ERP – a moving target

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Abstract: Enterprise Resource Planning systems are central elements in long-term wide-ranging design and use networks. Present ERP research focuses on single-enterprise implementation and fails to address important features of the ERP networks such as multi-spatiality, the design of the generic and the dynamics over time. A six-field matrix is proposed as a conceptual frame, encompassing short- and long-term, and micro, meso and macro elements and leaving implementation as but one out of six aspects. Empirical research shows the long-term drift of an ERP community crosscutting locally and globally, and a single-enterprise case combines implementation and use underlining the marked reconfiguration of ERP modules and processes in a professional service company.

Keywords: actor network theory; biography; community; configuration; ERP; multispaciality; networks; professional services.


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1 Introduction

The changing conditions of the global economy continue to place information systems and communication technologies in the centre of desired enterprise transformation. Enterprise Resource Planning (ERP) is one core system, which has an estimated global market volume of US$88 billion in 2006 (Gartner, 2006). In the past almost 15 years ERP has developed away from first-time implementation in manufacturing enterprises, where the system originated, into a much broader array of settings and developments. These span shifts in the focus of ERP from single site to global organisational change, from ‘single source’ to ‘best of breed’ configurations in ICT architecture(s), from one software house to global networks of software development, from core enterprise functions, like accounting and production, to external interfaces (SCM and CRM), from implementation to life cycle adjustments to emergent business strategies. All this is...
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taking place under continual hyper competition and high-speed growth. These trends should accord with the management approaches and renewed attempts to study and understand the interaction of ERP with organisations and people.

The first aim of the article is therefore to evaluate the theoretical foundations for the study of ERP in prolongation of the above-mentioned developments, which should challenge several strands of research. The evaluation addresses some of the theoretical imperfections that characterise several perspectives in ERP research including information systems research and sociology of technology approaches. This article raise the issues not only multi-spatiality, proximity and spanning, mass customisation and the dynamics in ERP, but also on present restricting research focuses to single place enterprises and the use of metaphors. It is suggested that ERP ‘systems’ need to be understood as heterogeneous assemblages of human and material elements. These assemblages can be understood as ERP communities of software companies, customers, professional associations, various kinds of hardware and software, procedures implementation, practices and rhetoric spanning time and space. The systems are not solely malleable clay; rather they are heterogeneous materiality composed with abstract discourse elements that possess certain hardness. Moreover, ERP is driven by commercial business interests; software, hardware, consultancy and training are commodities, and design of these systems occurs under strategies of mass customisation, in which the encoding of the generic user is a necessary tool to reduce development costs and time to market. ERP is moreover a business subject to hyper competition (D’aveni, 1994) and a constant restructuring of players. The ERP networks are on therefore moving targets. The paper makes a status of ERP studies in this light, and ERP studies turn out to be a very uneven and dispersed set of contributions from diverse strands.

The second aim is to empirically illustrate the dynamics of the ERP networks. There is a need to show the connection between the global ERP (design) network and the organisational implications for enterprises. Two cases are examined, with a view to describing how design and interaction with users occur under such circumstances. The first, in which the network is denoted GlobalCo, mobilises a biography of an ERP system and its network to establish that distant and/or mediated users are a necessity in the long-term development of the generic. The second case describes how ERP, which is modelled over the template of a manufacturing company, is implemented and operated in a professional service enterprise. The enterprise is called ProfCo. As in the first case, the time frame is longitudinal to break away from the dominant focus in ERP studies on implementation.

2 Methods

The theoretical approach in this paper has its centre in interpretative sociology, but is multi-disciplinary. It builds strongly on science, technology and society studies (Grint and Woolgar, 1997; Law, 2002; Mackenzie, 2003; Pollock, Williams and Procter, 2003; Latour, 2005) and information systems research (Ciborra et al., 2000; Avgerou, 2004; Kallinikos, 2004), combined with management studies (McLoughlin, 1999) and the sociology of organisations (Preece and Laurila, 2004; Dawson and Buchanan, 2005). The multi-disciplinary approach is intended to enable an understanding of the multiple dimensions of ERP. It is thus (continually) necessary to open the black box of the
information system. In addition to understand the development and the use of information systems as a social process of building coalitions, networks and communities.

The conceptual part, taking stock of ERP studies, builds on several papers, articles and books by the author (Koch, 2001, 2002, 2004). It selects strongly in the extensive literature, drawing on literature reviews in a European project ‘Better Enterprise System Implementation’ (BEST, 2006), ongoing collection of material, and a recent literature review (Botta-Genoulaz, 2005).

The first case study is a multinational software house with offices in Denmark (called GlobalCo here) and was carried out within the frame of BiCON, but supplemented with other material (Dickson and Coles, 2000). The case study builds on two interviews with a high-level manager, an interview with a software developer and an interview with a test engineer, all with close relations to the development of a particular module of GlobalCo’s ERP system. The network of so-called Value-Adding Resellers (VARs) around GlobalCo was covered by eight semi-structured interviews selecting the VARs with relation to the development of the particular software module studied. Finally, 10 customer enterprises using GlobalCo’s ERP-system were visited carrying out ex-post evaluation of the implementation. In these case studies, several interviews were carried out at each enterprise. (Another version is published in Koch, 2004).

The second case study of a Denmark-based professional service provider, a consulting engineering company, was developed over 4 years of interaction. Managers from the IT-department of ProfCo contributed to seminars held at the Technical University of Denmark and ProfCo. Dialogue and one in-depth interview took place between 2000 and 2005. One interview with an end-user and informal dialogues with others were held. This interaction was supplemented with written material. Further research is ongoing. (Another version of the case study is published in Koch, 2004).

3 ERP studies? hardly any coherence!

The term ‘ERP’ surfaced roughly around 1993 and the systems that received this label emerged from two characteristically distinct strands: Manufacturing Resource Planning systems and Accounting Systems, both based on a client server technology. ERP has been studied from a number of perspectives such as technology management, information management, engineering, operations management, information systems research and sociology of technology. The vast majority of these studies focus on implementation and its impact on enterprises. Recent examples include Bendoly and Jacobs (2005), Shanks, Seddon and Willcocks (2003), special issues of Computers in Industry (2005) and Strategic Change (2005). Earlier contributions include Davenport (2000), special issues of Database (2001), Journal of Information Technology (2000) and many others (see Botta-Genoulaz, Millet and Grabot (2005) for a recent literature review). Some of these studies do to some extent take into account the increased complexity of contemporary techno-organisational change. However, complex and multilocated ‘systems’ such as ERP reveal a legacy that rests on relatively simple metaphors or core concepts such as ‘tool’, actants, boundary object and ‘embodied knowledge’, accompanied by a restricted set of actors such as the designer, the manager and the user (Avgerou, Ciborra and Land, 2004). As mentioned above, ERP ‘systems’ need to be understood as heterogeneous networks, assemblages of human and material elements.
That change with ICT continues to be at the core of contemporary enterprise transformation seems to be a very useful feature for researchers with that interest, evoking: on the one hand relatively well-established lines of research and on the other hand research agendas that keep establishing themselves: in the present case ERP, work and organisation. It is obvious that the understanding of implementation processes, impact of technology at work and in organisations, including control and skill issues has been extensively elaborated in respect of a number of ICTs (Zuboff, 1984; Orlikowsky, 1992, etc.) and is nevertheless still needed in ever-new areas. While it can always be claimed that the approaches need fine-tuning, the paradigm and a host of methods are long established. When ERP change is introduced in new forms of work and organisation, sensitivity towards the new domain and its micro-sociological life can be cleverly mobilised (Cornford and Pollock, 2003; Elmes, Strong and Volkoff, 2005; Benders, Batenburg and van der Blonk, 2006; Grant et al., 2006).

ERP, design and use enter into a complex and interactive relationship. ERP embodies work procedures and practices that unfolded in an organisation favour certain ways of organising. ERP and its materiality contribute to stabilising certain forms of organising and inhibiting others. However, local sociality interacts with ERP and becomes co-constructed in this process, which also means that elements of ERP are changed. In this process, immaterial elements of ERP are active. From a wider perspective, ERP is spread as a template for organisations, which attracts organisational models in one context and transport it to another. In this way, ERP plays a role as a type of material and immaterial institution.

Nevertheless, the present dominance of implementation studies needs to be challenged. They are sometimes too narrow in their time scope (as criticised by Pettigrew, 1985; Williams, 1997). Moreover, the separation between micro processes in enterprises on the one hand and meso and macro processes is holding up to a lesser and lesser extent. Lifecycle-oriented studies of continuous technological change are needed. And design is, as already noted, distant from implementation and use. Table 1 illustrates the point, although it is recognised that separating issues, as the matrix suggests, is of purely temporary analytical value – and hence seen as ‘illegal’.

### Table 1

<table>
<thead>
<tr>
<th>Micro</th>
<th>Long term</th>
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<tr>
<td>Implementation</td>
<td>Life cycle ‘after going live’</td>
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<td>Meso</td>
<td>Institutions of technology</td>
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<td>Professional</td>
<td>(MRP II) biography of system</td>
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<td>associations network</td>
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<td>Macro</td>
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<td>company change communities</td>
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### 4 Multi-spatiality

Early studies of technology, such as Pettigrew (1973) established an understanding of the implementation process taking the information technology as given by external factors. At least from around 1990 some contributions expanded to a much broader understanding of technological development.
Many authors from the 1990s criticise a linear understanding of technological change and perceive it in terms of location as more or less a *duality among two spaces*: the developing (software) company and the consuming/implementing company (Fleck, 1993; Salzman and Rosenthal, 1994; Williams and Clausen, 1997 and others). McLoughlin et al. (2001) provide a contemporary example of the same kind of constellation, and describe how it develops into a hybrid organisation between the software developers and the consumer company. Clausen and Koch (2002) argue that small IT vendors in the mid-1990s operated in segments of a few customers around a software house.

However, the main point today is that neither the single-organisation, nor the ‘two spaces in interaction’ approach encompasses the global features of the development and implementation of ERP. There is a need to go much further than the dual-arena concepts discussed above. ERP systems are not developed in a single-placed software house. The systems and their vendors have developed into worldwide organisations, in which further development of software is occurring in literally hundreds of places in parallel. Companies like SAP may have a majority of development resources located in one country (Germany), but encompass major development locations in a number of places, and even most of their offices worldwide carry out country-specific design. The company engages in a multitude of development alliances with representatives of future customer groups, such as construction contractors, universities and other public institutions (Pollock et al., 2003).

In such a constellation of companies developing the same suite of software there is an internal tension as to how and when to develop what (McLoughlin et al., 2001). Some actors see it as their competitive advantage to engage in what starts as bespoke software with a small customer group. In doing so, they do not wait for the ‘parent company’ to develop a new facility as part of the next version. Rather they develop their own and thereby create pressure on the parent company. Concurrently with this user groups, consultancies and others develop interpretations and political programmes on what is now needed (Koch, 2003).

For the time being there seem to be two complementary roads to go: *First* developing the new materialism approach that sees technology as material, immaterial and social (Latour, 1996, 2005; Law, 2002; Pels, 2002; Woolgar, 2002). In addition to add a discussion of the inbuilt organisation in ERP packages, looking at spatiality-producing elements and looking at how ERP produces certain spaces in organisations and at the same time tends to shape these organisational elements. *Second*, to view the constellation as a community or even a community of practice. Around a generic mass-produced ERP one finds a vast, heterogeneous grouping, which has at least a technology, the particular ERP system in common (Koch, 2001). The distance between the producers and consumers in the community is intentionally kept high by the producers, since competitiveness is seen to develop from being able to standardise and mass produce software. A number of organisations acts as mediators such as consultants, VARs (Value Adding Resellers), professional associations, user groups, education and training units. A certain level of common discourse on the capabilities of the ERP software and inbuilt organisational models is developed through the closer encounters like implementation processes, spread of information at seminars, magazines and other types of communication.

The community understood in this way becomes different from Wenger’s community of practice. Although, Wenger allows artefacts and reification to play a (important) role, technologies are hardly seen as constituting the Community of Practice (CoP). Wenger
(1998) gives preference to smaller, less invasive artefacts. At least in his 1998 version, there is considerable emphasis on co-presence as part of the way local constitutive practice unfolds. Finally, although Wenger assures us that COPs are not necessarily peaceful and harmonious (Wenger, 1998), the dominant stances build on the notion of ‘joint enterprise’.

In contrast to this, the constellation around an ERP system is usually multi-located in a way that not only creates islands of arenas for co-present practice, but also vast distances, with inbuilt tensions and conflicts. The core of an ERP community is not the practice, but the constitutive joint technology.

5 Distance, proximity and spanning

Since the phenomenon of multi-spatiality also represents a contemporary development of user-domains, it becomes crucial to understand the simultaneous proximity, distance and spanning between geographically dispersed locations. Proximity, conceptualised as ‘context’, is important for early information systems’ development thinkers in their attempt to promote the collaboration of designer and users (Kyng and Mathiassen, 1997). Today, however, other dynamics govern design, and the argument below is that strategies of mass customisation mean that social distance is aimed at in order to create generic functionality.

Proximity is clearly more of a social construct than it is a naturally given feature. Studies of user organisations show (Hinds and Kiesler, 2002; Mackenzie, 2003 and others) that new proximities are created when ICT mediates and helps spanning the geographical distances. A number of authors have proposed solutions to these issues. Castells proposes the term Space of Flows, to understand that place and locality are somehow dissolved and substituted with the importance of non-spatial communication over the web (Castells, 1999). Harvey speaks of ‘Time Space Compression’ (Harvey, 1996), Wenger of communities of practice, brokers and boundary objects (Wenger, 1998). Many have proposed virtual organisation (Koch, 2001). There are, however, still relatively few researchers who actually change their strategy to be able to conceptualise and achieve a better understanding of spanning and proximity. Those who have done so propose ‘imagining locality’ (Mackenzie, 2003), ‘travelling-risk’ (Rolland, 2004) and ‘global ethnography’ (Burawoy et al., 2000) as terms. On a much more practical level Holmström suggests the use of the internet for directly engaging with distant users in design (Holmström, 2004). It seems to me, however, that there is still a long way to go to understand the reconceptualised spaces for design and use.

6 Configurable, yet generic systems

Developments in the ERP markets were quite fierce in the 1990s. Hypercompetition wiped out a series of locally operating software houses specialised in bespoke solutions (Clausen and Koch, 2002), leaving fewer and larger players to survive beyond 2000. IS research has been slow to accept and re-focus research according to this occurrence of big business enterprise in software development and use (Averrou Ciborra and Land, 2005). Stewart, Slack and Williams (2005) describe it as the ‘design fallacy’, the too optimistic view that the problems of the users are basically an issue for good craftsmanship by
designers. The counter-strategy to the competition was mass production and generic packages such as ERP. The customisation possibilities of these mass-produced goods lie in configurability, in-built choices of modules, sub-modules, preconfigured workflows, and user profiles. As the case below discusses and Pollock describes in his research (Pollock, Williams and Procter, 2004) the design of generic packages makes it necessary to create distance from users and to mediate between the few taken onboard in order to create a ‘span’ to the complex and differentiated organisations. Embedding the full set of specific work procedures from a larger range of organisations would prove ineffective. ERP companies like SAP have here been successful in creating a belief that their product represented ‘best practise’, thus creating a situation in which local users were driven on the defensive, since specific details of the setting were construed as unnecessary barriers to development.

The configurability of the packages actually gives some possibilities of local appropriations. As the ProfCo case below shows, packages can be reconfigured quite profoundly. Seen from a globalised user perspective, the use of a common technology is moreover a condition of possibility for the creation of alternative experiences with more user-oriented configurations. Koch (2001), however, did not find but a few examples of ERP-support for team working in manufacturing, revealing that at that time organised users (unions, etc.) did not manage to exploit this potential. In other words, exploiting the configurability requires resources.

7 Dynamics: ERP networks are moving targets

A central feature of the ERP phenomenon is the coexistence of stability and flux in financial, organisational, technical and social dimensions. The multi-spatial ERP community with abstract and material elements possesses stability, and high speed at the same time. From a perspective of thoroughgoing interpretivism (Grint and Woolgar, 1997), instability in the form of renegotiation should be expected, whereas stability could be seen as a proof of technological determinism. Financially speaking, SAP has for example existed as a firm since 1972, with their main office situated in Walldorf since the early 1980s, whereas Microsoft Business Solutions through mergers and acquisitions encompasses elements with much shorter time spans of stability within ERP. A number of firms have disappeared from the field. Similarly, the technical elements of ERP systems such as the hardware, operative systems, the database, the application packages and the development tools exhibit very different speeds of development. One module of the software might represent 20 years’ stability, another just a year, a third exists only in marketing material.

It is perhaps this co-existence of stable and less stable elements that leads Kallinikos (2004) to declare the end of constructivism. He criticises constructivism for merely scratching the surface, arguing that ‘the study of technology and its social impact cannot be exhausted at the very interface upon which humans encounter technology. Essential strips of reality are not observable…’ (Kallinikos, 2004). In an appreciation of the complexity of the socio-technical phenomenon of IT systems and ERP, Kallinikos ventures into the system of technology, describing its components, functional interdependencies and sequences (Kallinikos, 2004). He observes that local actors will fail in their attempt to reshape/negotiate technology, since they will only encounter a limited area in a wider system of instrumental relations, sustained by an extensive
network of technical, organisational and social arrangements, an argument parallel to that
developed above on multi-spatiality, networked design and coexistence of stability and
flux. Therefore, within an ERP-community extensive resources are vested in design and
development processes, where new material elements are stabilised through a social
negotiation process, and most observers would find this process researchable via social
constructivist approaches. It is for example characteristic that software and
communication technology for Supply Chain management; Customer Relationship
Management and E-business are rapidly developing (Mansini, 2004). These processes
coexist with the stability of other black-boxed elements. Kallinikos’s argument thus helps
us in realizing that social shaping processes are not loyal to micro, meso, macro
distinctions, but cut across them (See also Mackenzie, 2002; Latour, 2005). Certain
elements are black-boxed in this social process and difficult to change for ‘local’ actors,
but are nevertheless a result of a complex social process and can and will be renegotiated
in ‘due’ time. It is exactly the complex spatial/non-spatial interaction that makes it
difficult to conceptualise using classical social sciences approaches.

The status of ERP studies thus exhibits a number of inabilities in addressing the
important trends of multi-spatiality, the tensions and the relations between spaces, the
mass customisation and the dynamics. Also restricting research focuses to single place
enterprises, implementation and a problematic use of metaphors. Here I attempt to
‘repair’ this, first by using a biographical approach on an ERP network, and second
through a longitudinal study of ERP and a professional service provider. The notion of
biography has been used by others focusing on the biography of the artefact (Appadurai,
1992; Kopytoff, 1992; Pollock, Williams and Procter, 2003). It is extended to encompass
not only the artefact, but also the entire network. This enables an understanding of not
only the complexity and depth, but also the dynamics of the network development. Using
the longitudinal approach in the enterprise case allows the understanding to transcend the
initial transformation of a manufacturing information system into a professional service
provider and highlights the continual alignment between business development and ERP.

8 Cases

Below two illustrative cases are described and analysed. The first, the biography of an
ERP-community, cuts across the entire six-field matrix presented above (Table 1),
whereas the second is a more modest attempt to demonstrate how the addition of the long
term perspective changes the results of a single enterprise study of an ERP
implementation and use in a professional service provider.

9 The biography of an ERP community

The global company in this case has an extensive international network with a number of
software development locations. The company is called ‘GlobalCo’ here and initially the
focus is on its Danish division, which commenced as an individual company. It is the
story of this company that forms the first part of the biography. The software is a
portfolio of several generic ERP packages, and the focus here is on one of them. At the
time of the study, the installed base of the system covered more than 50,000 customers
within Denmark and more than 15,000 abroad. The ERP system at the time was sold in
more than 20 countries. The Danish division was founded in the 1980s, independently of GlobalCo, and its growth was moderate in the first 6 years, bringing the turnover beyond US$15 million. From 1994 to 1998, the turnover tripled and the number of employees went up from 150 to 450. The company was merged with another ERP player in 1999. The development, sales and implementation of this software involved a complex collaboration between the Danish company itself and a network of VARs and a small number of major customers in the private and public sector. Many of the VARs were small, whereas a significant group had a turnover comparable to that of the Danish company. The VAR network continued to develop and restructure with new entrants, existing members leaving and mergers between VARs throughout the 1990s. The eight VARs studied were both small and very locally operating companies with 10–30 employees and larger ones with around 500–700 employees. The VARs both co-operated and competed within this framework. Many had overlapping customer groups, while others focused on more restricted market niches. Within this framework, a range of additional services had been developed and ‘bundled’ with the main software product, such as consultancy, training and additional software modules. Within Denmark, the network of VARs consists of more than 100 companies. Internationally, there are approximately another 500 VARs linked to the Danish company. These are legally independent companies with various types of formalised relationships with GlobalCo and ‘end-user’ customer enterprises. Therefore, it is important to note that, in contrast to classical software design and development of bespoke systems, GlobalCo does not have a direct relationship with most of its customers. The development of the collaborative networks with the VARs was a consequence of a deliberate strategy. This sought to use such inter-organisational collaborations as a means of ‘outsourcing’ sales and implementation, while maintaining product development activities in house. However, the larger, and some of the more specialised, VARs started developing additional software. The result was a distributed system of design. Here, the focus is on the development of the third generation of the ERP-system and a specific module within this. This project involved in the development of collaborative networks within the Danish part of GlobalCo itself, which then interacted with the broader network of VARs and selected customers described above.

The software development process studied was initiated in the mid-1990s by the core enterprise, which preferred a clean-sheet approach to building on experience with the earlier generation of the product gained by the VARs and end-users. The underlying business objective was to make the product more appropriate for use by medium-sized (not just small) enterprises and to expand in the international market. The organisation of the product development process was based upon the Microsoft Solutions Framework (MSF) (see Cusumano and Selby, 1995). This represented a shift from a traditional functional project organization to a form of matrix organisation. It involved the decentralisation of decision-making to product teams and the shortening of development cycles. This was motivated by the wish to reduce ‘time-to-market’ and by the perception that sustaining the growth of the company was dependent on finding new ways in which to ‘leverage’ the skills, expertise and knowledge of programmers and the system developers during the product development process. The formation of teams for the software development broadly followed the MSF rules and procedures. One of the teams was followed in their effort to realise one module of the package (the project management module). The team was particularly successful in negotiating, an appropriate fit of its task to available resources with the overall project management. The team was
able to limit the scope of the tasks that was required to undertake and was able to
persuade the project management to take a task away from the team. Similarly, in the
planning phase, the team was able to take the initiative in prioritising certain tasks and
down scaling others. Subsequently, the team was able to win additional human resources.

Internal communications within the team appeared to work effectively; as specified
by MSF, the team included a Product Manager, recruited externally, who had practical
experience in the domain the software module was to address. In most of the MSF
phases, the team was able to agree the chief part of its priorities and design internally and
to resist ‘interference’ from outside. At ‘post-mortem’ meetings held at the end of each
cycle of the MSF, several activities were evaluated by the team. These included the
internal collaboration within the team itself and how their respective roles were
functioning. The team established external communication about customer requirement
with the external intermediary network of VARs and significant major customers. In the
first phase, there were informal interactions between the team and the external VAR
network. Here three VARs and one significant end-user/customer were consulted. These
largely informal linkages served to open up information and communication channels
between the VARs, who had a more direct experience of customer requirements, and the
team, which was also able to manage the VARs’ expectations as to what the new module
would actually deliver. In a parallel process, the VARs were more ‘formally’ consulted.
A committee of VARs held three meetings before project management decided to halt
that activity. This reflected a continuing debate within the Danish division on the role of
the VARs. Several different departments of the Danish division articulated different
views on this issue. Within the team studied, an articulated interpretation was that
‘listening to the customers is in contradiction with being ahead of the competitors’.

Although the team developed a fair control over the development process, they did
not manage to control management as it was under pressure from clients and VARs to
release the beta version of the module from the first cycle. The release resulted in a heavy
bombardment of telephone calls to the team from VAR representatives and others who
wanted specific details incorporated in the next cycle. Two further forums served to
facilitate the flow of information between the Danish division and the VARs and between
the VARs and end-user/customers. These were monthly strategic meetings with both the
distribution function and project management, and project development workshops
organized by the VARs for their customers. In some instances, they resulted in joint
specification of requirements. However, from the view point of the VAR network, the
overall development process posed a number of problems. While all VARs were keen to
inform and support the development of the new ERP package, not all were convinced that
the end product was superior to competitor offerings. In some cases, VARs chose to
develop their own additional modules in order to make their total offer more competitive
from their viewpoint. Some VARs indicated that early product releases lacked the
necessary quality and created problems with customers. At the end of the research period,
there were still some VARs who would not implement the main releases of the ERP
package because of perceived quality problems. Several VARs expressed consternation
regarding infrequent releases of service packages for servicing the existing customer
base, and some mentioned the lack of help from the Danish division in creating sales
arguments in relation to competing systems. To this end, VARs used informal networks
and contacts with software development project teams to gain product information of this
type. In some cases, these flows of information contradicted internal structures and
procedures within the Danish division. Such tensions also highlight a differentiated
landscape of VARs. Many are ‘total systems solutions’ providers where additional tailor-made programming is a central offer. Some have a role as developers whereas others are mere implementers of standardised systems. If developers and total systems solutions providers flourish, this will be a problem for GlobalCo in the long term, in as much as the company is primarily interested in branding its ERP products as very flexible standard solutions with little need of subsequent customisation.

The acquisition of the individual company by GlobalCo occurred as a process in parallel to that described above. A ‘multiplication’ of software suites, VARs and customers occurred, introducing even stronger dynamics than before. The case shows how internal and external networking also takes place around the development of the new module for project management. The network players constitute a differentiated landscape and several dynamics are intertwined. Where the project management module is genuinely new and reaches out to the professional service companies, other elements of the ‘new’ packages merely re-established pre-existing functionality.

10 A traditional enterprise case? – Implementation, use and further development of ERP in a professional service company

The case study discusses a Danish consulting engineering enterprise, an international firm with main office in Denmark (called ProfCo). Main activity areas comprise engineering consulting on energy, environment, infrastructure, building and operations, construction management, economics, general management and information technology. These areas are organised in nine divisions supported by a general services department encompassing the IT organisation and staff. The company employs some 1500 in the parent company in Denmark, and an international organisation, which has not, however, implemented SAP. The process of ProfCo with SAP R/3 unfolds, through first a SAP R/3 configuration and implementation, and, second, the subsequent further development.

10.1 The initial vision: substitution of legacy systems, R/3 as (almost) single source

The strategic vision of information systems management was developed in 1995–1996. The old fragmented legacy systems architecture was to be replaced by standardised IT solutions, using SAP R/3, Microsoft Exchange and Documentum as the three main elements. At the same time, ProfCo did not have ambitions for reengineering the organisation and the company’s CAD solution was also kept outside the area of renewal. ProfCo established a project organisation that carried out a market search and finally short-listed SAP R/3 and Oracle. A contract with an implementation consultant was signed in 1996.

The central business processes in engineering are the projects. From initial quote to final delivery ProfCo have to manage more than 5000 projects per year. Moreover, the main resource of the enterprise is its human resources. Finally, the main content of the projects is handling and information developing of various kinds. These basic preconditions tell a lot about the differences between business processes and resources at ProfCo compared to the ERP template of a manufacturing company.
The company considered purchasing the business solution for construction and engineering, but did not feel that it sufficiently met the central demands. Especially, registration of hours spent on projects by employees was seen as key. Since SAP found this need with other companies in related sectors, such as management consultants, this became the basis for a new business solution for service providers. ProfCo thus became part of one of SAP's sector alliances, which enforced both parties’ strategies: SAP's diversification strategy and ProfCo’s search for strong solutions in its business processes.

In the initial phase of the project, it was decided to avoid additional software application development and focus on standard R/3. Initially in the configuring phase, some main modules were taken on board whereas others were left behind. The former included financial modules, human resources, sales and project management. The latter comprised materials management and production planning. This choice indicates that ProfCo's configuration is markedly different from the manufacturing template, which would usually encompass material management and production planning as central for controlling manufacturing resources, mainly machines and materials. Many manufacturing companies would also choose quality and maintenance management.

Even at the sub-module level, certain choices are characteristic. Within Human Resources, the cross application time sheet module (CATS) is thus crucial in this configuration. All 1500 employees use this module on a daily basis. In addition, travel administration is important. To support financial reporting on projects, the special ledger sub-module (FI-SL) was configured. The project group’s ambitions regarding adjustments of parameters overthrew the schedule for the implementation. Moreover, cooperation with the external implementation consultants had to be cancelled. Configuration of user profiles and training was carried out in a relatively traditional way. The project group considered the appropriateness of narrow or broader profiles and developed an ordering of access elements in 200 activity groups. These are mixed for the individual user according to user groups. For example, employees have two central profiles for CATS and travel, respectively and each department needs to have a specific activity group. Other important meta-groups of user profiles include those for line managers and financial management.

The implementation involved training, the first program in 1999, and the second later as a campaign to enhance user support, user interface and other elements improving end-user situations. The 1500 employees use the system for hours spent registration, and 700–800 project managers use it for project management accounting. Around 60–70 line managers use the system for financial management. Finally, central functions like finance and human resources are using the system. However, project management in general is still carried out using other products like Microsoft Project, Artemis, Primavera and others (see below).

10.2 Further development

ProfCo has continued to develop its installation since 1999. An upgrade of R/3 from version 3.1 to 4.6 was realised in the autumn of 2000. A number of smaller upgrades and developments have been carried out using ABAP/4 programming, resetting of parameters, changes of screens and design of new reports. In 2001, a major configuration and programming of automatic data generation for intellectual capital accounting was implemented. The enterprise strategy for knowledge management is in this way supported by R/3, along with the other systems in the present IT-architecture. Although
the original belief in 1995 was that an integrated architecture with a few systems could be realised, the IT architecture is still combined by a number of systems. External co-operation in the construction area, for example, means that the company needs to be able to tackle various system interfaces in almost every new project. Moreover, intranet, projectweb, project management and computer-aided design continue to be areas where others can deliver better systems than SAP. The present best-of-breed architecture consists of nine integrated applications/systems:

- Intranet
- Project Extranet
- Internet Interface
- PRIS (project information data mining)
- ERP
- CAD
- MS Office
- MS Project.

PRIS is an in-house developed system handling information on previous projects. The integration between software packages using object-oriented techniques is therefore central and will even gain importance in the future, which parallels the general increased focus on integration of information systems (Prencipe et al., 2005; Hasselbring, 2000).

After roughly a year of operation, it was decided to configure the system to support and ‘automise’ the intellectual capital accounting of the company, which was only possible after considerable effort by the internal IT department. Lately business intelligence functions have been configured and offered to department managers. In parallel to this, the company decided to globalise further, through mergers and acquisitions. Two major companies were merged into the company structure, which meant developing two different IT-integration approaches. In the first merger the users’ profiles were enlarged, accounts and so on in a full embankment of SAP functionality, which collided with organisational practices in the acquired company. The other merger was much more cautious in recognising the existing ERP-system in use in the acquired company, and using single projects as probes for the integration.

11 Discussion

This article opened with the claim that there was a need to enlarging scope and topics in ERP-studies to achieve a better understanding of the dynamics and the full range of the design and use network within which the organisational implication are shaped. Two case studies have been examined in order to underpin and illustrate how new approaches like biography and longitudinal studies covering implementation and operation can help. In the following reference is made to the matrix presented in the conceptual part (Table 1).

The ERP community case (GlobalCo) covers the entire matrix, and micro and macro phenomena are intertwined. GlobalCo, while still a Danish company, became an ERP network based on mass customisation. The commodity feature became central and the
hub-software house successfully kept the users and the customers in general at a distance. The VAR network was not only instrumental in doing this, but also represented a potential competition, which meant that a continual alignment was carried out in the design network.

The biography approach reveals that the long-term development does not represent an accumulation of functionality, but rather waves of more and less new functionality. Software is in this respect a commodity and the software company is doing business, which can be realised through reselling the same functionality over time. The case shows that there is room for classical design activities. The SW designers were thus active in shaping what they believed were the needs of the users. There was moreover one customer company that was active at the ‘birth’ of the package. This result accords with the Pollock study, in which a few customers were invited onboard in the initial design phase (Pollock, Williams, and Procter, 2003).

The case of a professional service provider implementing and operating SAP R/3 (ProfCo) operates more modestly on the micro level in the matrix, but includes operations in contrast to the vast majority of ERP-studies. It shows that, when R/3 is configured for consulting engineering, the solution becomes markedly different from the manufacturing template. After months of initial struggle the R/3 implementation and use were evaluated as largely a success for ProfCo. ProfCo continues, however, to face problems in meeting detailed demands on existing processes when configuring SAP to support them. In other words R/3 is not endless malleable, but the IT-department was able to develop needed bespoke solutions and ProfCo’s considerable investment in internal R/3 competency paid off. Through these internal resources, ProfCo was also able to compensate for dependency on the development of SAP’s service provider sector solution. ProfCo does have a number of wishes for further development of the sector solution.

The organisational implications relate primarily to the need for strategic management to have a stronger overview and control of the enterprise. For a user of R/3, experience points to a freezing of particular roles such as tasks for the Project Manager and tasks for an ‘ordinary employee’. Moreover, in each department there is a tendency for only a few (department managers) to use the financial controlling functions. The user-friendliness of the system was the subject of ongoing debate and the fragmentation between the company’s ICT infrastructure and project-specific external ICT demands gave continual ‘gluing’ problems in attempting to draw on SAP along with a specific project management (like Primavera). The two major new companies were merged with ProfCo in two different ways: the first exhibited enlargement of the user profiles, access to accounts and so on in a full embankment of SAP functionality, along with full organisational and spatial integration at the headquarters of ProfCo, which collided with organisational practices in the acquired company. The other merger was much more cautious and maintained the existing ERP-system in use in the acquired company.

12 Conclusion: The moving target II

Mass-produced packaged information systems, such as ERP, are global networks of design and use. These networks around the technologies are unstable; new versions and new companies keep emerging and with unclear content vis-à-vis previous systems. This situation challenges the skills of all types of user representatives, perhaps especially information system managers. It seems more important than ever to create temporary,
agile and flexible alliances externally and internally. Internally, it will be important to create policy processes with broad participation, enabling the enterprise actors to formulate basic policies for the needed software, not only during implementation, but in a long term alignment with company development, strategic management and IT governance. Externally, spanning the gap between design and use is a continual challenge and other local allies such as associations are important.

Different actors using various part of the ERP systems develop different experiences and get different development resources. The interpretation of the information systems will continue to be equivocal (Weick, 1990; Knights and Murray, 1994). This is also echoed in the ProfCo case, where some employees may have developed an understanding of the system as inflexible and unduly complicated, whereas other groups, like the supporter-users, interpret it quite differently. At the same time, external developments in the ICT sector and among collaborators will continue to create tensions for the ICT solutions adopted in the enterprises.

The analysis above-addressed some of the imperfections of present ERP studies. They should in the future go beyond the single space enterprise, as well as moving away from implicit assumptions of stable states of the system. Moreover the specific types of software design related to mass production and hypercompetition could be better understood. ERP, organizations and people are moving targets, a profound challenge for upcoming research.

References


ERP – a moving target


