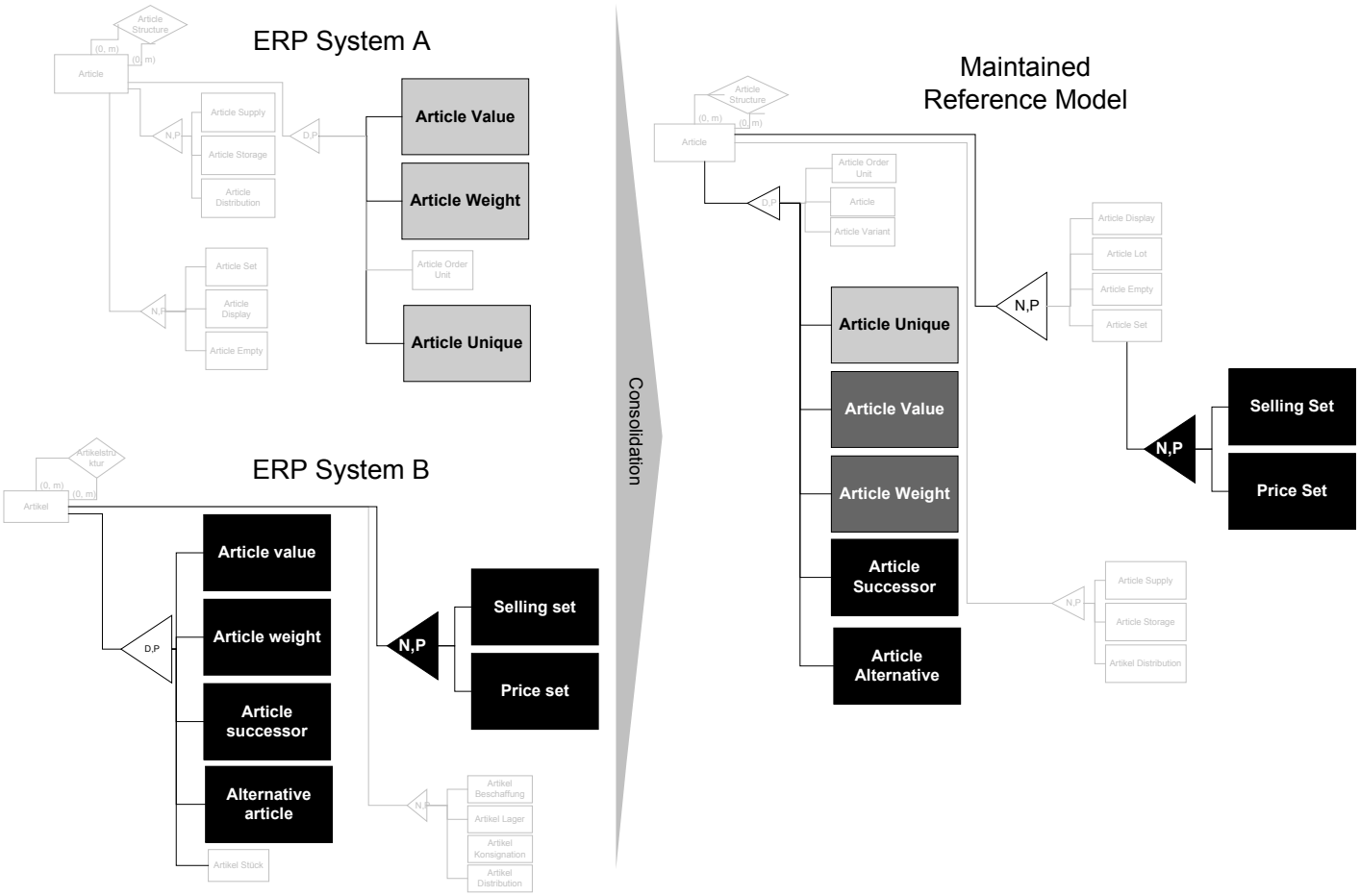

Figure 5: Model Consolidation (Excerpt)

cle Value, Article Unique, Article Successor, Article Alternative, Selling Set and Price Set). Although a model enhancement due to repeatedly observed model elements promises to result in more objective reference model enhancements, there is the potential danger that the reference model enhancements will only display "common practice." Innovative concepts in terms of "best practice" used by only one ERP system may not be incorpozated into the reference model that way.

6. Conclusion, Limitations and Outlook

The present article proposes a first procedure model for the maintenance of conceptual reference models. It tries to overcome the difficult access to domain information once a reference model has been initially created. The procedure model builds additional reference knowledge on ERP user interfaces only. An extension towards underlying concepts (e.g. object models) is conceivable but has not been tested so far. As an advantage, the procedure model allows ongoing maintenance of existing reference models without significant entry barriers, such as comprehensive project organization or contractual assurances or liabilities. The contribution is a complementation to the comprehensive methods of reference model design.

Although the procedure model is to some extend very pragmatic and easy to apply, there are also some limitations on its usage:

First, there has to be an existing reference model with a suitable granularity and a sufficient model size as a starting point for the maintenance. This may well be the case for food retail or production in general but may not be the case for specific domains like furniture retailing, although there are many ERP systems available for that domain.

Second, suitable ERP systems have to be identified in order to gain additional knowledge for the domain of the reference model. In addition, experienced modeling and ERP experts are necessary for the analyses of the ERP systems.

Third, the procedure model – as well as the reference model maintenance – may suffer from the subjective expert views on the underlying ERP systems and the elements that will be incorporated into the reference model. However, this is a general problem of reference modeling because it is hardly possible to achieve a true understanding when designing and maintain-

ing a reference model. As a significant advantage, the acquired knowledge from the ERP systems has already run through various iterations and validations on the ERP market and therefore can be seen as widely accepted.

Fourth, the knowledge gain through ERP system analyses is mainly limited to "common practices" and may represent a low potential for the innovative development of systems based on maintained reference models. However, the maintained models are well suited for the purpose of software selection and documentation, as well as a structured, technical description of the core processes and information objects of a domain. They can potentially realize significant benefits.

The use of the procedure model outside of the ERP system domain is most likely possible but has not been tested yet and is subject to future work. Hence, further research includes the ongoing validation of the procedure model in different professional domains and with different reference models and IT systems. In addition, the integration of the presented approach into a comprehensive reference model design method and therefore the methodical coverage of the entire model life cycle is an important challenge for future research efforts.

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Archetypes and the Logic of Management – How assumptions on ERP systems influence management actions

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The journey with enterprise resource planning systems has taken us beyond implementation, into the second wave of ERP. Now, after running in some years, it is interesting how the ERP system is managed and what role it plays in the organization. These questions are addressed in this paper. Through seven case-studies we found similarities and differences in the patterns of ERP management. The key characteristics, with respect to which ERP management differs, are associated with an archetypal interpretive scheme that we conceive as embodied organizational motivation and architecture. The empirical analysis coalesced in our conception of three alternative archetypes - which we call the supporter, the driver and the co-player. These archetypes are illustrated with material from our case-studies. The archetypes are believed to play an important role in conveying the essential differences of the ways in which organizations manage their ERP system.

1. Introduction

Few IT innovations have had as much impact on organizations in the latest years as enterprise resource planning (ERP) systems. ERP systems are standardized package software for integrating the core functions and managing the information of an organization (Holland and Light, 1999; Markus and Tannis, 2000). Virtually every major private organization has implemented an ERP system and is concerned with managing the technology and achieving a return for their investment (Mabert, et. al. 2001). It is estimated that by 2003 organizations worldwide had spent around US$18.3 billion annually on ERP (Shanks et al., 2003). The journey from acquisition to implementation and use of an ERP system in the organization is long and complex. Many researchers have describe the journey as a set of stages (Markus et al., 2003; Markus and Tannis, 2000; Ross and Vitale, 2000; Rikhardsson and Kræmmergaard 2006; Shank et al. 2003; Willis and Willis-Brown, 2002). Ross and Vitale (2000) describe organization's experience with ERP systems as moving through different phases: acquisition and implementation, a stabilization phase in which new functionalities and modules or bolt-on applications are added, and the third, continuous improvement phase, in which the organization is transformed to obtain strategic value from the system. Marcus and Tanis (2000) also describe several (rather similar) phases, but, unlike Ross and Vitale, they see the process as iterative, with organizations recycling through the phases when they undertake major upgrades or replacements of their ERP systems.

While the last decade has seen intensive research into the first stage, and much has been learnt about the implementation of ERP systems, little research attention has been given to later phases (Schlichter and Kraemmergaard, 2010). Research on how to manage ERP systems to maximize benefits to the firm is scarce even though the annual cost of ERP maintenance averages 25-33 % of the initial ERP investment (Glass, 1999). More recently researchers have pointed to the need for research into the various motives that managers hold for ERP systems, whereas these motives might affect perceptions of value realization after implementation (Ross and Vitale, 2000; Marcus and Tannis, 2000; Pui, et al., 2002; Rikhardsson and Kræmmergaard, 2006). For example, Ross (1998) have stated that different companies have different motivations for implementing ERP systems, and that they follow different implementation approaches, which result in different post-implementation circumstances for the organization.

Parr and Shanks (2000) identified three broad approaches to the implementation of ERP systems, called "comprehensive", "middle road" and "vanilla". They contend that understanding the differences between these three is crucial if researchers and project managers are to understand the process of designing a maximally efficient implementation. The comprehensive approach is the most ambitious implementation approach, typically chosen by multinational companies. The aim is to standardize business processes across national boundaries, and so the software is aligned with the business processes. The middle road approach is characterized by operating to diverse sides. Choices are made concerning when to use the standard defined within the system and when to align the software to the existing organizational processes. The vanilla approach is the least ambitious and least risky approach. Here, the companies decide to have the core ERP function only. In order to utilize the full process model built into the ERP, the organization is aligned with the software.

In this article we present the results of a study on how different archetypal assumptions about ERP systems influenced the way that these systems are implemented and managed in organizations. Our research is based on longitudinal (2-10 years) investigations in seven Danish companies that implemented ERP systems during the 1990's and early 2000's. In line with the above-mentioned preceding research trend, our analysis shows, that some basic assumptions of ERP systems seem to influence how organizations conceive, implement, and manage their ERP systems. With the concept of archetype, we try to describe and clarify these background assumptions and their implications. Our findings suggest that there are three distinct archetypal frameworks, which crucially shapes the explicit conceptions that managers will assume together with the implementation and use of the ERP systems. Furthermore, our empirical material indicates that these archetypes are often formed in an early learning cycle, prior to the selection and acquisition of the ERP system. Later, it appears that these conceptions influence the key outcomes of the systems' implementation and use.

The rest of the paper is organized as follows: In section two we offer a short introduction to archetype theory, discussing the basic concepts underlying our analysis. In section three we discuss our research methodology and present summary background information of the seven case studies. In section four we present our empirical findings, and in section five we conclude with implications for future research and practice.

2. The Archetype Approach

The concept of archetype is very relevant for analysis and discussion of the management of ERP systems. As it has been conceived in organization theory, an archetype is an implicit conception or pattern of understanding, which is operative and of major significance – for example in relation to the entire way of managing an ERP system – without being noticed. By explicating such archetypes it becomes possible to handle them as concrete ideas, and thus to bring more insight and perspective to the ERP management in organizations.

The notion of archetypes has a long history of use in the organization theory literature (Lammers, 1978; Carr, 2002). To attain coherence and shared understanding organizations tend,

according to Greenwood and Hinings (1993), to operate with structures and systems that approximate archetypes. Archetypes do not constitute a disembodied organizational frame, but are infused with meanings, intentions, preferences and values. Furthermore, organizations will evolve toward archetypal coherence as advantaged groups seek consolidation of political positions and control over the distribution of resources. One explanation of why organizations move towards archetypal coherence is that it is beneficial to have only one interpretive scheme rather than several competing ones (Miller and Friesen, 1980). While the concept of archetype implies some sort of typology or classification, the central idea of an archetype is that of an interpretive scheme useful for understanding 'logics of action' or 'modes of rationality' in organizations (Callon and Vignolle, 1976; Miller and Friesen, 1977, 1980; Karpik, 1978). Archetypes suggest not only organization structures and systems, but also managerial mindsets and patterns as well as potentials for actions within organizations (Pettigrew, 1985). Archetypes are interpretive schemes that express underlying values and core beliefs about the organization (Brock et al, 2006; Greenwood and Hinings, 1993).

Interpretive schemes must be distinguished from cultures, though both include values and beliefs. The term 'culture' denotes entireties of values and beliefs embodied in organization structures and systems together with the habits and behaviors that conform with these values and beliefs (Alvesson 1995, Schein 1997). In contrast, the aim of introducing the concept of archetypes to the study of organizational practices with ERP systems is to focus on the explication of particular assumptions and patterns that are involved in the management of ERP systems.

The use of concepts of archetypes in IS theory is not new, either. They have been widely used in presenting both empirical and theoretical findings. For instance, Kaarst-Brown and Robey (1999) employed the metaphors of magic as an interpretive lens to generate five archetypes of IT culture when they presented their findings from ethnographic studies in two insurance companies. Parr and Shank (2000) outlined three archetypes for ERP implementation derived from their search in previous case studies and from a series of structured interviews with practitioners experienced in ERP systems. Based on 14 insourcing case studies, Hirschheim and Lacity (2000) described four archetypes that are involved in the way organizations approach IS sourcing. Agarwal and Sambamurthy (2002) offered three models of archetypes embracing organizing principles for CIO´s to consider in reassessing their organization's design. Their models evolved from a two-year study of how leading-edge firms have designed their IT function to nurture innovation and sustain superior business performance. Desouza and Evaristo (2006) classified and derived four archetypes of project management offices, building on semi-structured interviews with PMO managers or directors in 32 IT departments within a wide assortment of industries. As the outcome of a theoretical analysis Mathiassen and Sørensen (2008) also suggested and exemplified four archetypes of information services.

As it has become clear, an archetypal approach must apply a 'holistic' perspective, including objective architecture as well as subjective motivation. You should not just look at an organization's structures and systems that form its architecture, but also the beliefs and values that motivate this architecture and constitute its significance. In line with this view, we use the term archetype for a set of structures and systems together with their surrounding beliefs and values, all of which is implied in the organizational ERP management.

3. Research Design

Our research methodology is hermeneutic. In accord with Ricoeur (1991), we conceive methodical interpretation as a dialectics of understanding, i.e. a hermeneutic circle or spiral in which more or less immediate forms of understanding (such as sedimentary experience, preconceptions, common sense ideas, direct perception, and naïve notions) are lifted into more reflected and defensible forms of understanding through various kinds of explanation. An explanation is an objectification of aspects of a more subjective understanding, which might stand alone as a level of clarifying the theme being studied. But it can also be integrated at a new level of understanding - which is precisely what is meant by an 'interpretation' of the explanation and its associated, more immediate understanding. This hermeneutic methodology allows for combining deductive and inductive approaches to the research field in as much as the research process is directed by theoretical interpretation as well as empirical analysis of the research field, which must be studied as an intertwinement of (more or less objective) explanations and (more or less subjective) understandings (Feldman 1995, Weick 2001).

Our study rests on our previous objectifications and interpretations of the management of ERP systems. But behind that explication lies the very idea of interpreting ERP management in the perspective of archetypes, which is inspired by the already mentioned article by Parr and Shank (2000) and also the study conducted by Desouza and Evaristo (2006). These empirical sources have contributed to our pre-understanding of the research field and thereby to the design of the present study. An additional, more exploratory, background has been formed through previous pilot investigations, which include eight semi-structured interviews with IT managers about the implementation and management of ERP systems. This compound exploration makes up an inductive contribution (cf. Eneroth 1984, Strauss and Corbin 1990) to the research design, which was further illuminated (deductively) through the concepts and orientations offered from the theoretical explanation of ERP management and organizational archetypes. Obviously,

the search for empirically distinguishable archetypes is rooted in our theoretical pre-understanding, that there might be different main types to be found, i.e. neither one definitive form nor a chaotic variety of ERP management.

Our investigation consists of seven longitudinal qualitative case-studies in Danish companies, starting in 1996 and spanning from two to ten years in each of the seven companies that were included. Table 1 gives a schematic overview of the included case studies. The empirical material comprises recurrent rounds – mostly every six months – of semi-structured interviews, observations, and collecting documents pertaining to the ERP system implementation and management. Though there were some variations, the general design of the case studies included observations of the ERP management meetings as well as the daily work within the organization and courses related to the enterprise system. As it appears in table 1, the interviews were conducted at various levels of the organization – with senior managers, the ERP manager, members of the project group, internal consultants, super-users and regular users. The interviews comprised questions about the implementation process, the impact so far of the enterprise system on the organization, its value (if any), and the expected future impact. The documents that were collected and analyzed consisted of project manuals, notes from project meet-

Case Company	Type of Company	Industry	ERP System	Length of Study	Interviewees
Case 1	Production	Industrial Piping	SAP	10 years	Internal SAP consultant ERP Implementation manager IT-manager Business managers (process owners) Business executive, CFO, Sales and Marketing director Super-users and end-users
Case 2	Production	Food	SAP	2 years	IT-manager ERP implementation manager Project team members Business managers (second level) Internal SAP consultant CEO
Case 3	Production	HI-FI	SAP	4 years	ERP implementation Team Internal SAP consultant Logistics Manager Users
Case 4	Production	Light and Sound	Baan	3 years	The CEO, Implementation team Internal SAP consultant ERP Implementation manager IT-manager Business managers (second level) Super-users
Case 5	Production	Heating and water controls	SAP	3 years	Project Portfolio Manager Implementation Team Internal SAP consultant ERP Implementation manager IT-manager Business- managers (second level) Logistic Manager
Case 6	Production	Toys	SAP	2 years	ERP – manager IT-director Implementation team Internal ERP consultant
Case 7	Production	Pumps	SAP	3 years	Implementation team IT-manager SAP-manager Internal SAP consultant

Table 1: The seven case studies

ings, post-implementation evaluation reports, etc. In some of the case studies, respondents were also asked to write a narrative describing the organization's experience of implementation and use of the ERP. The carrying out of the case studies was described more in detail by Rikhardsson and Kræmmergaard (2006).

4. Empirical Findings

Through the analysis of our case studies, the notions of architecture and motivation that are characteristic for archetypal interpretative schemes in ERP management became clear to us. While architecture is generally conceived as primarily technical systems and structures, it became evident that social relations and positions – such as the organization of the IT function and the delegation of IT-governance – are no less important to the architectural formation of the ERP. What is more, the motivational side of ERP management could not be grasped adequately with the general conception of values and beliefs. We found it necessary to discern a number of topics more precisely: How does the applied ERP strategy relate to the organization's reproduction and to its business strategy? How is the CEO's orientation towards the ERP and the organization's IT in general? How is the organization's overall perception of the ERP in use? What is the organizational perspective of change with the ERP system? Eventually, the major topics that turned out to frame these questions, and so, contributed to depict a style of ERP management into the characteristics of an archetype, were motivation, strategic orientation and organizational architecture.

Through our examination of our questions within these topics, three archetypical forms of ERP management were gradually identified: the supporter, the driver and the co-player. A comparative outline of the archetypes is attempted in table 2 where, of course, we highlight only the typical features that mark the differences between the three styles of ERP management.

In the following sections, we describe the characteristics of each of the three archetypes and include an illustrative case together with a box of exemplary quotations.

	The ERP Supporter	The ERP Driver	The ERP Co-player
Benefit expected from the ERP system	Stability and control	Continuous improvement	Organizational transformation
IT-governance	ERP upgrades are decided by the IT function on technical grounds	ERP enhancement are decided by the IT function on business grounds	ERP model innovations are collaboratively decided by business managers and IT function

Table 2: The Distinction between ERP Archetypes

4.1 The Supporter

The supporter is an organization who's architecture is marked by standardized technology. In accord with their IS strategy, they are keen on minimizing the number of management systems and reducing the IT costs. Though the organization may maintain a few more or less outdated IT systems, they prefer to have only a single ERP vendor. This situation helps the supporter in making decisions regarding new technology. A main problem is that data are embedded in the individual applications, not integrated across all of the systems.

The supporter appreciates stability and control, though the ERP may not yet be fully embedded in the organization. Typically, the supporter follows a defensive strategy, which might be due to a conservative attitude or financial trouble. They use their ERP to improve efficiency, but do not seek a competitive advantage from the ERP. Their alignment perspective follows the execution of strategy (Henderson and Venkatraman 1999), which means that the ERP is to support the business. A more or less articulated business strategy is the anchor domain and pivot of the organizational design. Most likely, changes in the organizational design stem from the business strategy, whereas the ERP must be adapted to these changes.

There is little involvement from top management to ensure a full integration of the ERP in the organization. Generally, the IT is regarded as an extra cost of doing business, a cost that has to be reduced as much a possible. The employees, as well, only feel little responsibility towards the IT systems. Thus, it is entirely up to the IT function to make sure that the IT systems are aligned with business processes and that the systems' data are in order.

Most likely, the IT function is a sub-function to another department, and because the organization views the ERP as a project that ends after the implementation, the supporter probably uses external ERP consultants. The organization does not find it worthwhile to spend resources on keeping the ERP competencies in-house.

Quotation box 1: The Supporter

"The main benefit from the system was to begin the integration within the organization. Earlier, everything had been handled manually – and also the integration between the headquarters in Denmark and our international subsidiaries."

"Our IT-policy states that we have an ERP system, and when there are whishes of a new functionality, we take a look at SAP to see if we can handle that within the existing system's configuration – if not, we have to find another solution, which means to change the system or find something else that can fulfill our needs."

"Right after the implementation of SAP the old silo-mentality within the organization kind of changed. People across the different departments had to talk together. Now, six years later, due to among other things that the people with extensive knowledge about the ERP system and the organization - who were part of the SAP competence center, were moved back to the different departments, and now we see the silo-mentality again. It is a curious development that has taken place."

"Today we are a small group of people, approximately four, working with the SAP system as such, all from the IT department. It is strictly maintenance, authorization and help-desk services that we are dealing with. We use external consultants whenever we have a need for development of our SAP system."

"The employees in the IT department (…) are not very good at socializing on their own initiative with the rest of the organization. But people from the rest of the organization are very welcome to drop by whenever they have a problem that they believe we can solve for them. This results in a lot of traffic within the department."

4.2 The Driver

The driver uses the ERP as an information management system to rationalize data into shared databases, and to integrate the core processes. Typically, the driver has only one ERP vendor. Giving priority to 'rationalized data' (Ross and Vitale 2000), the organization applies a best-of-suite principle with the ERP system to support as many business processes as possible. This improves the infrastructure of the organization as well as the decision-making on future investments. Having finished the implementation of ERP, the driver is often in a stage of extending and integration, adding new modules and functions to the system.

The driver's business is based on core products. Still, the organization also seeks and analyses new markets and products. In prolongation of their business strategy, they adapt an IS strategy for comprehensiveness, where the ERP supports the existing business operations and makes it easier to identify and utilize opportunities in the market.

Although the business strategy is in focus, the IS strategy has its own effect directly on the IS processes and indirectly on the organization as a whole. On the basis of a close collaboration between the IT manager and the CEO, the IT function can both follow the ERP vendor and look for opportunities in new processes and modules.

Whereas the driver is an organization that realizes the business potential in IS, the ERP system has full support from the CIO. In order to achieve the full benefits of the ERP, the driver focuses on maintaining within the organization the knowledge generated from the implementation. This is done by building in-house ERP competencies.

The driver sees the ERP as a new player within the organization, instead of a process ending by the implementation. Thus, the organization acknowledges that the ERP must be ascribed a kind of organizational 'actor status' and that it must have its own management.

Quotation box 2: The Driver

"Before the implementation of the ERP our head of IT was IT-manager. During the implementation he became IT-director, which meant that he was now a part of the top-management, and this has without doubt had an impact on setting that agenda, in which IT and our ERP system played an important role. Now it is seen as the tool that can bring us further."

"We do not operate with any economic goals for SAP as such, and we do not regard it as an investment, but rather as an important tool in our further evolution of the company – optimizing our processes and selling our product to our costumers – and we believe that SAP is an important player in everything we do."

"We go with the standard in SAP, and do not believe that we are different from anybody else in our industry. And we see a lot of advantage from that. Among other things, we feel that we get offered a lot of new technology, which we can just plug on to our existing system. We are now in the process of implementing the new web-enabled version of SAP, and we upgrade our system whenever a new version is on the market. We are very, very strict in not using other systems than SAP."

"From the view of IT, who has the main responsibility for SAP, we have been very conscious about having a close collaboration with the CEO and the rest of the top-management group. The CEO has always been placed at the end of the table, whenever SAP has been on the agenda. He is also a member of the IT-steering committee."

"The organization has changed its view on [the IT department], from being regarded as a support function to now being regarded as a central department within the organization – a place where a lot of interesting and important things are going on - and an important player in the strategy formulation in the organization. We are not seen as a cost anymore."

4.3 The Co-player

The co-player appreciates a modular organizational architecture with a wired business core. This allows the co-player to choose new ERP modules and functionalities that fit best with the relevant part of the organization, while still maintaining a solid core. The co-player does not have a single ERP vendor. Instead, they choose from case to case among several vendors

to find the apparently best solutions on the market, the best-of-breed.

The co-player adds modules to the ERP, but also uses the system to transform the organization. This is done by creating closer links to customers and suppliers through the use of ERP.

The organization is searching for new products and new markets, applying a prospector strategy for the organization as a whole. In order to do this they need a flexible IS strategy. The co-player regards their IT as a potential competitive advantage. Therefore, the IS strategy is a major part of the business. The IS strategy can be understood as an anchor domain affecting the business strategy, and thereby, the entire organization.

Most likely, the IT function is a department with its own director, working in close collaboration with the CEO. Since it needs knowledge about the business as well as the ERP system, the IT department has extensive business competences.

The co-player sees the use of ERP as a journey and is constantly looking for new opportunities from all relevant software vendors in the market. Though the co-player is trying to keep competencies in-house, this is not done at any cost. If some part of the organization is judged not to be a core competence, it is outsourced.

Quotation box 3: The Co-player

"There has been a paradigm shift with us. We continue to develop on our SAP R/3, but at the same time we implement other solutions and system components that do not come from SAP. Just after the implementation, six years ago that was different. We are exploiting the opportunities within SAP, but now we are also looking at other vendors."

"When we have a specific need for knowledge, which we do not have in-house we hire external consultants, but only as specific knowledge workers, and never as project managers. When we use external consultants we are very aware of knowledge transfer. So, we never hire external consultant for the same assignment more than once."

"Previously, our IT-competences were spread out all over the organization. Today, we have centralized our IT-department, and have - instead - a lot of offices for project work, where many of our people are placed on a temporary basis, together with people from the business. The dialog between the business and IT people is regarded as very important, even though it takes up a lot of time."

"After having been very focused on keeping our system in accordance with the standard software from SAP, we are now focusing on how we can differentiate from others. We do that by implementing the new web-services and configure them in various ways fitting specific business or costumers needs."

5 Discussion

The three archetypes presented here are a set of structures and systems embedded in an interpretive scheme, which is infused with meanings, intentions, preferences and values. Our purpose has been to bring out the implicit notions and orientations, to give both insight and perspective as to the way ERP systems are managed in organizations. Understanding the difference between the archetypes is crucial if researchers and managers are to understand the process of managing the ERP system in any particular organization.

The concept of archetypes serves to clarify the alternative main types of organizational management with ERP systems. Though the archetypes in themselves are satiated with normative ideas, to us they simply represent ways of shaping and understanding organizational experience, and it is not our task to evaluate their normative content (Brock 2006, Carr 2002, Mueller et al. 2003). Currently, the interpretive research on ERP management is in an overall phase of objective explanation, which might of course later be followed up (and subsumed) in new normative explication and evaluating discussion of the motivation – i.e. particular intentions, strategies, and more general values and beliefs – that carry the ERP systems.

The distinction between the three archetypes may become a tool for managerial reflection. It is a practical perspective that can be useful for the implementation and evaluation of ERP systems. The typology provides a view of the dimensions and consequences of the managerial and organizational context of ERP systems.

The archetypes can also provide assistance to researchers who engage in case-study research of ERP management. The typology should be useful in multiple-case studies for facilitating the identification and discussion of comparable cases. Furthermore, it provides a foundation for future research to specify in more details the applicability of the archetypes in organizations.

Belonging to one of the three archetypes does not imply that the organization will remain committed to this way of managing their ERP system. The organization can be expected to change its architectural perspective when the interpretive scheme underpinning the particular archetype is challenged, for instance due to technological changes or changes in the organizational context.

The benefits from implementing an ERP system may seem obvious to the organization. But we question whether an ERP system actually becomes integrated with the culture of an organization just by implementing it. Clearly, an archetype of ERP management makes up a specific component of the organizational culture in which it is embedded, whereas it is an interpretive scheme that comprises corporeal meaning and significance, which is instituted and taken for granted in the everyday life of the organization. But this implicit source of organizational sense may very well conflict with quite dominant orientations, trends or segments within the culture. If so, there would only be a partial integration or an unhappy marriage between the ERP system and the organization culture. Furthermore, the bare implementation of an ERP system does not necessarily lead to the emergence of a clear-cut archetypical

form of ERP management. The system may to such an extent be opposed to the organization culture that the managerial archetype only matures very slowly or never quite accomplishes its formation. This topic about week and strong formations of the three archetypes is associated with normative as well as descriptive questions of power, competence and participation that have not been taken up in our present study.

The organization needs to become aware of the different characteristics of the archetype manifested in its approach to and implementation and management of the ERP system. This helps them to consider the benefits and disadvantages of this archetype in its concrete organizational context. Furthermore, it helps them to reflect on changes in their management of the ERP system and also the possibility of moving towards a different archetype.

6. Conclusion

Understanding of ERP management is a relatively new field. The conception of archetypes of ERP management constitutes a foundation for the study and discussion of different aspects of organization and management in relation to ERP systems. Our study indicates that it would be superficial to apply a single, generic concept of ERP management.

We have presented three different archetypes that can be discerned in the management of ERP systems, when – after their process of implementation – these systems are established in the everyday life of an organization: the supporter, the driver and the co-player. The archetypes have different motivational, strategic and structural aspects, whereby they can be characterized.

Regarding further research, we consider the most interesting issues to be related to questions of power and change: How are concrete structures of governance, competence and participation associated with the different archetypes? How do the processes of transformation from one archetype to another unfold? In particular, it would be exciting to apply a normative perspective on the grounds of which the archetypes might be analyzed, assessed and discussed critically.

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