

THE CONSTRUCTION AND RECONSTRUCTION OF PRACTICE

An examination of the effects of the implementation and use of ERP systems

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ABSTRACT

One of the key features of ERP systems is that they are claimed to bring with them a set of practices that should support the organization in achieving a variety of benefits through standardized ways of working that use integrated and real time information. During implementation and use, these practices need to be re-contextualized and in this process they will be (continuously) adapted to the local contextual situation. Viewing ERP practices as a form of organizational routines, that need memories to be enacted and interpreted and that are also “locations” of such memories, enables us to use an organizational memory mismatch approach for our subsequent theorizing and analysis.

Our analysis focuses on identifying examples of memory mismatches – conflicts in the memories that are evoked to interpret and enact the ERP practices – through re-analysis of the AcademCentre case study, which particularly focuses on the ways people (learn to) use an ERP system at a Dutch university, or fail to do so successfully. The impact of these mismatches on the enactment and re-enactment of ERP practices is explored enabling the development of a better understanding of the ways in which ERP systems are actually implemented and used.

1 INTRODUCTION

Enterprise Resource Planning systems are a specific type of complex information systems that organizations (intend to) use in order to enhance efficiency, in particular by supporting administrative and logistic internal processes (Klaus *et al.*, 2000; Van Stijn, 2002). ERP systems should support the organization in achieving a variety of benefits such as faster administrative cycles, improved scheduling, cost efficiencies, and reduced throughput times, through standardized ways of working that use integrated and real time information (Boudreau & Robey, 2005; Davenport, 1998; Gattiker & Goodhue, 2004; Holsapple & Sena, 2005). ERP systems are a widespread phenomenon in the sense that they are developed and introduced around the world. Large Fortune 500 multi-national firms as well as SMEs in many different sectors and settings have embarked upon ERP projects particularly since the mid-nineties (e.g. Davenport, 2000; Hirt & Swanson, 1999; Markus *et al.*, 2000; Muscatello *et al.*, 2003; Olhager & Selldin, 2003; Sarkis &

Sundarraaj, 2003). As with other information technologies, the results with ERP systems are contradictory (Boudreau & Robey, 1999). One may encounter stories of extreme success to drastic failures.

“IBM’s System Storage (disk drive) division achieved a reduction in the time to enter pricing information from five days minimum to five minutes, replacement part shipping went from twenty-two days to three, and credit checks that previously took twenty minutes are now accomplished in three seconds (Davenport, 2000, pp. 7-8).”

Failures are reported as well, for example “Unisource Worldwide Inc., a \$ 7 billion distributor of paper products, wrote off \$168 million in costs related to an abandoned nationwide implementation of SAP software (Bingi *et al.*, 1998, p. 7).” The ERP implementation at FoxMeyer is even assumed to have been a major factor in their bankruptcy (Scott, 1999). Considering the high ambitions and stakes, the high risk and cost of failure, and the multi-billion market surrounding ERP (involving suppliers, consultant, application hosts, etc.), improving the rate of successful implementation is obviously of major practical and academic concern. Indeed, the general question as to how we may develop, implement and use ERP systems efficiently and effectively to improve our business and gain competitive advantage has certainly not lost its relevance.

ERP systems are seen as the generation of IS that is able to standardize and thus integrate information and information streams across the different functional areas in the organization. In particular, this implies that people supposedly share the same set of data by means of the ERP system and that they put this data to use in support of the plethora of organizational (Al-Mashari & Al-Mudimigh, 2003; Davenport, 1998). This kind of information system is constructed and implemented with the intention of structuring the functioning of the organization by prescribing and proscribing certain practices and by creating dependencies and relationships between people that often have not existed before – or at least had not existed in such an integrated, formalized and rationalized manner (Koch, 2001; Pollock & Cornford, 2004; Pollock *et al.*, 2003). Indeed, ERP systems may be seen as archetypical of rationalistic systems consisting, as they do, of models of rationalism which results in their being comprised of a large array of formal

rules, regulations, norms, and knowledge embedded or implied in the system. This formality, necessary as it is to manage the complexity of the systems they are intended to represent, brings about a specific rigidity that makes dealing with emergent situations, learning, and creativity difficult challenges (Kallinikos, 2004).

In contrast to many of the earlier information systems, ERP systems are not developed in-house, they are developed by third parties. This raises additional pressure for standardized solutions, so that the software developers can market standardized 'solutions' to a number of clients. In order to create standardized systems it is necessary to de-contextualize the system contents in order to be able to "copy and replicate" practices across organizations, thus enabling the application of a single version of an ERP system across a number of clients (Gosain, 2004; Wagner & Newell, 2004; Winter & Szulanski, 2001). It is important to recognize that although some significant standardization takes place there are also opportunities for customization. Thus, the approach of ERP suppliers tends to be to deliver a limited form of mass customization, in terms of providing a platform that has standard characteristics but also a certain degree of freedom for the organization that implements and uses the ERP system. To the extent that we may view mass customization at one end of a spectrum and standardization at the other end most ERP systems fall between these two extremes.

In this paper we focus primarily on the (re)construction of ERP practices during implementation and use of an ERP system by client organizations. It is interesting to note that one significant rationale advanced for the adoption of ERP systems is that the practices 'encoded' by such systems represent ideal 'best' practices (Wagner *et al.*, 2004). As we have noted above, in order to be more generally applicable these practices need to be encoded in a standardized, generalized and de-contextualized manner. They represent 'ideals' that are packaged in a particular ERP 'solution'. During implementation and use, then, these practices need to be re-contextualized and in this process they will be (continuously) adapted to the local contextual situation, either through the ways in which the software is configured and customized, prescribing and proscribing practices or in the ways in which practices are actually enacted.

Re-contextualizing practices that are encoded in ERP systems may well result in the mutual adaptation of the de-contextualized contents of the ERP system and the existing, and evolving context of the organizational settings in which practices are enacted. We have also observed, and discuss later in this paper, that practices are sometimes re-contextualized by vendors and consultants only to require further re-contextualization by the actual users of the system. Re-contextualization may also require organizational members to learn new concepts and re-learn or unlearn pre-existing concepts (Pawlowski & Robey, 2004). Sometimes encoded practices may be modified whereas in other cases we find that practices are reconstructed through by developing workarounds and “tweaks” during actual interpretation and enactment of the practices. Such actions may well result in the emergence of new practices (Boudreau & Robey, 2005; Pollock *et al.*, 2003; Soh *et al.*, 2003; Van Stijn & Wensley, 2005a, 2005b; Wagner & Newell, 2004). Thus, ERP’s practices are continuously reconstructed over time and through this reconstruction we contend that they will always differ from the alleged ‘ideals’ that are claimed to be embedded in ERP packages (Van Stijn & Wensley, 2005a, 2005b; Wagner & Newell, 2004). Indeed, such ‘ideals’ are not fully contextualized practices and can never be. Although some aspects of context can be embedded in ERP systems we contend that it is not possible, in principle, to embed *all* aspects of the appropriate context. Since we do not have space to discuss the nature of context elaborately we would refer the reader to a recent paper by Thompson and Walsham (2004). In this paper they define context as:

“[C]ontext is seen as a performative prism, in which shared and non-shared, historically pre-existent, *components* of experience fuse completely in a unique configuration to a particular experience-in-activity (Thompson & Walsham, 2004, p. 742, original italics).”

Although Thompson and Walsham (2004) provide some hints about how we might interpret context and hence theorize about the nature of de-contextualization and re-contextualization we would contend that these concepts are not well-understood yet. In the paper we offer a starting analysis by investigating how people engage with ERP practices and how they reconstruct these practices during implementation and use

(Orlikowski, 2002; Schultze & Orlikowski, 2004; Szulanski, 1996). In particular we focus on the role that individual and organizational memories play in this reconstruction process. Individual and organizational memories comprise essential components of the context within which practices are enacted. We would note that there is not a one-to-one mapping between individual and organizational memories and the components of context to which Thompson and Walsham (2004) refer. We intend to elaborate on the nature of an appropriate mapping in a subsequent paper.

We have noted above that the implementation and use of ERP systems may lead to the creation of new knowledge or, at least, the modification of existing knowledge. However, we would observe that it is not clear how such new knowledge can, will, or should be integrated with old knowledge or with other items of new knowledge. Further, such new knowledge is often not recognized as such and thus may be ignored or even lost. We will return to this issue later on in the paper.

We direct the discussion in this paper at the level of practices making use of the literatures on organizational memory and organizational routines. Viewing ERP practices as a form of organizational routines, that need memories to be enacted and interpreted and that are also “locations” of such memories, enables us to use an organizational memory mismatch approach, as developed in Van Stijn and Wensley (2001), for our subsequent theorizing and analysis. We focus on identifying examples of memory mismatches (Van Stijn and Wensley, 2005a and b) through the re-analysis of an extensive case study of an ERP system in use, AcademCentre (Bondarouk, 2004, 2006). The impact of these mismatches on the enactment and reenactment of ERP practices is explored enabling the development of a better understanding of the ways in which knowledge potentially either supports or fails to support change at the process level stimulated by the implementation and use of an ERP system. The approach we adopt allows for the partial articulation of the notion of context that is relevant to the enactment of practices within organizations.

The remainder of this paper is structured as follows. In section 2, we provide a further theorization concerning the nature of ERP’s practices, their reconstruction and the

relevance of conflicting memories, placed against the background of prior research. Then, we introduce the AcademCentre case and our methodological remarks relating to this case in section 3. Section 4 presents the rich details of our re-analysis, followed by a discussion and reflection in section 5. In section 6 we draw up our conclusions.

2 THEORIZING ABOUT ERP'S PRACTICES

In this section we describe the way in which we approach ERP practices through our perspective derived from the study of organizational routines, organizational memories, and memory mismatches. To put our research in a broader frame we first address existing ERP studies that also have a focus on knowledge.

2.1 Prior studies on ERP from a knowledge perspective

Robey et al. (2002) discuss how people struggle with learning about how a new job should be done and with understanding how the new practices they form part of are interrelated and integrated. Before people can learn to work with the new processes (*assimilation*) they need to learn more about the software to enable them to configure and re-contextualize the new business practices (*configuration*). These findings suggest that there is a dialectic taking place between memories and new experiences. To the extent that memories and new experiences are inconsistent or conflicting it may not be possible to integrate new experiences into existing knowledge. Thus, memories may be considered to be a barrier towards learning and implementing new knowledge. In the ERP setting, a lot of knowledge needs to be formalized and codified to build representations that can be embedded into the technological system (Lee & Lee, 2000). Hislop et al. (2000) narrate that at Pharma-Co, the project management team bypassed the production managers to involve lower level production management for the process mapping.

“The project team disguised its motivation for conducting the process mapping exercise by telling the production staff involved that it was related to new quality assurance certification. The necessity for the process mapping exercise, which was concerned with codifying and formalizing internal production procedures, was related to the tacit and embodied nature of the production process, which the project team needed to utilize to design their change program. This knowledge

had never been fully, formally, codified into documentation and was instead possessed by production staff, who had acquired it through on the job learning. Thus, to tap into this knowledge/ expertise the project team found it necessary to directly engage with the staff that possessed it (Hislop *et al.*, 2000, p. 403).”

Though the direct involvement of end-users – the people who were actually engaged in the processes – is commendable, the fact that it was disguised and taken out of the context of the ERP implementation is questionable. In addition, it becomes difficult in such a situation to share representations or knowledge about the processes, which postpones the identification of inconsistencies in knowledge and memories to occur and so they will not be detected until later, usually during actual use. The latter point about process representation is not addressed yet in these studies, though Newell *et al.* (2004) interestingly note:

“After an abortive attempt by some to work together, each member conducted his/ her workshop independently and then proceeded to map out the particular processes associated with his/ her functional area. There was very little attempt to share these maps or to see overlaps between them (Newell *et al.*, 2004, S. 49).”

And that:

“To map existing organizational processes, then, involves accessing and integrating these collective understandings, which are both dispersed and ambiguous (Newell *et al.*, 2004, S. 44).”

Several studies theorize about the transfer of knowledge and knowing internally in the organization (Lee & Lee, 2000; Volkoff *et al.*, 2004). Lee and Lee (2000) present a case study of the University of Nebraska. These studies suggest that knowledge transfer takes place by adopting the core business knowledge proposed by ERP and by mapping the reference process models or ‘best practices’ to the organization. They focus on the explicit codified knowledge and representation, in a rather rationalistic manner, and do not indicate how other knowledge is of relevance (Hislop *et al.*, 2000). Although Lee and Lee point towards conflicts with existing organizational structures and values – more

similar to the misfits suggested by Soh et al. (2000) - they do not investigate the organizational epistemic and conflicting memories in the broad sense that is adopted for this paper. We would suggest that such approaches to knowledge transfer ignore much of the context that must necessarily be invoked in order to enact practices, 'best' or otherwise, in any organization.

Volkoff et al. (2004) investigate the knowledge transfer from an implementing team to users at the level of communities of practice, and particularly the role of "power users" therein. Attention is paid to the fact that the transfer of knowledge among different communities is difficult because of incompatibilities between what constitutes knowledge in the different communities. Thus knowledge transfer often requires at least translation and sometimes also transformation (Bechky, 2003; Carlile, 2004). This aspect of transfer and translation is also illustrated in the case of ManDisCo, a manufacturing and distribution organization (Pawlowski & Robey, 2004):

"We sit with our users. So every day is a knowledge transfer. I have people throughout this whole building, sitting there, knowing the business, being able to talk their language, to be able to interpret what they're asking for (Director, Information Resources – Informant #4) (Pawlowski & Robey, 2004, p. 654)."

"IT professionals thus viewed themselves as both translators and interpreters – reframing, explaining, and clarifying information in the context of the work practice of a particular group. Because each group's meanings were situated in their own work context, IT professionals needed to be aware of the differences in meanings of the same words, or the same word used differently, and forms of speech used by different organizations (Pawlowski & Robey, 2004, p. 659)."

These observations prompt questions about whether knowledge is actually being transferred in these cases. It would appear that a process is taking place that results in the creation or recreation of knowledge rather than its transfer. As Thompson and Walsham (2004) caution, views of knowledge as objects which can be transferred from one situation to another ignore both the importance and richness of context and the importance of individual knowing.

Jones et al. (2006) take a pragmatic view on knowledge sharing in an ERP setting, defining it as “sharing of knowledge about business processes and the related knowledge required to make these processes work (Jones *et al.*, 2006, p. 412).” They investigate how different dimensions of organizational culture may facilitate or hamper the knowledge sharing process that is necessary for ERP. Following Thompson and Walsham (2004) we would suggest that this situation can be explained through awareness of the fact that organizational culture is a component of the context. Experience that fuses with one context to result in action may result in fundamentally different action when we attempt to fuse it with a different context. Wagner and Newell (2004, p. 308) take a different road where they develop the notion of diverse epistemic cultures, focusing on “the heterogeneity of the knowledge-creating activity across contexts”.

“Knorr Cetina (1999) argues that different communities exhibit distinct epistemic cultures; that is different sets of social, material and discursive practices that make up ‘how we know what we know’ (Wagner & Newell, 2004, p. 308).”

Thus they focus on diversity between different groups, as for instance the difference between the budget director, faculty and administrative staff regarding the budgeting approach - illustrated in their case study of the university Ivy. This resulted in conflict rather than cooperation and may be related to the way that ERP’s best practices are forcing organizations to choose for one set of knowledge over another. As Wagner and Newell put it:

“The power of best practice software is then to inscribe the values and politics of professional managers over traditional academic standards. This has the potential to reorder the working activities of actors and send the message that there is only one source of valid knowledge within the university. Focusing on these processes of standardization helps us think about the implication of design – of squashing multiple knowledge repositories – when the ultimate goal is to find a way to coordinate and govern an organization. In this way perceived success or failure of an ERP design is secondary to understanding the power of technology to act as a delegate for a particular world view, and a silencer of others (Wagner & Newell, 2004, p. 324).”

Whereas researchers have dealt with questions as to how new knowledge is transferred, shared and integrated with existing knowledge in the setting of ERP systems, such investigations have provided only limited understanding as to how difficulties arise from such knowledge being diverse, ambiguous, vague, unshared, or indeed conflicting, and how this influences the ways in which people are able to construct and reconstruct ERP practices when they are re-contextualized during implementation and usage. In the next sections, we further detail the theoretical frame of our approach.

2.2 ERP's practices as organizational routines and the role of memories

Central to the analysis presented in this paper is the notion that ERP practices are, in essence, organizational routines where people make use of ERP technology (cf. Szulanski, 1996) as an integral part of enacting such routines. Many definitions of organizational routines exist (Becker, 2004; Cohen & Bacdayan, 1994; Pentland & Rueter, 1994), focusing primarily on “recurring patterns of behavior of multiple organizational members involved in performing organizational tasks (Feldman & Rafaeli, 2002, p. 311).” These tasks are – especially in the context of ERP practices – highly integrated, both in terms of the dependency of actions that constitute any given practice and of the knowledge involved in actually enacting a practice (Boudreau & Robey, 2005). Although with ERP systems the prevailing view is that the set of possible patterns is and should be much more restricted by the ‘best practice’ rules, templates and formalizations, this view has been contested in several studies that report such phenomena as “tweaking” and workarounds (Boudreau & Robey, 2005; Pollock & Cornford, 2004; Pollock *et al.*, 2003; Wagner & Newell, 2004).

Our view of practices as routines is reminiscent of the agency and practice views (re)introduced recently (Boudreau & Robey, 2005; Emirbayer & Mische, 1998; Feldman, 2000; Feldman & Pentland, 2003; Orlikowski, 2000, 2002; Schultze & Orlikowski, 2004). Every time a practice is evoked, its precise nature is a result of a complex interaction between individual knowledge and cognitive structures, organizational memory, and other aspects of organizational structure and agency. Interestingly as participants act they also help to structure the actions of others. In this context, structures are seen in a more or less similar manner as proposed by Giddens (1984) in his discussion

of structuration processes and the duality of agency and structure. Some of his ideas, in particular concerning the importance of interpretive schemes, how human action is given meaning (signification) through such schemes, and the fact that we are talking about knowledgeable agents who have a potential for exhibiting reflexivity, are indicative of the importance of memories in practices.

Knowledge (interpretation) is necessary in order to be able to enact the routines and the enactment of routines shapes and modifies our knowing. This is especially true in the case of prescriptive technologies such as ERP where we want the routines to be performed in a reasonably stable manner which would imply either a reflexive understanding of these routines or their habituation. Within organizational memory theory, routines are seen as specific 'locations' of organizational memory (Becker, 2004; Cohen & Bacdayan, 1994; Moorman & Miner, 1998). We view memories as both individual and structural; they are networked in a complex web of interrelated and interacting knowing that derives its meaning from the use (including abuse, misuse, non-use) of the memories in people enacting ERP's practices. This networked web gets dynamically shaped through such use, because the enactment creates new memories, in the form of new representations, concepts, ideas, and so on, and enactment weakens or eliminates others and changes the individuals as well as the setting (network) within which they act.

It is important to consider that the memory contents at different 'locations' (1) embed contents that may refer to, and derive their meaning in part from other memory contents in other 'locations' and (2) they may re-shape each other, and interact, when for instance they are simultaneously used in enacting a certain routine. However, such interactions and interrelationships of memories are often ignored in the literature (Corbett, 2000). Clearly, as we implement and use technologies that potentially change the nature, content and interrelationships between organizational and individual memories it is likely that existing practices (routines) may be modified and new practices (routines) enacted in ways that were neither intended nor are fully understood.

2.3 Reconstructing ERP's practices

When we refer to “the reconstruction of ERP's practices”, we consider it important to recognize that different actors retain and make use of multiple representations of these practices, they operate within different contexts. These actors are primarily suppliers, consultants and people located in different units within the organization. Next to the memories of these (groups of) individuals, the web of memories also includes the representations in e.g. the existing routines, structures and the cultural heritages of the organizations directly and indirectly involved in the practices concerned – as suggested by organizational memory theory (Walsh & Ungson, 1991; Wijnhoven, 1999). Because a key aim is the integration of the practices supported by ERP, these practices are necessarily boundary-spanning in organizational and memory terms.

The reconstruction of ERP practices takes place through the implementation of an ERP system that is based on the various representations and interpretations of how the ERP practices should be shaped. In addition, the recreation of the practices is understood here as being realized through the actual enactment of the routines. When practices are enacted existing individual and organizational memories interact dynamically with interpretations of the ERP system's representation of practices. It is our contention that careful investigation of such enactments occurring and reoccurring as the ERP system is actually used is necessary in order to understand the richness of the interactions between the ERP system and the organization and some of the consequences, both positive and negative, of these interactions. Implementation studies involving the identification of organizational-level critical success factors for ERP do not provide this level of detail and therefore fail to identify many challenges and opportunities associated with the use of complex enterprise-wide information technologies (Hong & Kim, 2002; Umble *et al.*, 2003).

In our analysis, we interpret representations primarily in terms of people's understandings – and misunderstandings – of the ERP practices. As such, learning processes and training are considered to be essential to the modification of existing representations and the creation of new representations. In our approach training relates to the guided preparation to learn how to use ERP for the job tasks resulting in modification or establishment of

practices. Training must take into account not just the new actions that must be performed but also facilitate the addition, modification or elimination of practices in part through the elimination or modification of existing memories and the establishment of new memories. Training must also take account of the need to develop new understandings of the actions of others and facilitate the creation of structures of interpretation and interaction that will allow for the enactment of new practices or the modified enactment of existing practices. Adopting this richer perspective on training allows us to highlight significantly more nuanced understandings of what is going on at this level and, in particular, identify problems with the “push button approach” to training that is often adopted as well as critically evaluate the role of manuals in the training for and reenactment of practices.

All in all, the reconstruction of ERP practices can be viewed as a continuous process of re-interpretation and re-structuring, meaning that every time people engage in the enactment of practices, they have to interpret/re-interpret the system and/ or change their interaction with the system. There is a danger that as practices become routinized, users may forget aspects of the underlying logic of the practices or forget essential flexibilities that the practices are capable of exhibiting as a result of not having been exposed to conditions that would evoke such flexibility.

In the next section we explore the nature and significance of memory mismatches as a prelude to making use of them as an explanatory device in subsequent sections of the paper.

2.4 Theorizing about organizational memory mismatches

In order to further understand the reconstruction of ERP practices, we make use of the concept of ‘organizational memory mismatches’. Adding the notion of conflicting memories or memory mismatches to our analysis of ERP implementation and use also sheds interesting light on the reasons why certain types of problems occur and how they may be interpreted.

Memory mismatches in this context are the conflicts that occur between memories at the time memories are ‘activated’ in use. The memories referred to here may be individual memories or other networked memories, that are for instance related to routines and

culture (Van Stijn & Wensley, 2001). Thus, while it is inevitable that some mismatches exist within organizations these are likely to be reinforced because people have different experiential trajectories, knowledge, and idiosyncrasies that are likely to lead to diverging interpretations of practices. Basically, different individuals act within different contexts. Further, new mismatches are also likely to emerge as ERP systems provide new or modified representations and directly or indirectly cause the restructuring of existing organizational and individual memories. Or, to put it another way, such systems inevitably alter the organizational contexts with which individuals interact.

We would like to state at the outset that we do not agree with the view that “early articulation, reflection, discussion, negotiation, and possibly change of inconsistencies and incongruences may reduce the likelihood of unintended misunderstandings and delusions around the implementation and use of new information technology (Orlikowski & Gash, 1994, p. 202).” Soh and Sia (2004) repeat this remark in their work on misalignments, but the key issue with this position is that it suggests a predictability and rationality underpinning the occurrence of mismatches, that it is possible and necessary to come to consensus or “closure” thus, essentially eliminating mismatches. However, our position with respect to mismatches suggests that although we may create an awareness of their existence, it is not necessarily possible to prevent mismatches from emerging in the first place. They emerge as a result of dynamic interpretations and enactments of the practices over time. This makes them difficult if not impossible to predict. Furthermore, we also argue that mismatches – though their connotation might suggest otherwise – are not necessarily good or bad for the organization, they simply occur and people may sometimes ignore them, work around them, or, indeed, act upon them. Thus, we do not regard memory mismatches only in a negative light to be eliminated wherever possible. On the contrary, we will argue that such memory mismatches may be valuable indications of the need for change and adaptation by the organization and a signal that may indicate possible actions that may be taken to bring about such change or adaptation. Thus, mismatches are also likely to bring into question interpretations of new and existing practices. Such reflexive questioning creates a space within which practices may be modified or, at least, flexibly interpreted.

Summarizing, we have described that ERP's practices are reconstructed within adopting organizations through processes of representation and re-creation. These processes are likely to involve memory mismatches, that is, conflicts in the memories that are used for interpreting and enacting the ERP practices. We conjecture that the memory mismatches are important mechanisms that uncover the ways through which employees enact ERP practices. They thus provide an important linkage between the actions and cognitions involved, helping us further explain knowledge-related problems and possibilities inherent in ERP practices. The concept of memory mismatches allows us to analyze and thus articulate these processes of representation and re-creation of ERP practices. We have also noted that such an enquiry can help us articulate the part played by context since memories both individual and organizational are components of the context of practice enactment.

We will now briefly discuss the methodological approach that we adopt with respect to a case study conducted at AcademCentre, a Dutch University.

3 METHODOLOGICAL BACKGROUND

In the following section we make some general remarks concerning our methodological approach and further introduce the organization (AcademCentre) which provides the data that we present and interpret throughout the remainder of this paper. Since its beginning in the 7th century, AcademCentre has had a long history of being a centre for knowledge creation, accumulation and transfer in the fields of scientific research and higher education. At the present time, it is one of the largest Universities in the Netherlands, with more than 23.000 students, in excess of 7.000 employees and an annual budget of €12 million.

Most of the faculties in AcademCentre had been using a personnel information system called COMI-P since 1994. However, it became increasingly outdated towards the end of the '90s. The supplier no longer guaranteed on-going updates or further development. As a result, in 1998 the directors of the faculties and other services collectively established the functional demands for a future new system. In November 2000, the University Board made the decision to choose the SAP_HR personnel management system. By then,

AcademCentre had already implemented the financial module from SAP, SAP_Financial. By choosing SAP_HR, the organization hoped for a painless implementation trajectory based on their existing experience with SAP_Financial, and intended to create unproblematic interactions between HR and financial administration departments. Their approach thus essentially involved rolling out an integrated process-oriented standardized ERP system using a phased approach. The project was initiated primarily to replace an outdated system and to integrate it with the other systems at AcademCentre, in particular the finance module. In the Spring 2001, AcademCentre started to implement SAP_HR. The project was granted an initial budget of €1 million.

The case data were collected by Tanya Bondarouk in the context of another study that primarily looked into the role of group learning processes in groupware implementations (Bondarouk, 2004, 2006). During a 6 month period in 2003, she collected data using qualitative methods, such as semi-structured interviews, observations, and document analysis. 24 interviews were conducted, each lasting from one to one-and-a-half hours. Representatives of three groups of SAP_HR users were interviewed:

- Five employees involved in steering the project in AcademCentre. These employees were referred to as project team members. They provided support for end-users; manned the help-desk; were responsible for the functional and technical administration of the system; and monitored and analyzed the on-going use of the system.
- Four leaders of the faculties' HRM departments who were responsible for personnel policy and administration in the faculties. These individuals were not active end-users of the system themselves but the SAP implementation brought about significant changes in their departments.
- 15 end-users: four salary administrators from the central Salary Department and 11 HR specialists from five HRM departments. Individuals were selected based upon their intensity of SAP use. Those HRM specialists, whose daily work tasks had to be performed through the system, including five key-users who were advanced users of the SAP_HR system were interviewed.

Table 1 shows how the different units investigated exhibit considerable diversity that lead to significant variation in the ways HR information was processed.

Organizational unit	Abbreviation	Staff in a unit	HRM features of the Faculties
HRM department in the Social Sciences Faculty	SC_HRM	9 employees all make inputs in SAP_HR	The largest Faculty with 700 employees, it participates in 9 curricula, 3 of them are "mixed" with other faculties, resulting in many part-time and contracts spanning two faculties (510 employees).
HRM department in the Geographical Faculty	Geo_HRM	5 employees 3 employees make inputs in SAP_HR	320 employees, one-quarter of whom are declarants who work for short periods of time.
HRM department in the Faculty of Arts	Arts_HRM	9 employees 2 employees make inputs in SAP_HR	Includes many highly specialized external Professors who are invited to teach only one course.
Service Centre	SS_HRM	11 employees 3 employees make inputs in SAP_HR	A special structure in AcademCentre providing HRM services to more than 400 employees working for the support units (museum, communication centre, etc.).
HRM department in the Veterinary Laboratory	VL_HRM	1 employee	The unit (64 employees) provides support for three other Faculties. There are no Professors or PhD students in the unit but there are many on-call workers executing simple tasks for 1-2 days.
Central Salary Department	SAL	12 employees all make inputs in SAP_HR	Salary administrators process the salary data and then sent it to the external Governmental Salary ICT called IPA.

Table 1. Overview of the AcademCentre units participating in the research

Additionally, access was granted to relevant documents such as the project plans, detailed notes of key-user meetings, plus the main manual and 36 sub-manuals covering the use of SAP_HR for the AcademCentre. These manuals were particularly interesting because they were also used as training material.

The primary goal of our re-analysis of the case study is to get a rich picture of how different people interpreted the endeavor of ERP implementation and use. We are particularly interested in the interpretations and enactments of ERP practices by people in the case organization. Many of these interpretations and enactments of practices relate to practices that were new to them and embedded in the ERP systems representing

‘reference practices’ or ‘best practices’. In order to capture such things as representing processes and learning how to interact with the ERP system through training and use, this research is based on an interpretive stance (Klein & Myers, 1999; Walsham, 1993). Our focus is directed towards individual construction and re-construction of meanings, interpretations, codifications and significance, learning, communicating, etc. (Schultze & Orlikowski, 2004). Multiple iterations of interpretations, engagement in diverse discussions (also with Tanya Bondarouk), reference to earlier writings, and extensive literature study throughout the research process together lead to the conceptualization of ERP’s practices and memory mismatches presented in this paper. We took the experiences and lessons of another case study (Van Stijn & Wensley, 2005a) as a basis for our investigation and re-analysis of the AcademCentre case. We contend that the re-analysis of case material is a fruitful way of looking at such research in a different thinking mode and can highlight new insights and reasoning that was not uncovered in prior analysis. For instance, Wagner and her colleagues investigated and elaborated on the Ivy university case through the application of various lenses or perspectives (Scott & Wagner, 2003; Wagner, 2002; Wagner *et al.*, 2004; Wagner & Newell, 2004). This approach provides a counterbalance to the problems associated with finding suitable new research sites. We address encountered limitations in the discussion section.

All in all, the case material provides for embedding of our work in a rich and relatively realistic context and enables us to link our work to practice. Further, such embedding also allows for the empirical exploration of the conceptual perspective we present here. In the next section we will identify and analyze detailed observations made during the study of AcademCentre.

4 AN ANALYSIS OF THE ACADEMCENTRE CASE

From the various interviews that were conducted we have gained the impression that the project history can be characterized as being very well thought out, prepared in detail (April – November 2001), followed by quick focused pilot projects that were evaluated as being very successful (November-December 2001), and finally by dramatic, seemingly endless, chaos after its introduction to all the users (since January 2002). The extent of the chaos during the first 7-8 months was expressed in various ways. For example, we

heard of about 3000 mistakes being registered in the database with only a third being resolved, 450 e-mails in six months from the users reporting problems, 75 “crucial” problems to be resolved, 10-20 technical changes/improvements *per day*, and finally about 300-400 AcademCentre employees who experienced difficulties in getting their salaries.

“Now I am sure – if they want to do something like this again in the same way – I am leaving. I really mean that! It was just one big disaster from the beginning. People did not get any income for three months. It was terrible and unclear who was responsible for what. Many HRM specialists became sick...” (Erik, SS_HRM, key-user).

We did not observe a ‘happy ending’ to the SAP_HR implementation during our six months of involvement. However, at least we know that the number of employees experiencing problems with getting their salaries had decreased from 300-400 in Spring 2002 to 60-100 in March 2003.

4.1 ERP practices: tasks and interdependencies

Let us share the story in more detail. On January 1st 2002, SAP_HR was introduced in 12 faculties and in all the support and administrative services at AcademCentre. The targeted users were personnel and salary administrators. They had to cooperate in new integrated practices. At a task level, we found that there were about 40 tasks performed through SAP_HR such as appointment of an employee, work time registration, making HR statistical reports and information management reports (sick leave reports, and HR financial reports). However, SAP_HR could not support some other tasks like: communication with employees (telephone calls, e-mails, sending official letters), maintaining personnel files, and administering conference/ congress leaves. Furthermore, two faculties refused SAP_HR, and kept their old personnel systems. In this paper we leave aside questions such as: Why did these two faculties refuse to introduce SAP_HR? For us it is important that the HRM departments from those faculties continued to send paper-based data to the salary department, and the salary administrators had to process it in the old way. This meant that the ‘old’ knowledge remained relevant and had to become integral part of the ‘new’ knowledge.

The implementation of the ERP system resulted in radical changes in the nature of task interdependence, reflecting the integrated nature of the ERP system. Instead of being concerned only with internal paperwork in the faculties, now all the inputs made by personnel administrators became interdependent with the inputs by the salary administrators, and eventually with an IPA system that is outside the organization. Additional control had to be exercised in order to avoid on-line mistakes. It should be noted that IPA worked in a highly structured and standardized way, and therefore would not accept incorrect or unknown inputs. Consequently, extra checks and extra controls were necessary for both personnel and salary administrators. It was decided that it was necessary to double check all the inputs made in the HRM departments. This decision was implemented in various ways. For example, in the SC_HRM, all users were equally qualified and were engaged in the same tasks and, as a result, there were no strict rules about who should check inputs – any available user could do this and was encouraged to do so. In contrast, in the Geo_HRM, the inputs went through a triple control: a user, then a key-user, and then the head of the department. In the VL_HRM, where one employee carried out all the HR administration, that person had to double check his own work.

Next, we further address the complexities of enacting the new integrated ways of working and the problems encountered with the novel system.

4.2 Pointers towards memory mismatches

We argue in this paper that the difficulties encountered as a result of implementing an integrated system are, to a large extent, due to the former ‘contents’ of the organizational memory of the AcademCentre – that is the memories of individual people in the different departments, memories associated with the way the organization traditionally structured itself in the different departments, faculties and schools, and knowledge relating to the way the processes (in particular here the administrative processes) had been organized. The new ways of structuring integrated practices were not easy to learn as the focus was only on the process memories – a restructuring of practices on a modeling level – and did not address the need for potentially modifying or eliminating existing individual memories, supporting the development of new ones nor consider the structures surrounding the practices. The different groups of users referred to this phenomenon in a

general way by mentioning “the others” who were never accurate, satisfied, or stable in their expectations of what the other groups should do with the system and so on. For example, a salary administrator said:

“It was terrible that we had to correct inputs, and we did not have enough knowledge about the system and how to work with it. We did not even have an image of a good input, and how a correct input should look. It was very confusing for us because one month an input “A” was good and accepted by the IPA system, but the next month the same input “A” was certified as bad and rejected by the same IPA. It was not clear what was behind the screen” (Karen, salary administrator).

These issues were compounded because users from the different units were not willing to communicate and share experiences for at least two reasons. Firstly, they did not know each other; and secondly, they had no time to communicate because of the sheer number of problems. Further, it was apparent that no-one wanted to admit actually making mistakes; they always tended to blame others. For example:

“Sometimes it was not only technical difficulties that caused the problematic situations. Correct and timely communication is very important. Even within those groups closely related to the salary administration groups we cannot always find consensus: when anything goes wrong, everybody is sure that they did their own job well, and the problem must be elsewhere. Such communication doesn’t help to improve the situation, and we might face a similar difficulty in the future” (Daniel, SAP technical administrator).

However, within the units, there were active discussions about problems with the SAP_HR administration. In the Arts_HRM unit, meetings took place biweekly, and in SS_HRM weekly. The personnel administrator from Geo_HRM described the situation as follows:

“We worked together (Personnel Department) very well. We discussed difficulties, and helped each other with this system. We made reports about mistakes ourselves, and the key-user took them to the regular meetings. In our

faculty, we are lucky to have such a strong team. During all those SAP problems we became even closer to each other” (Tom, Geo_HRM, personnel administrator).

Such interactions helped users to develop a deeper understanding of the system and modify or eliminate existing individual memories or, where appropriate, develop new ones.

Where the SAP_HR did not fit the needs of the users, as was often the case, they did not trust the new system or they failed to see any real usefulness or value in the system. As one of the users commented:

“I think SAP_HR is a good system. You can do many things with it, but I don’t need many things. For example, we have our own system for sick leave administration. The same applies to time registration, there is our internal ATREA system. This contains various special items such as overtime, working during the weekends or holidays, and evening work. It has existed for ten years already. Maybe it can be incorporated into SAP, I don’t know. Therefore, I don’t use the sick leave administration and time registration components in SAP_HR. I don’t use the “arrangements” application. They do this in the R&O files and keep them on paper. In SAP, this would be extra work for me. Other examples of useless applications are the “previous employer” field, and the “children” and “subscriptions” fields. I don’t need them” (Monique, VL_HRM personnel administrator).

As a result, employees actually kept shadow systems running, avoiding the ERP system. This was subversive behavior in the eyes of management, but necessary to “tweak” the ERP system to the situational and contextual situation in a way that only the real process owners may do.

The interviews with the SAP_HR users have shown that an apparently straightforward technical intention – as communicated by management and consultants – tends to bring with it many social changes, which was largely unexpected by them because they had approached the project as a “mere” replacement of the old system. HRM administrators

got increased responsibilities for the transactions they completed. As one of the personnel administrators noted:

“With SAP we got extra control, and more responsibilities. We have to be very careful with all inputs. Earlier everything was on paper, but now we have to concentrate more intensively in order to avoid faults” (Roy, Arts_HRM, personnel administrator).

The new situation also required changes in the mental frames of the personnel administrators:

“The preciseness, control and calculations were never the strongest point of the personnel specialists. Their work was not about salaries or calculations but about the personnel policies in the faculties. The SAP_HR demanded from them to be accurate and exact in filling in all the small details... That was out of their ordinary way of working. Such calculations and preciseness were more usual for the salary people” (Joost, former leader of the project).

Indeed this is one of the indicators of memory mismatches as we understand them, and the trigger for a learning process that enabled users to become more adapted to the system. We would like to observe that the formalizations prompted by the development and implementation of an ERP system can be very problematic as people are often imprecise, informal, and to a certain extent intuitive – not mindless but more subconscious – immersed in the practices as they know them. As a result, when that changes they do not always know how to adapt.

With respect to memories it is also intriguing to note that all 24 interviewees commented that they lacked an understanding of the logic of the system. The main complaints were about the lack of understanding of what was “behind the screen”. They observed that it was not difficult to click the buttons, but they needed to foresee the outputs of the transactions: the connection with IPA which, at the beginning, seemed to be a big black box.

“In fact, none of the project leaders realized that we – the HRMers – did not know about IPA. We had never worked with it. The end-users in their day-to-day work

see only SAP screens. We were confused a lot because sometimes SAP_HR allowed us to input a number (as a code), but it was then forbidden by IPA, etc.” (Lucie, Geo_HRM, key-user).

Most mistakes and their understanding became apparent through the experiences with using the ERP system, which people could not predict in advance:

“Most of the mistakes are only recognized after an employee complains. We don’t know about them “in advance”. People inform us about mistakes in the personnel documents or in the salary administration” (Hans, Arts_HRM, head of the department).

One of the personnel administrators described her attitudes towards SAP_HR as follows:

“In April 2002 I started to hate the system and working with it. I had a feeling that everything I did went wrong, and that it was all about salaries and bonuses” (Monique, VL_HRM, personnel administrator).

Another thing that the interviewees emphasized was that operating the system was not easy and generally slowed them down. Again, we see that there are mismatches arising, in this case it is what we consider a ‘classification mismatch’ that inhibited fast access to the information:

Personnel numbers were linked with the family names that were, in turn, placed in alphabetical order and “if you wanted to search for a name in the system, the system gave you hundreds of people with the same names with a rather complex classification, you have to spend quite some time to find the right person” (Vivienne, SC_HRM, personnel administrator).

Further, correcting mistakes took a lot of effort at AcademCentre. The salary administrators told us a story about changes in the salary savings scheme for the employees at AcademCentre that they had to process due to government policy. They tried to input all the changes at once for all employees but the system collapsed and they had to begin from the beginning and do it for one employee at a time. Spelling mistakes were difficult to discover and even more difficult to resolve:

“In fact, since the introduction of the system we started getting more and more mistakes in the database. The SAP application didn’t allow you go further unless you left the existing mistakes” (Hans, SC_HRM, head of the department).

Sick leave administration required processing the same transactions in several sub-fields and all appointments of an employee required additional time:

“I would like to work out the information about one person only once without wasting time on the same administration steps several times!” (Betsy, SS_HRM, personnel administrator).

“... If a person stopped working, I had to go through all his/her information fields to cancel them: salary, using the train card, and CAO à la carte. It didn’t block them all automatically” (Monique, VL_HRM, personnel administrator).

Many interviewees shared the opinion that the system did not improve their task performance.

“I think the results of using SAP_HR were not that enthusiastic. We didn’t perform quicker or better. In my view, we even started providing fewer reports than before. For example, earlier I could give the management prognoses about financial costs until the end of the year (with COMI-P). But now I am not doing that” (Sandra, SS_HRM, head of the department).

The users also doubted the reliability of the information in SAP_HR. For example, a year after the introduction, a user

“discovered a very big mistake. If a person worked for the company in different departments (part-time), he/she got double all premiums: personnel administrators made inputs independently, and the system thus doubled the amount. It was difficult to estimate the financial losses of this situation over the whole year” (Vivienne, SC_HRM, personnel administrator).

The interviewees gave us other examples of when they discovered mistakes in the output reports from SAP_HR such as wrong totals of sick employees or new workers. This made them question the quality and reliability of the output information in general.

The interviewees highlighted several mismatches between their traditional way of working and the “SAP” situation:

- CAO à la carte [the collective labor agreement of Dutch universities] was executed partly in SAP_HR, partly in another IT, and partly manually.
- Administration of declarants required special tricks to be utilized in order that they were processed appropriately:
- “You register him/her on date ‘A’, however we cannot pay the salary from that day but only from later. You have to do special tricks in the system in order to get the salary on time” (Lucie, Geo_HRM, key-user).
- The system did not recognize the difference between two types of professors, and that again required adaptation of the system from the users.
- The system could not cope with transactions if they were input immediately one after another. The users usually had an additional schedule for ‘on-going’ transactions.
- All transactions that were sent to the Salary Department were held for about two weeks. During that time, any personnel administrative processes concerning an ‘unlucky’ employee were blocked in the system.
- If an employee had multiple appointments (part-time) or ‘jumped’ from one unit to another (on a project basis, for example) then, each time, the system created a new personnel number for that employee. As a result, a SAP_HR user could be faced with the same employee name ten times over without knowing ‘which one’ was really active.
- The VL_HRM had their own IT for sick leave administration that required working with two different systems.
- The codes for salary administration in SAP_HR and in IPA were different, and this again called for adaptation.

According to the heads of the HRM departments, one result of the introduction of the system was significant damage to the image of the HRM departments in the units:

“The most awful result, in my view, was that during the first months of struggling with the system, the HRM department lost its good image in the faculty. All the credit that we had built up through our good work for the employees was lost. We were already trying to achieve the grander HRM goals such as improving situations in different departments and social issues. We achieved this from a stable base: good and reliable administration of the personnel data and salaries. It was a very pitiful situation, having attained a higher level, to find the basis – the salary administration – destroyed and the rest becoming irrelevant ...” (Andre, head of the Arts_HRM).

In the following section we will consider the role of training and learning in more detail. As we have noted above one of the functions of training and learning is the modification, elimination or creation of memories to support the modified or new processes that are required by the ERP system.

4.3 The role of training and learning

Let us look into the training that took place at AcademCentre. Before SAP_HR was introduced, the consultants provided employees with a course about the system. Interviewees were all of the opinion that this was not sufficient and did not give any idea about actually using SAP_HR. They recalled that they were instructed only how to ‘click the buttons’, but lacked knowledge about the main principles of SAP, its connection to IPA, and the outcomes of incorrect inputs. In some situations, during the course, there was only one PC available for three learners. The content of the instructions also seemed to be unrealistic:

“We had a training course on how to use SAP_HR, but it was not enough. It was too short and mostly related to the technical characteristics of the system, while we needed explanations about what to fill in, why, and when. Immediately after this, from January 2002, we had to work with the full responsibility of the new system” (Roy, Arts_HRM, personnel administrator).

“The training course was too complex for us. It was quick but not efficient. I did not have a clue about how to make inputs, or where, or why. We did not practice with the system. They decided to introduce it and let us learn from the experience. But, in such a case, you need highly qualified teachers. In my view, the reality was far from this” (Erik, SS_HRM, key-user).

The course was not oriented towards the specific individual situations of the end-users, but had a general content. A personnel administrator from the VL_HRM emphasized that:

“They gave training about SAP use. I cannot say that it was a very fruitful session. We, the users, are very different. For those who work eight hours a day with SAP there was a need for advanced skills and knowledge. But I only work with the system for two hours per week, not more. It makes things different! My questions may seem quite basic for the advanced users but I am not a computer person at all” (Monique, VL_HRM, personnel administrator).

Our document analysis has shown that there were about 40 manuals and sub-manuals. The interviewees stated that these were not helpful and, in particular, they were too long. Nobody could find time during their usual working days to study these SAP_HR “encyclopedias”. The first “good” manual was released on CD in July 2002 (half a year after SAP_HR’s introduction), and the best in February 2003 (a year after its introduction). Both manuals were the joint product of the salary and personnel departments. In some units, employees developed internal instructions. However, we did not discover any special on-going education, or courses, for new employees. Moreover, we did not find any arrangements or agreements about instructing new users in SAP_HR: those who joined after the introduction of the system had to learn it from the own on-the-job experiences. What did happen was that almost weekly the system administrators would send e-mails to all the users detailing the discovered small tricks – such as how to handle SAP_HR and IPA. Some of the users didn’t read them (relying on the key-users), some printed all the notes and put them on their whiteboards and tried to memorize the latest news.

Clearly, the training provided was not at the appropriate level. It did not facilitate the modification, elimination or creation of new memories. Such outcomes are only likely to occur when individuals are actually engaged in enacting the process themselves or realistic simulations of them.

4.4 Improvement efforts

We did not find any policies or arrangements for recognizing improvements in performance of the users of the system. In all units, during the departmental meetings, they discussed “bad” cases in the use of SAP_HR – i.e. when employees did not get their salaries. In addition, reward schemes did not exist to provide incentives for improved performance or compensation where the system reduced their productivity. In the units, the heads of the departments, on their own initiative, financially rewarded users for their troubles with SAP_HR. However, we did not discover initiatives to reward the users from the project team, or from ‘top’ managers.

“We never got any feedback from the SAP_HR project team – no encouraging comments, enthusiastic letters, or feedback notes during key-user meetings. No financial support for our troubles. But our direct boss, the head of the P&O department in the faculty, paid us special bonuses to compensate for our hard work with SAP” (Lucie, Geo_HRM, key-user).

The implementation essentially challenged users to try and work around the system in order to cope with all the errors that emerged. Users tried to get the senior management to improve the system, suggesting many improvements for the system and its usage, like:

- using the numbering scale for employees (to put the names in alphabetical order)
- regular meetings about working with “Query” and possible reports
- generating an error message instead of sending e-mails to each other
- the introduction of a mailing list for all users
- employing strong IT professionals in the project team
- composing a sub-manual about the registration of maternity leave
- special registration of ADV hours (reduction in working hours)
- separate registration of the basic specialization of employees

- registration of the division of working hours between teaching and research
- integrating dates about reports on extended sick cases

These ideas were discussed during the key-user meetings, but only two of them were implemented – arranging regular meetings about the “Query” module, and writing an additional sub-manual about maternity leave. The members of the project team commented that they were restricted in improving the system by SAP’s functionality:

“It is a standard system. You may make improvements within its functionality. However, if you overrule the system and build additional functions on top of it, you will lose support from the supplier. That’s why we have to be careful” (Erika, SAP administrator).

All in all, our research has indicated a lot of issues in relation to the question as to how practices are constructed and reconstructed in the context of AcademCentre’s setting. In the next section we elaborate on our findings.

5 DISCUSSION AND REFLECTION

We will first address the key limitations of our re-analysis of AcademCentre. First of all, we acknowledge that the introduction did not involve a ‘full-fledged’ ERP system, with the focus on SAP_HR and the integration towards the financial functions. Our work does imply that as introductions become more ambitious and span more functional domains and groups of people in the organization, when they potentially cross organizational and language borders, actualizing practices and the mismatches that may occur are likely to be even more problematic. Another drawback is that the case data were not detailed about the implementation phase of the project. Therefore we only described what happened in terms of training and learning. In particular further insights into the ways in which the new practices were represented and communicated (in terms of modelling efforts and so on) would have been interesting based on the theorization and empirical findings. Similarly, whereas the case data yielded rich insight into a variety of memory mismatches, the study did not particularly focus on their investigation. As a consequence, we recognize that we have a limited ‘search space’ now from where to draw examples of mismatches. Studies that actively take the occurrence of mismatches into account during

data collection may provide a richer overview provide for a broadening of the search within the extended ‘web of memories’. Lastly, we suggest that a longitudinal study would have the opportunity not only to study the occurrence of mismatches but also the way people are coping with them, thus further capturing the complexities of mismatches and their associated problems.

On the other hand, our study of AcademCentre provides us with an empirical elaboration of our theorizations about ERP practices and helps us to further our explorations of their (re)construction. It demonstrates that the implementation and use of complex information systems such as ERP will always impact the ways in which people interpret and enact practices when they have to integrate new ways of thinking and doing that are prescribed and proscribed by the new technology. Furthermore, we have started to address how memories – not only of individuals, but in a much broader sense – are essential in shaping practices as they are the basis for their understanding, and how memories are reshaped by practices through their interpretation and enactment. Memory mismatches, or conflicting memories, are a tool to analyze and explain how these memories exhibit issues because of diversity, ambiguity, vagueness, and incommensurability. As practices and memories co-evolve, these conflicts are a ways of demonstrating cognitive discrepancies over time. The case findings show that the fact that people who lack understanding of the new practices, or feel they possess inadequate knowledge, when they have to start working with them, can also experience significant negative emotions towards the new ERP and the work at hand. Such negative emotions may not only directly affect their attitudes towards the system and its proponents but also result in failure to acquire new memories. The psychological literature recognizes that emotion plays a central role in the retention of experiences. Clearly, there is a need to extend future research into this area.

We have noted that models are often used in the representation of processes. However, it is important to recognize the context within which these process models are developed. Often aspects of the process and the organization within which they are enacted are ignored or minimized. Such components of context may be much more important in the organization within which the processes are to be re-created or re-contextualized. We would propose that some of the problems that arise in attempting to implement ‘new’

processes in organizations occur because of these contextual problems – and this may be reflected in the conflicts in memories that occur.

A different area of research that is of interest relates to the role of consultants (and other third parties) in the reconstruction of practices. Consultants are supposed to bring with them adequate knowledge about aspects such as project leadership and management, system customization and administration, as well as technical knowledge (Haines & Goodhue, 2003). Knowledge transfer is said to take place through the working together, but is also getting shape in the form of training. Ko et al. (2005) found that the successful interchange of knowledge between consultants and clients depends on such factors as absorptive capacity, shared understanding, intrinsic motivation, and credibility.

“During ERP implementations, consultants bring to the engagement their prior work experience, work values, norms, philosophy, and problem-solving approaches. To the extent that these are similar to those of the client, there is a greater likelihood that the two are able to work effectively toward transferring knowledge (Ko *et al.*, 2005, p. 64).”

However, the research presented here suggests that such a shared understanding should not be assumed, given the fact that consultants and clients are part of their separate webs of memories and may even be impossible to achieve as the extent that they interact they are not focused on reconciling extant mismatches. As for instance Scott and Wagner note:

“External ERP experts lacked contextual understanding of Ivy’s ethos and workflow, making it difficult to develop a common basis for a collective work focus (Scott & Wagner, 2003, p. 301).”

A final area of interest relates to the ‘old’ problem of gaps between design and use of complex information systems. It should be noted that the interpretation processes within the organization could also lead to the ERP system getting a different meaning and reinforcing different memories than actually meant by the system developers of the ERP supplier. Thinking about knowledge in terms of organizational memory as we do here, provides us with a different sense of context. That is, organizational memory theory provides us with an understanding of different “locations” of memories in the memory

webs, and those give us insight into how different parts of the memory webs are potentially interrelated in that they provide context for interpretations, and understandings when particular ERP practices are (re-) constructed.

6 IN CONCLUSION

In this paper we have suggested that a central issue of concern with ERP systems is how the practices that they encode are constructed and re-constructed every time they are interpreted and enacted in client organizations. This issue is critical since the vendors of such packages argue that ERP systems allow organizations to adopt standardized ‘best’ practices. We have maintained in this paper that the creation and re-creation of practices is a complex, contextually dependent process. A significant component of the context which is necessary for the enactment and re-enactment of practices are individual and organizational memories. The key proposition that we have put forward is that during such re-contextualization these memories will inherently exhibit mismatches, drawing our attention to issues of diversity, ambiguity, vagueness, and incommensurability. A close study of the part played by memories and such mismatches in the enactment and re-enactment of practices allows us to investigate at a very detailed level the impact of ERP systems.

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REFERENCES

- Al-Mashari, M., & Al-Mudimigh, A. (2003). ERP implementation: Lessons from a case study. *Information Technology & People*, 16(1), 21-33.
- Bechky, B. A. (2003). Sharing meaning across occupational communities: The transformation of understanding on a production floor. *Organization Science*, 14(3), 312-330.

- Becker, M. C. (2004). Organizational routines: A review of the literature. *Industrial and Corporate Change*, 13(4), 643-677.
- Bingi, P., Sharma, M. K., & Godla, J. K. (1998). Critical issues affecting an ERP implementation. *Information Systems Management*, 16(5), 7-14.
- Bondarouk, T. V. (2004). *Using group learning to enhance the implementation of information technology: The results of discourse analysis*. Unpublished doctoral thesis, University of Twente, Enschede.
- Bondarouk, T. V. (2006). Action-oriented group learning in the implementation of information technologies: Results from three case studies. *European Journal of Information Systems*, 15, 42-53.
- Boudreau, M. C., & Robey, D. (1999). Accounting for the contradictory organizational consequences of information technology: Theoretical directions and methodological implications. *Information Systems Research*, 10(2), 167-185.
- Boudreau, M. C., & Robey, D. (2005). Enacting integrated information technology: A human agency perspective. *Organization Science*, 16(1), 3-18.
- Carlile, P. R. (2004). Transferring, translating, and transforming: An integrative framework for managing knowledge across boundaries. *Organization Science*, 15(5), 555-568.
- Cohen, M. D., & Bacdayan, P. (1994). Organizational routines are stored as procedural memory: Evidence from a laboratory study. *Organization Science*, 5(4), 554-568.
- Corbett, J. M. (2000). On being an elephant in the age of oblivion: Computer-based information systems and organisational memory. *Information Technology & People*, 13(4), 282-297.
- Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, July - August, 104 -112.
- Davenport, T. H. (2000). *Mission critical: Realizing the promise of enterprise systems*. Boston (MA): Harvard Business School Press.
- Emirbayer, M., & Mische, A. (1998). What is agency? *The American Journal of Sociology*, 103(4), 962-1023.
- Feldman, M. S. (2000). Organizational routines as a source of continuous change. *Organization Science*, 11(6), 611-629.
- Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing organizational routines as a source of flexibility and change. *Administrative Science Quarterly*, 48, 94-118.
- Feldman, M. S., & Rafaeli, A. (2002). Organizational routines as sources of connections and understandings. *Journal of Management Studies*, 39(3), 309-331.

- Gattiker, T. F., & Goodhue, D. L. (2004). Understanding the local-level costs and benefits of ERP through organizational information processing theory. *Information & Management*, 41, 431-443.
- Giddens, A. (1984). *The constitution of society*. Berkeley [etc.]: University of California Press.
- Gosain, S. (2004). Enterprise information systems as objects and carriers of institutional forces: The new iron cage? *Journal of the Association for Information Systems*, 5(4), 151-182.
- Haines, M. N., & Goodhue, D. L. (2003). Implementation partner involvement and knowledge transfer in the context of ERP implementations. *International Journal of Human-Computer Interaction*, 18(1), 23-38.
- Hirt, S. G., & Swanson, E. B. (1999). Adopting SAP at siemens power corporation. *Journal of Information Technology*, 14, 243-251.
- Hislop, D., Newell, S., Scarbrough, H., & Swan, J. (2000). Networks, knowledge and power: Decision making, politics and the process of innovation. *Technology Analysis & Strategic Management*, 12(3), 399-411.
- Holsapple, C. W., & Sena, M. P. (2005). ERP plans and decision-support benefits. *Decision Support Systems*, 38, 575 - 590.
- Hong, K.-K., & Kim, Y.-G. (2002). The critical success factors for ERP implementation: An organizational fit perspective. *Information & Management*, 40(1), 25-40.
- Jones, M. C., Cline, M., & Ryan, S. (2006). Exploring knowledge sharing in ERP implementation: An organizational culture framework. *Decision Support Systems*, 41(2), 411-434.
- Kallinikos, J. (2004). Deconstruction information packages: Organizational and behavioural implications of ERP systems. *Information Technology & People*, 17(1), 8-30.
- Klaus, H., Rosemann, M., & Gable, G. G. (2000). What is ERP? *Information Systems Frontiers*, 2(2), 141-162.
- Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, 23(1), 67-94.
- Knorr Cetina, K. (1999). *Epistemic cultures: How the sciences make knowledge*. Cambridge, Ma. (USA) etc.: Harvard University Press.
- Ko, D., Kirsch, L. J., & King, W. R. (2005). Antecedents of knowledge transfer from consultants to clients in enterprise system implementations. *MIS Quarterly*, 29(1), 59-85.

- Koch, C. (2001). Enterprise resource planning: Information technology as a steamroller for management politics? *Journal of Organizational Change*, 14(1), 64-78.
- Lee, Z., & Lee, J. (2000). An ERP implementation case study from a knowledge transfer perspective. *Journal of Information Technology*, 15(4), 281-288.
- Markus, M. L., Tanis, C., & Van Fenema, P. C. (2000). Multisite ERP implementations. *Communications of the ACM*, 43(4), 42-46.
- Moorman, C., & Miner, A. S. (1998). Organizational improvisation and organizational memory. *Academy of Management Review*, 23(4), 698-723.
- Muscattello, J. R., Small, M. H., & Chen, I. J. (2003). Implementing enterprise resource planning (ERP) systems in small and midsize manufacturing firms. *International Journal of Operations & Production Management*, 23(8), 850-871.
- Newell, S., Tansley, C., & Huang, J. (2004). Social capital and knowledge integration in an ERP project team: The importance of bridging and bonding. *British Journal of Management*, 15(Supplement 1), S43-S57.
- Olhager, J., & Selldin, E. (2003). Enterprise resource planning survey of Swedish manufacturing firms. *European Journal of Operational Research*, 146, 365-373.
- Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science*, 11(4), 404-428.
- Orlikowski, W. J. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. *Organization Science*, 13(3), 249-273.
- Orlikowski, W. J., & Gash, D. C. (1994). Technological frames: Making sense of information technology in organizations. *ACM Transactions on Information Systems*, 12(2), 174-207.
- Pawlowski, S. D., & Robey, D. (2004). Bridging user organizations: Knowledge brokering and the work of information technology professionals. *MIS Quarterly*, 28(4), 645-672.
- Pentland, B. T., & Rueter, H. H. (1994). Organizational routines as grammars of action. *Administrative Science Quarterly*, 39, 484-510.
- Pollock, N., & Cornford, J. (2004). ERP systems and the university as a 'unique' organisation. *Information Technology & People*, 17(1), 31-52.
- Pollock, N., Williams, R., & Procter, R. (2003). Fitting standard software packages to non-standard organizations: The 'biography' of an enterprise-wide system. *Technology Analysis & Strategic Management*, 15(3), 317-332.

- Sarkis, J., & Sundarraj, R. P. (2003). Managing large-scale global enterprise resource planning systems: A case study at Texas Instruments. *International Journal of Information Management*, 23, 431-442.
- Schultze, U., & Orlikowski, W. J. (2004). A practice perspective on technology-mediated network relations: The use of internet-based self-serve technologies. *Organization Science*, 15(1), 87-106.
- Scott, J. E. (1999). The Foxmeyer drugs' bankruptcy: Was it a failure of ERP? *AMCIS99*, 223-225.
- Scott, S. V., & Wagner, E. L. (2003). Networks, negotiations, and new times: The implementation of enterprise resource planning into an academic administration. *Information and Organization*, 13, 285-313.
- Soh, C., Kien, S. S., & Tay-Yap, J. (2000). Cultural fits and misfits: Is ERP a universal solution? *Communications of the ACM*, 43(4), 47-51.
- Soh, C., & Sia, S. K. (2004). An institutional perspective on sources of ERP package-organisation misalignments. *Journal of Strategic Information Systems*, 13(4), 375-397.
- Soh, C., Sia, S. K., Boh, W. F., & Tang, M. (2003). Misalignments in ERP implementation: A dialectic perspective. *International Journal of Human-Computer Interaction*, 16(1), 81-100.
- Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17(Winter Special Issue), 27-43.
- Thompson, M. P. A., & Walsham, G. (2004). Placing knowledge management in context. *Journal of Management Studies*, 41(5), 725-747.
- Umble, E. J., Haft, R. R., & Umble, M. M. (2003). Enterprise resource planning: Implementation procedures and critical success factors. *European Journal of Operational Research*, 146, 241-257.
- Van Stijn, E. (2002). Beyond ERP systems as a hype: Understanding ERP systems as distinct technological, organizational and cognitive phenomena. In F. F. H. Nah (Ed.), *Enterprise resource planning solutions and management* (pp. 243-254). Hershey: IRM Press.
- Van Stijn, E., & Wensley, A. K. P. (2001). Organizational memory and the completeness of process modeling in ERP systems: Some concerns, methods and directions for future research. *Business Process Management Journal*, 7(3), 181-194.

- Van Stijn, E., & Wensley, A. K. P. (2005a). *ERP's best practices and change: An organizational memory mismatch approach*. Paper presented at the European Conference on Information Systems, Regensburg (Germany).
- Van Stijn, E., & Wensley, A. K. P. (2005b). *Transferring ERP's best practices: An organizational memory mismatch approach*. Paper presented at the OKLC, Bentley, USA.
- Volkoff, O., Elmes, M. B., & Strong, D. M. (2004). Enterprise systems, knowledge transfer and power users. *Journal of Strategic Information Systems*, 13(4), 279-304.
- Wagner, E. L. (2002). *Narrating an organisational matter of fact: Negotiating with enterprise resource planning technology to achieve order within a traditional academic administration*. University of London, England.
- Wagner, E. L., Galliers, R. D., & Scott, S. V. (2004). Exposing best practices through narrative: The ERP example. In B. Kaplan, D. P. I. Truex, D. Wastell, A. T. Wood-Harper & J. I. DeGross (Eds.), *Relevant theory and informed practice: Looking forward from a 20 year perspective on IS research* (pp. 433-451). London: Kluwer Academic Publishers.
- Wagner, E. L., & Newell, S. (2004). 'best' for whom? The tension between 'best practice' ERP packages and diverse epistemic cultures in a university context. *Journal of Strategic Information Systems*, 13(4), 305-328.
- Walsh, J. P., & Ungson, G. R. (1991). Organizational memory. *Academy of Management Review*, 16, 57 - 91.
- Walsham, G. (1993). *Interpreting information systems in organizations*. Chichester [etc.]: John Wiley and Sons.
- Wijnhoven, F. (1999). *Managing dynamic organizational memories: Instruments for knowledge management*. Pacific Grove [etc.]: Boxwood Press.
- Winter, S. G., & Szulanski, G. (2001). Replication as strategy. *Organization Science*, 12(6), 730-743.