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ERP's Best Practices and Change: An Organizational Memory Mismatch Approach

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Abstract

Enterprise Resource Planning (ERP) systems implementations undertaken all over the world have resulted and continue to result in significant organizational change. Organizations adopt ERP systems to benefit from the underpinning (allegedly) best practices, the suppliers' or sometimes consultants' "recipes" for conducting successful business. Such practices are said to lead to considerable improvements in the way the business performs, emphasizing the functioning and management of business processes. However, the implementation and use of best practices remains highly problematic! Here, we conceptualize ERP's best practices in terms of organizational routines, which are considered to be "repositories" of organizational memory. Memory mismatches are at the core of our (metaphorical) lens to surface understandings of what goes wrong and how people negotiate solutions, both during the implementation and, more importantly, the in-use phases of ERP systems. Looking from an organizational memory mismatch perspective provides us with interesting insights into the challenges and opportunities for implementing and managing change in this context, giving an appealing structure for reasoning about ERP's best practices. Illustrations from a case study of a Dutch SME are presented to enrich our account. The overall thrust of the paper is to identify a variety of concerns, intriguing questions and avenues for future research.

Keywords: ERP best practices, organizational routines, change, organizational memory mismatches.

1 INTRODUCTION

Nowadays, some of the most pervasive and invasive information systems that are being implemented by and made use of in organizations are those referred to as Enterprise Resource Planning (ERP) systems. The launch of ERP systems have spawned a multi-billion dollar global supplier and consulting industry (Gosain, 2004, p. 407; Umble et al., 2003). Parallel, academic concern for ERP systems, in teaching and research, has been increasing (Van Stijn, 2002). By adopting a process orientation and consequently integrating business processes by means of pre-engineered packaged software applications, the stated goals of adopting ERP systems are to obtain organizational benefits such as lower inventory costs and shorter cycle times (Holsapple and Sena, 2005; Markus and Tanis, 2000). In addition, it is increasingly the case that organizations are seeking to embed much of their organizational knowledge in complex information systems such as ERP systems (Van Stijn and Wensley, 2001). Adopting this perspective, these systems are presented as more effective and efficient ways of representing the knowledge necessary to manage the contemporary organization (Davenport et al., 2004). Thus, they tend to impose a specific logic of doing business, which is particularly shaped by the "best practices" that ERP systems seek to bring with them (Kraemmerand et al., 2003; Wagner and Newell, 2005). However, actually implementing and using such best practices within the adopting organizations has turned out to be a major challenge!

In the rest of this paper, we set out to answer the question as to how an organizational memory mismatch approach can be used to look at the nature of the changes surrounding this adoption and use of ERP's best practices. Traditionally such changes have been widely discussed at an organizational, strategic, or institutional level (Markus and Tanis, 2000; Soh et al., 2003). When change is studied from an organizational learning or knowledge management perspective, the tendency is to look at aggregate levels such as culture and to treat the knowledge involved in a rather homogenous manner (Jones et al., 2004; Lee and Lee, 2000; Robey et al., 2002). Our starting point, however, lies primarily in the individual an social cognitive realm with a primary focus on memory contents which are treated as diverse and, potentially, conflicting. We are convinced that this perspective opens the way for raising a different set of interesting questions, suggesting new directions for research and practice. In this context 'organizational memory mismatches' are defined as disparities between organizational memory contents in the ERP best practice, the ERP system and related contents in other media, such as individuals' memories, and the structure and culture of the organization, i.e. they arise when different "stocks" of memories are in conflict with each other (Van Stijn and Wensley, 2001). Our concern is that relatively little attention has been paid to these mismatches both initially during implementation and, more importantly, as the organization and the ERP system evolve through use. It is our contention that organizational memory mismatches are important cues for identifying both challenges and opportunities for implementing and managing change.

The purpose of this paper is to discuss how our approach helps to conceptualize and raise a variety of interesting questions. We start by theorizing about ERP's best practices. The central idea that we adopt is that such best practices are best understood as, in essence, organizational routines, that are a location of organizational memory. We proceed by investigating the linkage between the implementation and use of such best practices and organizational memory mismatches. Then we briefly discuss workarounds in this context, before we draw our conclusions. Throughout our discussion we will primarily refer to the case of Electro (a pseudonym). With a labor force of approximately 100 employees, Electro is a Dutch SME that produces emergency lighting as well as printed circuit boards and Customer Specific Products. The annual revenue of Electro is approximately €13 million. Having succeeded his father, the current director had managed the company for about 3 years by 2002 (the starting date of our study). He had introduced some major changes in the organization. One of these changes involved the introduction of an ERP system that started in June 2000, with the system going live in December 2001. Our study of the introduction of Electro's ERP system took place in October 2002. After an initial interview with the chief of operations, all project documentation was made

available and arrangements were made for interviews with 10 of the 28 current users. The material used here has been translated from Dutch by one of the authors. Electro's case provides for the embedding of our work in and its linkage to practice, enriching our conceptual enquiry.

2 THEORIZING ABOUT ERP'S BEST PRACTICES

A key premise underlying ERP systems is that they embody best practices in their reference models (Kumar and Van Hillegersberg, 2000). "Reference models supposedly reflect preferred business models including underlying data and process models as well as organizational structures (Kumar and Van Hillegersberg, 2000, p. 25)." Reference models are process models that are available from third parties; for example, suppliers like SAP or ERP consultants. In this context, process models may be understood in a broad sense as including function, data, and organization models (Scheer, 1998). While the software underlying these systems can typically be configured to accommodate different business processes, the vendors of the software (e.g., SAP, Oracle and previously Baan and PeopleSoft) typically provide configurations that reflect blueprints for "best practice" processes. Vendors argue that the adoption of these best practices makes the configuring of the software less costly and brings about improvement in the organization's processes. Consequently, organizations and their members often experience pressure to conform to these best practices (Gosain, 2004). In her discussion of knowing-in-practice, Orlikowski (2002) articulates why she finds the notion of "best practices" quite a problematic one. "When practices are defined as the situated recurrent activities of human agents, they cannot simply be spread around as if they were fixed and static objects. Rather, competence generation may be seen to be a process of developing people's capacity to enact what we may term "useful practices"- with usefulness seen to be a necessarily contextual and provisional aspect of situated organizational activity (Orlikowski, 2002, p. 253)."

There appears to be a trade-off between achieving standardization and accommodating the uniqueness of the company. Achievement of the former tends to undermine the ability of the organization to achieve competitive advantage based on how it operates. Standardization is meant to provide a common ground for understanding practices and for performing them in a seamless and efficient manner within and across organizations (as the benchmarked best practice processes are often intended as industry standards) (Kallinikos, 2004). However, some will argue that if all companies were to adapt the same standardized best practices, there would be no competitive advantage (Bearda and Sumner, 2004). This leads us to a consideration of how standardized such best practices will actually be. The configuration of ERP packages such as SAP entails the selection of thousands of features and many different practices. Customization of the package can be applied to further adapt the best practices to the organization (Soh and Sia, 2004). Pollock and Cornford (2004) provide examples of such customization in the context of a British university. Furthermore, the differences in situations and contexts that may lead to different interpretations and enactments of the technology all result in local adaptations of the best practices. All in all, we suggest – as does Gosain (2004) - that each company essentially constructs its own unique instantiation of the technology that is configured and customized to fit (to a certain extent) with the new organizational situation, and does so in a more-or-less unique manner. This implies that the term "best practice" does not necessarily apply to standard processes as proposed by the suppliers. Indeed so, even the organizations that are model for the best practices do not always end up with "vanilla" solutions, but may customize these so-called "best" practices as well (Wagner and Newell, 2005). In addition, in the spirit of Orlikowski's (2002) remark, we note that when they are in-use, practices themselves are open to improvisations, flexibility, and change, especially considering the multitude of people that are involved in interpreting and enacting the practices (Feldman and Pentland, 2003).

Central to our argument, we consider ERP's best practices to be a particular form of organizational routines. Organizational routines are typically characterized as "… a repetitive, recognizable pattern of interdependent actions, involving multiple actors. (Feldman and Pentland, 2003, p. 96)" or in other words, "… multi-actor, interlocking, reciprocally-triggered sequences of actions (Cohen and

Bacdayan, 1994, p. 554)." Following Latour (1986), Feldman and Pentland (2003) distinguish between the ostensive and performative aspects of organizational routines, as they put it: "The ostensive aspect is the ideal or schematic form of a routine. It is the abstract, generalized idea of the routine, or the routine in principle. The performative aspect of the routine consists of specific actions, by specific people, in specific places and times. It represents the routine in practice. Both of these aspects are necessary for an organizational routine to exist (Feldman and Pentland, 2003, p. 101)."

A key element of organizational routines is that they have multiple participants (Becker, 2004). During the in-use phases, numerous organizational members are involved in the interpretation and enactment of the best practices that, because of their integrated nature, tend to span many different organizational departments. In the context of ERP systems, one should also realize that a wide variety of people are involved (or not!) in their implementation (Somers and Nelson, 2004). For example, at Electro, three different groups were identified: members of the steering committee (top management), key-users (project group), and end-users. The project was essentially run by the first two groups, and the end-users were largely ignored. To a large extent, people within the adopting organization depend upon the interpretations of the practices provided by third parties. Thus, it is also important to recognize the participation of both the individuals at suppliers such as SAP, who primarily develop and sell the ERP packages, and the numerous consultants who are active in the ERP system field. Throughout the implementation phase at Electro, consultants from three firms were active. In particular in the following we will look most closely at the implementation partner and SAP R/3 software application host, called PCCons here.

The fact that the people enacting the routine are usually not the ones designing the routines and further, that they are excluded from the implementation process may add to the often experienced gap between best-practice-as-designed and best-practice-in-use (Orlikowski, 2000). Furthermore, one of the - often under-highlighted - consequences of multiple actors enacting and interpreting best practice routines is that in doing so, individuals can and do change both the ostensive and performative aspects of these routines. In this light, interpretive flexibility may give rise to multiple, partially overlapping local adaptations by individuals (Pinch and Bijker, 1987; Swan et al., 2000). "The involvement of multiple individuals inevitably introduces diversity in information, interpretive schemes, and goals of the participants. The individuals performing the routine do not all have access to the same information, and even if they did, they might not interpret the information in the same way. […] As a result of these factors, their subjective interpretations of the appropriate course of action will differ. […] There is no single, objective routine, but a variety of different perspectives on what is involved (Feldman and Pentland, 2003, p. 104)." Furthermore, it is important to recognize the fact that some individuals (through agency) have a choice to enact routines differently or resist acting altogether (Feldman and Pentland, 2003; Vaast and Walsham, 2005). "While users can and do use technologies as they were designed, they also can and do circumvent inscribed ways of using the technologies - either ignoring certain properties of the technology, working around them, or inventing new ones that may go beyond or even contradict designers' expectations and inscriptions (Orlikowski, 2000, p. 407)." This provides a basis for the improvisational character of routines, opening the way for evolution and change (Boudreau and Robey, 2005; Feldman and Pentland, 2003; Moorman and Miner, 1998).

Understanding ERP's best practices as organizational routines also means that we may consider them to be part of organizational memory. Organizational memory may be defined as "… stored information from an organization's history that can be brought to bear on present decisions (Walsh and Ungson, 1991, p.61)." It should be noted that a wide variety of taxonomies of memory exists (Cohen and Bacdayan, 1994). For example, Van Stijn and Wensley (2001) distinguish for instance between information, knowledge, paradigms and skills. In this paper, we make use of the distinction between declarative and procedural memories Such a distinction is often associated with individual memory and has been extensively developed by researchers in the field of artificial intelligence (Moorman and Miner, 1998). Declarative memories refer to memories that have factual content whereas procedural memories refer to the memories about the performance of actions (Cohen and Bacdayan, 1994; Moorman and Miner, 1998).

Memory contents may be thought of as stored at different locations or repositories (Walsh and Ungson, 1991). In this sense, routines are considered to be a key repository of organizational memory (Becker, 2004; Cohen and Bacdayan, 1994; Moorman and Miner, 1998). Organizational memory processes, such as search and retrieval, operate upon the memory base, thus enabling the actual use of the memory contents (Stein, 1995). Though our discussion of organizational memory here relies heavily on the dominant information-processing metaphor of memory, it should be noted that we do not exclude the use other memory metaphors, as they may be equally instructive. Corbett discusses why he finds the idea of "storage bins" of memory problematic, though it does include external tools and memories. "Whilst such a model reflects the hybrid and fragmented nature of memory […] it does not do justice to the interconnectedness of such memory sites, nor the fact that each "storage bin" contains memories of the others. It is the interaction between the "bins" that is of key importance, as, from a social psychological perspective, memory is less a structure than an ever-moving assemblage of memory fragments that are reconfigured and reconstructed by different actors in a multitude of ways to serve a multitude of purposes (Corbett, 2000, p. 288)." Indeed our conceptualization of memory mismatches stresses the interaction and interrelationships of the different memory locations.

In organizational settings, we naturally talk of 'organizational memory' as if it were a reasonably precise analogue of individual memory. However, we do not take such a metaphoric transposing of memory properties to organizations literally! We further maintain that it is appropriate to investigate such concepts as knowledge, knowledge management, or indeed organizational memory at the individual and social cognitive level.

In Figure 1, we have summarized our previous analysis and offer a preview of the topics covered in the next section, where we particularly explore the link between ERP's best practice routines and our notion of organizational memory mismatches.
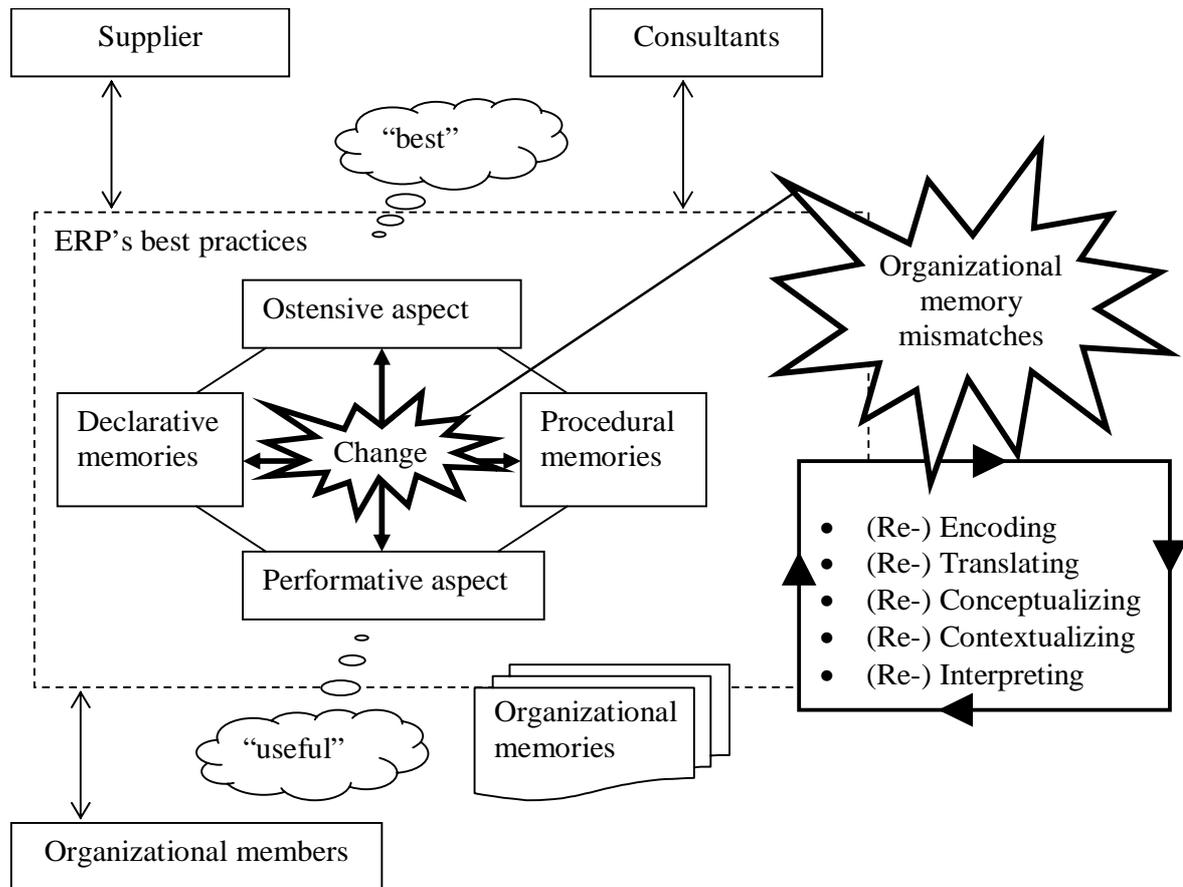

Figure 1.   Conceptualization of ERP's best practices, mismatches and change

3   ORGANIZATIONAL MEMORY MISMATCHES

It is our central thesis that organizational memory mismatches may exist between the memory contents associated with ERP's best practices and related memory contents in other media (Van Stijn and Wensley, 2001). For instance, as the steering committee (October 2002) at Electro recollected: "We have lost about 200,000 Euros because of the way the inventory is denominated in the old and new system. With one system it is 'Work in Progress', in the other it is 'Stock'. Now, we have the work in progress on a separate location and it is kept up-to-date manually, with dummy registrations."

The way we interpret the above example is that there was a mismatch in the ostensive aspect of the best practice routine and the involved declarative memories, i.e. the way people described the inventory. Because people inconsistently interpreted the types of inventory and confused the terms, they also made errors in the underlying procedural, performative aspect of the routine, which resulted in costly extra inventory being ordered. The above mismatch was resolved both by re-translating and re-conceptualizing the terms stock and work-in-progress. Changes were made to procedural memories involved in performing the related routines. In addition, a separate location was used for one type of inventory and dummy manual registrations were used. The workarounds represent adaptations but are not directly represented in the ERP system and thus, though they may have resolved the problems, workarounds carry with them significant risk.

We need to briefly set our concept of memory mismatches apart from the concept of institutional misalignments, because on a first glance we may appear to be talking about the same set of concepts. Gosain (2004) and Soh et al. (2003), who identify institutional misalignments as problematic to the successful implementation of enterprise systems, focus on institutionalization/ structure, in particular rules and norms, and rather less on interpretative schemes (knowledge, cognition) (Giddens, 1984) as well as the processes and the individuals that play their parts in the implementation and use of ERP's best practices. Looking at similar problematic situations, we would reason about memory mismatches and interpretation, conceptualization, understanding etc. instead of opposing institutional forces and misaligned embedded structures (Gosain, 2004; Soh et al., 2003). Thus we provide a different theoretical and narrative framework for understanding that supports additional levels of detail and richness.

From an organizational memory perspective, it is worth considering that the routines are 'encoded' in the particular structures that are chosen for ERP systems. Routines that are originally encoded may not appropriately represent the routine that needs to be enacted. For instance, Electro experienced this type of issue regarding evaluation of personnel (Electro's issue list, 2002) as shown in Exhibit 1.

Description:
The capacity evaluation of personnel is set up with pool capacity. This does not anticipate in evaluation of the separate work places.
Solution:
It is suggested that separate capacity sources per work space be created that are "active" next to the pool for the units Assembly, Lighting and FAS Lighting. In this way the personnel capacity is shown in two ways: for the pool and for each specific workspace. The capacity availability in the workspace indicates the maximum number of employees (that physically can work at one line). Is this what is intended? If yes, a "conversion scheme" has to be developed.

Exhibit 1.   Encoding the ERP routine of capacity evaluation (Electro's issue list, 2002)

In terms of organizational memory mismatches, we would say that the memory of pool capacity as encoded in the ERP package did not match with the memories encoded in the organization's routines to evaluate separate work places separately. Declarative memories relating to separate work places appeared to be lacking in SAP (which made the related procedural memories incomplete and the desired practice not possible to enact) and it was suggested that these memory contents should be

separately encoded. In this case we would consider this a different type of mismatch when compared to the mismatch that occurred with the stock, as we discussed earlier, where there was an inconsistency between different memory contents rather than a lack of specific memory contents that could be re-encoded into the ERP system (Van Stijn and Wensley, 2001).

A word of caution is necessary here since memories may be refined, expanded and sometimes discarded during the implementation phase. Thus, there is a need to assess the extent to which actual pre-existing memories are appropriately represented in the ERP practice and the package. There is also a need for significantly more research into the location, nature and extent of process memories both before and after the implementation of ERP technology and practices. Care must be taken to investigate how procedural memories stored on different media interact both before the implementation of the practices and during use. The process of encoding that ERP systems prescribe does not appear to allow for any significant evolution or revision of the approach to encoding post implementation. It is also worth observing that organizations are likely to have both formal and informal memory processes for maintaining and enhancing memories and these processes need to be taken into account both in the implementation and in-use phases.

In addition to (re-) encoding, we consider the process of (re-) translating. During the blueprint phase at Electro, the primary task of the consultants of PCCons was considered to be the translation of the best practice processes of the selected ERP package SAP R/3 into applicable blueprints for the organization based on interviews held with members of the organization. As some scholars have noted, SAP (like other enterprise systems) is rather "germane" (Kallinikos, 2004), and it has its specific language (part of which is captured in the process modeling tool ARIS and the implementation tool AcceleratedSAP) that the adopting organization needs to learn in order to achieve an appropriate translation. The result of this initial translation at Electro was not regarded to be successful:

> This process was not clear. The results of interviews just went into PCCons and a blueprint emerged. We did not recognize it [as an appropriate representation of (future) business processes]. It seemed to be the work of very dyslectic consultants. The blueprint actually was supposed to serve as a test (go/ no go), but that was not possible. Looking back, they didn't really do a great job. […] They are consultants, and think 'it should be like this', but they don't mention the preceding steps, it is just prose." – *Steering committee (October 2000)*

Overall, the consultants' way of working did not facilitate the acquisition of the SAP language by Electro. This was in spite of the fact that during the kick-off meeting in December 2001 the issue of potential terminology confusion was raised and the end-users were shown some of the terms in the old system, and how they could be translated into SAP. For instance, what used to be called a "recipe" now became the "routing and bill of materials". However, people did not actually learn the new language, and mismatches arose regarding such instances as the distinction between "stock" and "work-in-progress" as we discussed earlier.

We want to stress here that adopting ERP's best practices is not merely the learning of new terms and terminology, in the sense of translation. In addition, new concepts that underlie the best practice routines need to be learned and old (related) concepts need to be changed or forgotten. Although this may seem to be straightforward process, the adoption of best practices in particular and ERP systems in general, is likely to require fundamental changes, modifying deep understandings of many relevant concepts. Over and above this it becomes necessary to learn and understand how to interpret new and existing routines and enact them in day-to-day situations. Furthermore, when the best practice processes are implemented, how do we know that they are consistent with the existing processes? Do the users of the new system really understand the terms and concepts that are used to construct the new processes? How can one be confident that users actually understand the processes and their operation? How does one determine the extent to which new or restructured processes are understood?

Another potential problem with ERP best practices is the problem of context. Just where do the language, concepts, and routines apply? What are the relevant aspects of the business environment that need to be present for a blueprint reference model to actually constitute best practice? Processes exist

within a rich context that includes aspects of the organizations products and services, its customers and suppliers, its employees and the organizational structure and culture. The danger is that much of this contextual memory contents may be missing from the ERP practice, as they are often tacit and embedded in other organizational memory media. How can organizations (and researchers!) deal with the tacit nature of much of this contextual knowledge? It is appropriate to note that tacit knowledge is particularly difficult to formalize and communicate. What difficulties does this pose?

In contrast to the governing idea that all necessary knowledge of best practices will be encoded in, for instance, the blueprint, our thinking about (re-) contextualizing stresses the idea is that a certain incompleteness (hence mismatches!) is inherent and even necessary in the specification of best practices (Becker, 2004). This incomplete specification introduces a certain level of uncertainty and ambiguity that has to be dealt with, in particular with the implementation of the best practices. This was not explicitly realized at Electro. In this analysis, their worries about the "dyslectic consultants" were not only a question of a new language and the need for translation. Indeed, it was unclear whether the consultants had actually understood the context of Electro and whether the best practices were appropriately contextualized.

In learning to enact a new best practice, essential changes in understanding of language, concepts and context are required in developing capabilities to deal successfully with the extensive integration of the routines and the system (Beretta, 2002). In the case of Electro, the importance of such integration capabilities had been particularly underestimated during the implementation phase. Interviewees commented that there were "a lot of little islands", that people "missed the jargon", that "the integrative character faded" and that "everything would fall in its place automatically". To make matters worse during training the focus was on SAP's transactions and screens, rather than the interdependency of the different routines in the various departments, as appears to be generally the case (Amoako-Gyampah and Salam, 2004). In our interviews at Electro, some of the employees said that during implementation they did not genuinely understand the new processes because they had not actually worked with or through the processes or been able to develop their understanding of the processes.

> The training consisted of a number of hours to get to know and go through the transactions that are of importance for the department. The key user showed the transactions, and then the end users went through the transaction themselves. Summarizing, all transactions were seen and executed once. Additional training material was a map with the relevant SAP screens. This training is the only time I have seen the system. It did not really contribute to the learning of the tasks at hand. – *end-user MM (October 2002)*

In comparison, respondents in a study by Kumar et al. (2003) mention that "it was very hard to explain the integrated nature of the process and the consequences of individual actions on the down-stream processes in the new work processes supported by the new systems. This was also because training was mostly focused on helping the users learn how to use the software (Kumar et al., 2003, p. 801)."

Learning-by-doing is critical to an understanding of systems and routines, but it may well be very demanding on the user. At Electro, the role for the end-users in the implementation was marginal. The project members justified this by saying they had the necessary knowledge and that the end-users were basically not smart enough to understand. "The end-users would only be confused by the many and fast changes." End-users on the other hand felt that they "joined in the middle of a conversation". Their lack of understanding became essentially a self-fulfilling prophecy! As a result of users not having been trained appropriately and lacking a thorough understanding, one of the issues at Electro was "tuning at the end of the line". As the MM key-user mentioned (October 2002): "Orders were placed inappropriately and many rush orders were misplaced. This is a result of the connection of production, planning, sales, and purchasing. It still happens that someone enters wrong data… In the beginning, the system was meant to be trusted completely, but it didn't work that way, it had to be done purely on ones own knowledge. Now we gradually switch to the system, the "old pain" is gone."

From a memory mismatch perspective, we consider that not only did mismatches arise regarding the integration of the routines but also procedural memories were conflicting. For example, it was unclear how to deal with requested orders versus actual orders. In the case of Electro, the requested orders were processed as if they were already approved and actually needed, whereas they were actually just the outcomes of the tentative planning procedure. This mismatch could have been signaled early on if the people from the involved departments had communicated (and questioned) why so many rush orders were being placed. However it went unnoticed for a while, the main excuse being that "the ERP system said so".

We have thus identified several processes that may both give rise to and potentially provide solutions or resolve organizational memory mismatches, namely: (re-) encoding, (re-) translating, (re-) conceptualizing, (re-) contextualizing and (re-) interpreting. These processes occur and reoccur throughout the whole life cycle of ERP's best practices and packaged solutions (to stress the reoccurring nature, we use the addition re-). In the next section, we briefly discuss the notion of workarounds as well. As we mentioned, through agency, people may enact the routines differently or they may resist enacting the new best practice as prescribed.

4   ERP'S BEST PRACTICES AND WORKAROUNDS

Over time, people learn various ways to "work the system" (Boudreau and Robey, 2005). We contend that in many situations employees develop informal ways of handling conflicts between the ERP system and other sources of knowledge. These informal approaches or 'workarounds' are rarely documented and are thus often overlooked. Workarounds potentially undermine the ability of the organization to function effectively. Most obviously senior management does not receive unambiguous signals from the ERP system or misinterprets the signals provided and fails to act appropriately. Many firms also appear to actively work to reduce or eliminate the informal mechanisms that enable users to actually use information systems and enact the best practices. Even if they do not work against such informal mechanisms, they certainly do not value such mechanisms or provide incentives for users to make use of them. Equally seriously, important information required for interpreting the outputs and inputs of the ERP system goes often unrecognized and unprotected. Finally, information that is likely to be vital to the future survival of the organization is overlooked since many of these workarounds contain indications of where current memories need to be adapted to 'fit' into existing categories and processes.

Description:
In the delivery monitor, deliveries are unjustly shown that are selected in the sales order on the following Monday, while the delivery monitor is set for deliveries today (e.g. Thursday). Also, other deliveries are rescheduled earlier with respect to the date in the sales order. E.g. 77 and 84.
Solution:
This arises because of 1 extra day in the route planning. In the determination of the "goods-availability-date" (visible in MD04) and the determination of the "goods-delivery-date" (visible in VC10C) something goes wrong sometimes. (It appears to have to do with the combination strategy and need transfer). As a solution, the whole planning steering of these data has been removed. Now all 5 dates in the sales order are always equal. We don't do anything with this anyway.

Exhibit 2.   Workaround fed back into the system from Electro's issue list (2002)

Workarounds also existed at Electro, as one of its end-users commented: "During the use of the system, the old ways of working, as used to be done with FINAS, has returned. For example, checking product numbers and writing them down, calculating things manually because the composition and output of SAP does not fit with the task at hand. These are actually all workarounds to get the job done. Also, the system is complex for the execution of the tasks, not providing a good overview and it is tedious (you need to have too many screens open at once) (MM end-user, October 2002)."

Interestingly, workarounds may also be fed back into the routines and the ERP system, as shown in Exhibit 2. The danger of this form of re-encoding is that, over time, they may not be appropriately identified as workarounds anymore. What happens when modifications are made to the system and the user does not recognize them? Or when it is not clear when the enacted best practice routine comprises workarounds? Additional research is needed to provide more insight in the flexibility that people have enacting ERP's best practices and the changes such flexibility potentially leads to.

5   IN CONCLUSION

Many organizations have sought to foster organizational change through the adoption of ERP systems in general and best practices in particular. We believe that inadequate attention has been paid to the nature of ERP's best practices and the extent and nature of the changes their implementation and use may engender. We have set out to look at these issues from an organizational memory mismatch perspective. ERP's best practices are considered to be a specific form of organizational routines that include the use of ERP packages, such as in the case of Electro supplied by SAP. Distinguishing between the ostensive (interpretation) and the performative (enactment) aspects of routines (Feldman and Pentland, 2003) helps to remind us that part of our conceptualizing of memory mismatches relates to what Gosain calls equivoque, to "refer to the technology that admits several possible and plausible interpretations and creates the possibility of misunderstandings, complexity and uncertainty (Gosain, 2004, p. 157)." As such, ERP's best practices are not necessarily "best" for the organization, but when they are adopted and used, they may provide useful ways of conducting business (Orlikowski, 2002). We may also question the extent to which there are truly standard best practices independent of a rich variety of subtly different instantiations of each particular best practice, accommodating for their uniqueness.

Considering best practices as organizational routines also implies that they are a "repository" for memory contents (Cohen and Bacdayan, 1994). This allows us to adopt a memory mismatch approach to our subsequent analysis. Organizational memory mismatches are defined as deficiencies between such memory contents "stored" in the ERP best practice and contents located in other repositories, such as individuals and other organizational routines. We show that organizational memory mismatches in both declarative and procedural memories are certainly not trivial, as they cost Electro a substantial amount of money (both because they occurred and for the effort that was needed to solve them). In contrast to other ERP studies that tend to view knowledge as rather homogeneous and shared, we have stressed diversity and conflict in the declarative and procedural memories involved. In doing so, we believe that we have added a different set of understandings and additional levels of detail and richness. Our focus helps to raise a new set of questions and offers a variety of suggestions for future research. Our discussion of Electro's issues with organizational memory mismatches also gives us some interesting insights into the practices surrounding the implementation and use of ERP systems in particular and complex enterprise systems in general.

The language of ERP's best practices seems to suggest that there are templates for particular processes and that these templates can be implemented in a relatively straightforward manner. On the contrary, we have seen that people have difficulties in acquiring this language and, even more difficulty, understanding the underlying ERP best practice concepts. Furthermore, best practices are not necessarily "best" since they are contextualized and we have to recognize that such practices will be interpreted or re-interpreted when they become part of and are enacted and re-enacted in the organization. Interpretive flexibility in this light inherently opens the way for conflicting memories that may give rise to change. Thus, we may raise a number of fundamental issues:

To what extent are they likely to be the 'same' ERP's best practice as the supplier intended, when they are subject to processes of (re-) encoding, (re-) translation, (re-) conceptualization, (re-) contextualization and (re-) interpretation? Will these best practices necessarily improve the performance of the organization when they are implemented and used? How will the changes with ERP's best practices impact on other parts of the organization? How does the implementation of best

practices change the way work is done and understood at the individual level? How does it change the way organizational memories are stored and processed? Are these changes likely to result in improved performance of the organization? And, to what extent are some of the changes that have been made by importing 'best practices' hidden? The best practices underlying the ERP system have a highly integrative nature and consequences of changes in one aspect may "ripple through" the organization in unforeseen and even unseen ways.

It is also interesting to contemplate to what extent the knowledge structures that have been built up by individuals prior to the implementation of the best practices and the ERP system are appropriate after the implementation - do they allow individuals to behave appropriately? Can they work with the newly reconstituted processes? Are they able to diagnose process failures or performance deviations appropriately? How do memories and practices transform and evolve during the in-use phases?

Failure to comprehend the issues that we raise, results in failure to appreciate differences (which may be very significant) between the best practices-as-designed and the best practices-as-used, and the underlying conflicts in individual memories and organizational "memories". It is our contention that this results in costly problems and suboptimal results from the ERP routines. The issues that have been discussed in this paper imply that the changes that need to take place for the successful implementation and use of ERP systems are often grossly underestimated. It can be argued that this both leads to very significant problems with the implementation and use of such systems and also an underestimation of the extent to which change has actually taken place. Memory conflicts are inherent and organizational memory mismatches are important cues for both challenges of and opportunities for change.

References

Amoako-Gyampah, K., and Salam, A. F. 2004. An extension of the technology acceptance model in an ERP implementation environment. Information & Management, 41, 731-745.

Bearda, J. W., and Sumner, M. 2004. Seeking strategic advantage in the post-net era: viewing ERP systems from the resource-based perspective. Journal of Strategic Information Systems, 13(2), 129-150.

Becker, M. C. 2004. Organizational routines: a review of the literature. Industrial and Corporate Change, 13(4), 643-677.

Beretta, S. 2002. Unleashing the integration potential of ERP systems: the role of process-based performance measurement systems. Business Process Management Journal, 8(3), 254-277.

Boudreau, M. C., and Robey, D. 2005. Enacting integrated information technology: a human agency perspective. Organization Science, 16(1), 3-18.

Cohen, M. D., and 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., Harris, J. G., and Cantrell, S. 2004. Enterprise systems and ongoing process change. Business Process Management Journal, 10(1), 16-26.

Feldman, M. S., and Pentland, B. T. 2003. Reconceptualizing Organizational Routines as a Source of Flexibility and Change. Administrative Science Quarterly, 48, 94-118.

Giddens, A. 1984. The constitution of society. University of California Press, Berkeley [etc.].

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.

Holsapple, C. W., and Sena, M. P. 2005. ERP plans and decision-support benefits. Decision Support Systems, 38, 575 - 590.

Jones, M. C., Cline, M., and Ryan, S. 2004. Exploring knowledge sharing in ERP implementation: an organizational culture framework. Decision Support Systems, article in press.

Kallinikos, J. 2004. Deconstruction Information Packages: Organizational and Behavioural Implications of ERP systems. Information Technology & People, 17(1), 8-30.

Kraemmerand, P., Moller, C., and Boer, H. 2003. ERP implementation: an integrated process of radical change and continuous learning. Production Planning & Control, 14(4), 338-348.

Kumar, K., and Van Hillegersberg, J. 2000. ERP experiences and evolution. Communications of the ACM, 43(4), 23-26.

Kumar, V., Maheshwari, B., and Kumar, U. 2003. An investigation of critical management issues in implementation: empirical evidence from Canadian organizations. Technovation, 23, 793-807.

Latour, B. 1986. The powers of association. In J. Law (Ed.), Power, Action and Belief. Routledge and Kegan Paul, London, 264-280.

Lee, Z., and Lee, J. 2000. An ERP implementation case study from a knowledge transfer perspective. Journal of Information Technology, 15(4), 281-288.

Markus, M. L., and Tanis, C. 2000. The enterprise system experience - from adoption to success. In R. W. Zmud, & M. F. Price (Eds.), Framing the domains of IT management: projecting the future through the past. Pinnaflex Educational Resources, Cincinatti (OH), 173-207.

Moorman, C., and Miner, A. S. 1998. Organizational improvisation and organizational memory. Academy of Management Review, 23(4), 698-723.

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.

Pinch, T. J., and Bijker, W. 1987. The social construction of facts and artifacts: or how the sociology of science and the sociology of technology might benefit each other. In W. Bijker, T. P. Hughes, & T. J. Pinch (Eds.), The social construction of technological systems. MIT Press, Cambridge, Ma., 17-50.

Robey, D., Ross, J. W., and Boudreau, M. C. 2002. Learning to Implement Enterprise Systems: an Exploratory Study of the Dialectics of Change. Journal of Management Information Systems, 19(1), 17-46.

Soh, C., and Sia, S. K. 2004. An institutional perspective on sources of ERP package-organisation misalignments. Journal of Strategic Information Systems, 13, 375-397.

Soh, C., Sia, S. K., Boh, W. F., and Tang, M. 2003. Misalignments in ERP implementation: a dialectic perspective. International Journal of Human-Computer Interaction, 16(1), 81-100.

Somers, T. M., and Nelson, K. G. 2004. A Taxonomy of Players and Activities across the ERP Project Life Cycle. Information & Management, 41, 257-278.

Stein, E. 1995. Organizational memory: review of concepts and recommendations for management. International Journal of Information Management, 15(1), 17-32.

Swan, J., Newell, S., and Robertson, M. 2000. The diffusion, design and social shaping of production management information systems in Europe. Information Technology & People, 13(1), 27-45.

Umble, E. J., Haft, R. R., and Umble, M. M. 2003. Enterprise resource planning; implementation procedures and critical success factors. European Journal of Operational Research, 146, 241-257.

Vaast, E., and Walsham, G. 2005. Representations and actions: the transformation of work practices with IT use. Information and Organization, 15, 65-89.

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. IRM Press, Hershey, 243-254.

Van Stijn, E., and 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.

Wagner, E. L., and Newell, S. 2005. 'Best' for whom? the tension between 'best practice' ERP packages and diverse epistemic cultures in a university context. Journal of Strategic Information Systems, article in press, 1-24.

Walsh, J. P., and Ungson, G. R. 1991. Organizational memory. Academy of Management Review, 16, 57 - 91.