

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 archetypal 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.

4.1 The Supporter

The supporter is an organization whose 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

	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

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 as 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 wishes 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 saturated 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, Muel-ler 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 weak 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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