PROCESS STANDARDIZATION AND CONTEXTUAL KNOWLEDGE

Hans van Leijen[a]
Walter Baets[b]

[a,b]NOTION, Universiteit Nyenrode, The Netherlands
[a] h.vleijen@nyenrode.nl
[b] w.baets@nyenrode.nl

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Abstract

In recent years, organizations have been standardizing their business processes. This is often harder than expected or yields ineffective results. It is useful to obtain more insight into how differences between similar processes depend on contextual circumstances, and how the effort needed for adequate change depends on the context specificity of process knowledge. This exploratory research examines seven change projects in a large organization. Our research goal is to offer insight into the way business processes are rooted in the contextual knowledge patterns of the individuals that execute them. A preliminary framework has emerged of the features that make work practices contextual, the effects of context specificity on standardization efforts and the effects of standardization on process knowledge.

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1   Introduction

In recent years, organizations have been rationalizing their business processes. The nineties' merger mania has led to large conglomerates of service providers, who are now seeking for an optimal and low-risk exploitation of the potential for operational synergy. They try to increase efficiency and quality by merging and standardizing processes.

A modern kind of this internal merger is *shared services*: pairing operational synergy with commercial diversity, by creating a matrix organization of customer-oriented marketing and sales departments, and product-oriented administration and processing departments (Swagerman and van Steenis, 1998). The challenge here is to achieve both *process standardization* and *product differentiation* at the same time.

Standardization of processes is influenced by available technology. IT creates possibilities for new process structure because it lowers the cost of coordination. An important phenomenon is the rise of "commercial off-the-shelf" (COTS) software for business process support. Examples are enterprise resource planning and customer relationship management packages. Creating tailor-made software turns out to be expensive. Nowadays, it is regarded smarter to adapt the processes of an organization to a piece of standard software into which the supplier has built the best practices of the industry, rather than adapt the software to the processes.

Contemporary business process change is not just aimed at efficiency. Organizations try to *professionalize* their processes to improve quality. They believe that processes can be executed in a more professional, disciplined manner, amongst other things by imitating "best practices" from some other party. This "art of imitation" has been stimulated by the knowledge management phenomenon. A best practice is a way of working that has originated from some practice, not as a consequence of a design effort, but as an outcome of experiential learning. The difficulty of implementing best practices is how to adapt them to local circumstances, something that is sometimes overlooked, but more often done too much, leading to incapacitated best practices and lack of adequate change. Knowing what to adapt and what to adopt unaltered is crucial.

The common denominator in the developments described is a standardization on a certain way of working, due to information technology usage or business integration after a merger. This implies a decrease in the specificity of a process with respect to the value proposition that that process supports. It requires a process of disentanglement, in which it is discovered how the current way of working is interwoven with its context, that what makes that proposition unique and competitive, and subsequently adaptation of non-standardized parts of the process to standardized pieces. In other words: a struggle to maintain uniqueness amidst standardization. If not properly orchestrated, this struggle can be costly and yield a sub-optimal outcome. For example, it is a well-known fact that company mergers usually take much longer than expected and often do not achieve the synergies hoped for (Bakker and Helmink, 2000).

When local differences in process structure support a unique commercial proposition, then standardization might damage competitiveness. To be able to make good decisions with respect to taking away differences, it is useful to obtain more insight into

why differences between similar processes exist. It is also interesting to see how the effort needed for adequate change depends on the context specificity of a process.

2 Background

The basic object of our study is an organization, for which we employ an agent-based model: each agent knows a set of actions that he, she or it uses to achieve certain goals. To relate actions to goals, agents employ knowledge: information about cause-effect relationships between events in the world. Knowledge of agents is overlapping: they have knowledge about each other's knowledge; it is this *shared knowledge* that enables them to coordinate their actions (Grant, 1996).

Knowledge, or competence, consists of four things: ontology, or, a set of categories; perception, which is a mechanism to abstract perceptual features to categories; causal relationships between entities that can be described in terms of the ontology; and routines, repetitive sequences of actions that have proven effective in the past. To possess a competence, an agent must know its ontology, be able to recognize and categorize events in terms of it, know useful causal relationships, and know routines to take appropriate action (Van Leijen and Baets, 2003).

Routines, or *scripts*, emerge from repeated planning using causal relationships; they speed up application of knowledge, but also cause inflexibility, because the causal relationships on the basis of which routines were once conceived, might not be valid anymore, or might simply be forgotten. In psychology, this process is called *compilation* (Gioia and Poole, 1984). The whole of routines and sets of information, stored in information systems, document collections, on paper, and in people's minds, are often called *organizational memory* (van Stijn and Wensley, 2001). When we say *business process*, we mean the process implemented as an ensemble of humans and machines; that is, the whole of symbol systems, categories, causal relationships, and routines used to serve stakeholder's interests.

Knowledge is highly contextual (Brézillon and Pomerol, 2001). Categories are developed in a local context, and their names and meanings are socially negotiated. Even if, at a higher level of abstraction, the goals of two similar processes are identical, their embedding in the meaning system of the individuals executing them might differ in a multitude of small details. Some of these details derive from differences that are related to the context in which a process is embedded; others have resulted from more

or less coincidental circumstances in the past. In general, we will call this dependency *contextuality*.

Central concept in this paper is the way knowledge is *allocated* across a process chain. A business process usually has a number of branching points, moments at which process participants (employees, customers) have to make a decision. Such a decision will yield some positive or negative outcome later on in the process. At each branching point, an agent will exploit distinctions in the situation presented and causal relationships it has learned before to predict which decision yields an optimal outcome. In general, using dinstinctions earlier in time allows one to choose a closer to optimal strategy, but this requires more cognitive effort and earlier information exchange with the environment. In practice, a business process is the result of pragmatic choices about when to exploit which distinction.

3   Research setup

3.1   Research questions

To understand the interaction between contextual knowledge and process standardization better, we want to obtain more insight into what happens to embedded process knowledge when it undergoes standardization. Much of the literature on change management deals with emotional, political, and motivational issues. These are important, but the primary aspect to be managed in an change process is ultimately organizational memory. As Szulanski (1996) has convincingly demonstrated, the purely cognitive difficulties in knowledge transfer are separately identifiable and can be even more problematic than the traditional concept of resistance to change, and thus warrant special attention of scientific research.

Our research problem is to explore the link between process standardization (with internal merger as a special case) and process knowledge. We will search for answers to the following questions.

1. *How are business processes embedded in organizational memory?*

2. *What is contextuality: how do subtle differences between similar processes depend on context of operation?*

3. *How is knowledge disentangled, decontextualized, and transferred to a new context?*

4. *What mutual effects do contextuality and standardization have on each other?*

4

5. What is the role of standardization in spreading knowledge? Is contextual knowledge destroyed by standardization, or is valuable knowledge preserved and spread?

3.2 Method

There has been little empirical research into this topic as yet. Therefore, the questions we have identified are exploratory in nature. We have conducted a multiple case study for the purpose of theory-building, using the grounded theory approach (Richardson, 1996): cases are analyzed one by one, while the conceptual model is refined continuously. Cases are chosen to explore the breadth of the problem; the extremes of the spectrum of situations that the new theory is proposed to cover, are represented in the cases. The research is "uncritical" in that it seeks to detect relevant variables and candidate hypotheses for relationships between them, rather than proving those relationships.

Our basic approach was to compare a small but representative sample of projects in which processes were standardized or merged. In each project, differences between the original non-standardized processes were compared to investigate the link between context and working practices.

To "seed" the grounded theory approach, a focus group session has been used to reflect on, and elaborate, an initial set of distinctions. Eight business consultants were invited to participate. They all had considerable experience in business process analysis and redesign in the context of mergers and standardization. A group support system (Dennis et al., 2002) was used to pose questions and collect feedback on examples of subtle differences in process structure. These examples were then elaborated and used for setting up the interview protocol.

Projects were examined by conducting either one or two interviews. Before each interview, project documentation was supplied to the researcher by the respondent for preparation. After the interview, more documentation was collected and studied to resolve any unclarities. Respondents were typically the most knowledgable persons involved in the project, and were either line managers, project managers or consultants.

3.3 Setting

The seven standardization efforts examined all took place within the same organization. This financial services company has resulted from a series of mergers. It

manifests itself in the marketplace using a number of distinct brands. Internally, the company has been in the process of realizing economies of scale by concentrating activities for many years.

The efforts examined differed in size, domain, and in the role that standardization played. For some, standardization was an explicit goal; for others, it was instrumental in achieving, for example, synergy of scale. In each of the projects, a number of *local processes* play a role, that are similar in some sense; we will call this the *reference group*. Furthermore, in each case some *reference process* can be discerned, a goal state in which each of the local processes has either been absorbed into some concentrated process, or at least conforms to a set of standardized requirements. In most cases, the reference process absorbs only part of the original activities of local processes, leaving context-specific activities distributed. This implies that some boundary has to be established at which work is handed off from a local process to the concentrated process.

For later reference, we will now shortly describe the seven cases.

1. *Human Resources Center* is a central department for handling administrative HR processes such as salaries payment and staffing. It is the result of merging numerous local departments.

2. *Document Services* is a supporting department that handles paper output for numerous other departments. Document Services was established in 1999 and has grown organically since then, extending their services to "absorb" output processes from client departments one by one.

3. *Mortgages Center* is a back-office and mid-office for handling mortgages. The parent company offers mortgages under three brands, that, prior to establishing the mortgages center, used to do their own underwriting and administrative handling.

4. *Pensions* is a large business unit that sells all kinds of pensions. Composed in the nineties from three brands, internally it still consists of three highly separate entities. This business unit has established a Six Sigma program (Linderman et al., 2003), a process and quality improvement methodology, aimed at measurement and variance reduction.

5. *Property Insurance Underwrting* is a department that does underwriting and policy administration for consumer property and casualty insurance. It has been established towards the end of 2002 as the result of merging two underwriting

departments. The two departments have not merged operationally but do try to absorb each others best practices as much as possible.

6. *Care Brokering* is a department that acts as an intermediary for health care insurance clients who are in a waiting queue for medical treatment. It tries to find treatment capacity for such clients elsewhere in the Netherlands or abroad. Care Brokering has been the result of merging two such departments from two different brands, and has undergone a period of growth and maturation amidst an unstable legislative environment.

7. *Care Procurement Policies* is a department that advises domain experts who are responsible for procuring care for health care insurance clients. Each expert group has its own specialty, such as dental care, hospital care, and so on. Procurement policies tries to standardize and professionalize these procurement processes.

3.4 Overview

Following the grounded theory approach, findings from the interviews have been categorized into "themes". We will describe features of the environment of a business process that explain its contextual features in section 4.1. Then, we will describe various kinds of contextuality with their relationships to the environmental features that determine them in section 4.2. In section 4.3, we will describe how we have found business processes to evolve over time, to be able to explain behaviour of processes before, during, and after standardization efforts. The last section gives conclusions.

4   Findings

4.1   Contextual factors

In this section, we discuss features of the context in which a business process operates, that influence its structure. A business process evolves in its own, more or less unique environment, that imposes requirements and changes on it. This leads to idiosyncratic evolutionary paths, resulting in more or less unique features for each process within its reference group.In general, contextual features are valuable to some extent depending on the value proposition that the local process is trying to fulfill. Features that are solely the effect of idiosyncratic evolutionary paths, and not dependent on strategic position or unique environmental requirements, are here classified as *historical complexity*. On the other hand, features that *are* valuable in their local context will henceforth be called "strategic contextuality". A feature's being historic

or strategic thus depends not just on its nature, but also on its embedding (Porter and Biggelkow, 2001). We discern six "exogenous" characteristics that influence process structure.

- *Product features* are the most obvious reason for local differences in business processes. Product features are also taken to include features of the sales channel and approach, such as the way customers are communicated with and the way discounts are offered and processed.

- *Value discipline* refers to the familiar competitive strategy choices of *customer intimacy*, *product leadership* and *operational excellence* (Treacy and Wiersema, 1997).

- *Customer binding* is the extent to which customers are "tied" to the organization. It has to do with customer loyalty and communicative intimacy.

- *Size*, in terms of the number of employees or the amount of business involved.

- *Asynchronicities in process innovation cycles.* Investments in process innovations in the past have usually not been in parallel across all local processes. Due to fast-changing technological possibilities and the effects on ways of working thereof, processes are likely to differ substantially because of this.

- *Complexity reduction efforts, or the lack thereof.* Innovation of product or process often leads to additional complexity. Organizations differ in the extent to which they invest in simplifying their operations.

These dimensions are not completely orthogonal, but they do distinctly explain different kinds of contextual process features. Next, we enumerate these kinds of contextuality and relate them to these dimensions.

4.2   Contextual dependencies

Process boundaries and activity groupings. Local processes can differ with respect to how distinct but related activities are distributed over departments. If coupling between two activities is considered important, they are more often grouped together. In the *Human Resources* case, administration of courses taken by personnel was assigned to the human resources department in the reference process. However, one particular business unit had a clear customer intimacy positioning, and highly trained personnel was, comparatively, very important. They had assigned course administration to middle management. Because the human resources support system

to be introduced assumed course administration to be centralized, this alternative grouping of activities was an obstacle to change.

In the *mortgage center* case, the allocation of handling life insurance policies coupled to mortgages varied; in one local process, it was assigned to the mortgage handling process itself, whereas in others, it was assigned to a dedicated life insurance process. This allocation depends on the relative level of product leadership of life insurance vs. mortgages: a business unit that is an expert in mortgages would rather concentrate on the mortgage rather than a relative byproduct. Conversely, another business unit aspired product leadership in neither mortgages nor life insurance; their strategic positioning was to focus on cross selling by having mortgages and life insurance handled closely together.

Sequencing of activities and order of information exchange. Every exchange of value between customer and organization starts out with exchange of information. Especially in financial services, the customer has to be supplied with good advice and information on eligibility, while the organization has to be supplied with information about the customer's situation and risk profile. But also more in general, customer and organization are likely to engage in "conversation for clarification" (Weigand et al., 2003) in order to be able to mutually judge the appropriateness of the envisioned relationship.

The order in which such information exchange activities are undertaken, depends on the amount of "customer binding", that is, the chances of a customer breaking off the sales process and choosing another provider. If that chance is high, a provider will try to maximize their sales effort, but minimize their efforts on up-front fulfillment of the sale before the customer has made a final decision. On the other hand, if the chance of customer loss is low, the provider might do some up-front fulfillment work even if the sale is not yet final, if doing this up-front work is more efficient. Besides the efficiency issue, in the first case, the provider does not want to "burden" the customer with having to supply detailed information. Rather, exchange of details is deferred until after the final sales decision.

In the mortgage center case, there was a marked difference between business units that sold via intermediaries vs. business units that sold directly. With the former, customer binding is higher as the customer visits the intermediary personally; this means the customer already has a higher commitment to this particular intermediary. While filling in the request for proposal, the intermediary can easily assist the customer with filling in intricate details like the execution value of the property. This way, the

company receives a complete request in one turn. By contrast, in the direct writer case, customers employ a "scattershot" strategy by seeking proposals from multiple providers simultaneously. Moreover, customers are much more quickly shied away by having to supply details. Therefore, the proposal phase is more light-weight; obtaining detailed information and performing expensive checks (like checking customer credentials) are deferred. This also means the hit rate distribution is more uniform across the chain of sales activities. In the former case, when a request for proposal comes in, the chances of a successful sale are 80%; in the latter, that chance is only 40%, and customers run a much higher chance of defecting or being rejected later on in the process, because less information and knowledge has been exchanged up-front. This sales channel difference thus has a large effect on the sequencing of workflow and the particular time points at which bits of information are exchanged.

Customer binding is related to, but not identical with, the strategic discipline of customer intimacy. In the insurance business, direct writers can be said to be more "customer intimate" than companies that sell their products via intermediaries, because the direct writers have direct contact with their customers. But although direct writers are more intimate with their customers, as explained above they have lower customer binding.

More in general, when there is a less intensive contact between two partners, and fewer opportunities for knowledge exchange, or when the knowledge employed is less stable and less uniformly shared, then success or failure will be more uncertain and the probability of success will be more evenly distributed along the process chain.

Horizontal segmentation of activities, and specialization. A source of differences between comparable business processes is the way activities are split up in tasks and distributed over work groups. In general, the bigger an organization becomes, the larger the number of work groups and task split-ups. This principle is tempered somewhat by heightened awareness of the relative advantages and disadvantages of specialization, and counter movements towards more generic work such as team-based work, empowerment, and the strive for a "single point of customer contact". There is a trade-off between the virtues of specialization against the inflexibilities it brings along.

Perhaps surprisingly, differences in the extent of segmentation across local processes was almost non-existent in all seven cases. This might be explained by a finding that human prejudice regarding bureaucracy can lead to misperceptions of the extent of segmentation. In the *property underwriting* case, one of the two departments was

multiple times larger than the other. The larger department was perceived by most employees of the parent company outside it as being *bureaucratic*, *rigid*, *geared for volume*, and *intransparant*. Yet, the newly appointed manager of the merged department, originating from the smaller, had to conclude after some time that the extent of segmentation was the same for the two.

Vertical segmentation of activities: handling exceptional cases. A business process can be characterized by the set of situations that it can respond to. Some of those situations will likely be "easy" or "standard", whereas others are "complex", or "exceptional". The word *exception* itself suggests that handling those situations will be hard to standardize, and findings confirm this. The way exceptional cases are handled differs substantially across local processes.

Consensus among respondents was that exceptions should not exist. Exceptions lead to longer and less predictable throughput time, and lead to uncontrollable growth of activities around them. In the *mortgage center* case, one business unit had weekly meetings to discuss exceptional cases. Usually, the exceptionality lied only in a higher or harder to assess risk. Abundant discussion probably served more to distribute responsibility for the decision to *take* a risk, than it really served to more precisely *assess* that risk.

Especially problematic about exceptions is that it is hard to decide up-front that a case *is* exceptional. A company will usually *assume* a case is standard, in order not to bother the customer with questions that are probably irrelevant to the case at hand, such as "*is the property you want to mortgage in a foreign country?*". When a case is deemed exceptional later on, it has to be handed off to a more experienced employee or a more specialized department, often leading to double work.

In the *pensions* case, the struggle between standard and exceptional handling was a central theme. Because of a history of large-size, highly demanding customers (employers, pension funds), client specific regulations had been agreed upon that resulted in specialized teams per customer and unwieldy extensions to information systems. Deciding on exceptionality of a case was problematic. Whenever a batch of some 100 cases had to undergo some standard process, the possibility that there might be one or two exceptions among them would often lead to the whole batch undergoing special treatment.

One of the measures to solve these problems was to equip the *work preparation* process, which examines incoming mail and assigns tasks to teams, with decision

trees to better match complexity of a case with its appropriate treatment. A "work preparator" will judge a case on the basis of the distinctions that the decision tree prescribes, and assigns it to an employee that the decision tree recommends. An issue in the design of these trees was how much handling to put into the tree, and consequently into the preparation process, vs. leaving work for the primary process itself. It was important to choose indicators that were easy to check yet gave a good indication of difficulty level. Put another way, knowledge residing with experienced people in the middle of the process, was formalized and transferred to an earlier point in the process.

Obviously, extensive exception handling is associated more with product leadership and customer intimacy value disciplines than with operational excellence; also, excessive exception handling is the result of a lack of complexity reduction.

Errors, prudence, and rework. We expected to find that differences in error prevention capability would pose problems for standardization, because departments performing low on error prevention, would not have the "cognitive discipline" to implement best practice. We have found some evidence for this in three of the cases.

In the *document services* case, some client departments were much better able to keep errors out of the output information flow than others. Some of them would "toss the specifications over the wall", only to discover errors in the generated output, while others would scrutinize specifications beforehand. Error proneness often results from the presence of an ignorant "middle man" in the workflow. In one case, a client department routinely collects output information from five separate information systems, but the department doing the collecting has insufficient knowledge about the reliability of those information sources. This leads to unreliable information being handed over to the document services department. Had the five information systems communicated directly with document services, problems would be much easier to correct.

In the *pensions* case, preventing errors is one of the main goals of the Six Sigma program. Because of the high complexity of the product offered, many errors result from manual work, for example, making typos in copied monetary amounts. A special category of errors is the misuse of templates and examples. For instance, letters would often be typed manually for client A and then adapted for client B, without replacing all occurrences of A by B, or otherwise without appropriate or complete adaptation. There was a similar problem with failed reuse of knowledge. Whenever a document template, thoughtfully contributed by a colleague for reuse by the team, was accidently garbled

by one colleague, the remaining colleagues would lose trust in this particular template, even if the error was later discovered and the template restored.

The effort that a team puts into error prevention seems to depend more on cultural and motivational factors than on strategic or historic choices.

Verification and inspection, authorization and employee autonomy. Local processes differed substantially in the way they implemented checks and the level of autonomy that employees enjoyed. A check's appropriateness is determined by its sensitivity (does it detect errors), specificity (does it detect *only* errors), cost, and the possibilities for correction should it turn out positive. Respondents felt that in many local processes, these variables were out of balance and too many resources were spent on verification. For example, some teams in the *pensions* case would have paper output returned to them to physically check all of it, even though it was too late for any corrections.

In the *pensions* case, there were many verification and inspection activities, and they were highly formalized. This was caused by the high task complexity. Whether or not to verify a case depended on its difficulty level. Verification could be implemented by "four eyes principle" (peer inspection), by a dedicated employee, or by a quality team. This varied by team size, distribution of competencies within a team, and trust relationships between team members.

The way verification and authorization procedures were implemented differed across cases and local processes. In general, business units that had workflow systems, also had much more elaborate authorization structures and procedures. Business units that did not have modern technology, relied more on "human" techniques. The use of workflow technology has a dual influence on the level of autonomy, or the reliance of employees on their superiors for decision making: on the one hand, by offering decision support it allows employees to make decisions on their own; on the other hand, by offering authorization functionality, authorization procedures are more formal and more strictly adhered to.

Extent and quality of information technology usage. Because of the fast rate of change in information technology and asynchronicities in process innovation cycles, information technology usage differed substantially across local processes. This was very problematic in standardization efforts, as existing processes are often closely tied in with legacy information systems. It appears that process knowledge is often tied in

with the way that classification schemes inside information systems are set up and used.

In the *human resources center* case, the original situation seemed encouraging because local departments had been using the same personnel information system for many years. Yet migration to a new system was highly problematic. Local departments had been defining *codes*, names and categories for entities like job titles and work groups, in an uncoordinated fashion. There had been no basic principles for systematizing code creation. This resulted in a large collection of codes that differed in the way they mapped onto the outside world, and in their semantic content. An example is the use of similar but not identical terms like "computer programmer" and "software engineer" for roughly the same job at different departments. Fields in the information system were often misused to carry information they were not meant for. For example, the use of a job description like "Business Controller H", in which the "H" signifies a salary level.

This wrong usage of codes had become ingrained in local practices. Information from the old system could not simply be "cleaned" and copied to the new system, because the codes carried local meaning in the form of, for example, references to them from employment contracts.

In the *mortgages center* case, there were many differences in local IT systems. The different value disciplines of the three brands participating in the project were reflected in their IT systems portfolios. The general intermediary insurer, focusing on intimate customer relationships with their intermediaries, had an old-fashioned and inflexible IT platform. The direct writing insurer had a highly efficient, large and sophisticated IT platform, but quite inflexible and not especially geared for the mortgage business. The mortgage specialist brand, on the other hand, had a highly automated and highly flexible architecture, developed in-house.

Especially troublesome in many projects were the various spreadsheet files used. Often developed by an individual in a highly specific context, they make restrictive and undocumented assumptions that turn out wrong when their usage context slightly changes. But the end-user programming features of spreadsheets also enable innovation. In the *care brokering* case, the smaller of the two departments had been using a spreadsheet solution with workflow-like functionality. This functionality was absorbed into the larger department's tailor-made system.

As for the link between contextual factors and information technology usage characteristics, respondents felt that differences in IT between local processes existed for historical reasons only. However, from the descriptions it can be hypothesized that extended, high quality IT usage is associated with large organizations with an operational excellence focus.

Level of formalization and documentation of processes. One of our hypotheses was that standardization would be easier when existing processes were highly formalized and well-described. Local processes differed substantially along this dimension.

Formalisation means ways of working are strict and discrete and refers to the use of standardized information structures to guide work. The decision trees from the *pensions* case are one example; checklists are another. In general, the level of formalization is strongly dependent on the level of IT usage, and in particular on the use of workflow systems. In the *pensions* case, the respondent indicated that in general, people do not like being forced to follow checklists. Nevertheless, checklist usage did have a positive impact on process quality, but only when used consistently.

Documentation means simply that working instructions are well-maintained and kept in a designated place. In some of the cases there was a separate administrative organization department that maintained process descriptions. Yet, those descriptions were under-utilized. Employees tend to request inclusion of exceptional handling, but the administrative organization employees resent this, claiming those are not "procedural knowledge". Moreover, when such a situation is included in the process description, it often turns out later that the actions it prescribes are not always valid given the conditions that it requires. In all, it is hard to determine what to regard as "procedural" knowledge vs. "task" or "domain" knowledge, and if that line is pushed, completeness or correctness often suffers.

The findings do not tell much about how formalization and documentation depend on context, other then that they are heavily influenced by the extent and quality of IT usage, by the size of a department and by its operational excellence orientation.

4.3   The process of change

Adaptive evolution of business processes. Organizations will adapt their processes in response to changing requirements or opportunities for improvement. A new behaviour will firstly be implemented in a flexible, ad hoc fashion, both to be able to experiment with different ways of dealing with it, and because new requirements tend

be unstable, subject to further change. Rigorous, efficient implementation will therefore be too expensive until stability of the environment sets in and effective process knowledge has been built up. This process of alternating *exploration* and *exploitation* phases was first described by (Nonaka, 1994) and then elaborated upon by (Nooteboom, 1996; 1999) from the perspective of organizational cognition.

This process of stabilization of innovations can be likened to the psychological notion of *compilation*, or chunking: trading flexibility for speed by replacing conscious planning for automatic routine. This evolution is most explicitly seen in the *property underwriting* case. One of the efforts undertaken there was to transfer more types of cases in the fire and theft line from a complex, flexible process to a standard process. They did this by imitating the way the motor insurance line was implemented. In this way, they used a template in the sense of (Szulanski, 2001). Motor insurance is a much bigger business, enabling higher investments in IT systems. Knowledge from this business line could thus be better exploited by transfering it to the fire and theft line.

For compilation to be effective, the environment of the process must be stable. In the *care brokering* case, stabilization was actively pursued by building trust relationships with select care providers in foreign countries, signing contracts for those treatments that the respective care provider had ample capacity for. The fact that those relationships were stable and formalized enabled the care brokering department to formalize and standardize the process of brokering care for the subsets of situations that required exactly those treatments.

Whenever a set of new case types is added to an existing process, that process will increase in complexity because it now has to respond to more variety. This was most explicitly seen in the case of *document services*, as they had to absorb client departments' output processes one by one. In their own words, a "generic framework" emerged, into which new clients can now be "hung up" much quicker and more reliably than they could before. This generic framework is a "progressing insight" , that partly consists of deep knowledge of the possibilities of the technologies used, and partly of "checks and arrangements" to prevent problems experienced in the past. This is a clean example of integration capability, much like the Banc One case described in (Szulanski, 2000).

Change as a process of knowledge transfer. In each of the projects examined, the knowledge constituting the new, standardized process can be said to originate from somewhere. Knowledge items can be said to be transferred from some origin in one or more of three ways.

For one, a benchmark can be used to assess *to what extent* a process can be improved, but not knowing precisely how. Secondly, best practices can be exchanged by careful studying and copying of behaviour and representations. Thirdly, knowledge about improvements can be created by measurement and experimentation.

Benchmarking is probably the most often used form of best practice exchange. Knowing that a competitor achieved improvement is a strong means of convincing coworkers that trying some new trick is worth the effort of coping with its disadvantages, whereas, had the trick never been tried before, it is all too easy to argue that the disadvantages will outweigh the benefits.

In the *mortgage center* case, there was strong benchmarking information about competitors that had concentrated their mid-office. The mortgage lending process is a relatively stable domain. These two characteristics combined made the implementation process highly combinatorial, mixing and matching resources from multiple local processes.

In the *property underwriting* case, multiple forms of knowledge transfer were used. The smaller of the two local processes had a practice of coordinating staff allocation with the sales department through a "marketing actions plan". This document describes marketing actions planned for the near future, along with a projection of their effects on the volume of customer contacts, so the back-office could plan staff allocation. The larger of the two organizations did not have such a representation and its associated practice. After a number of contacts with their new peers, they slowly started to develop the same practice. Upon first question, the respondent did not believe this was copying behaviour. But when pressed, he did agree that the practice had started some time after he himself had "left a marketing actions plan on their table". Thus, copying behaviour is not always apparent or explicit. Often, when a particular behaviour is seen to be feasible and effective, it is naturally and quietly adopted. The socialized knowledge of its effectiveness elsewhere obviates the need for explicitly justifying a change of behaviour.

In most cases a pragmatic, combinatorial approach was chosen with respect to best practice implementation, instead of an inquisitive, experimental approach. In the *pensions* case however, exchange took all three forms of benchmark, copy and creation. As Linderman et al. (2003) points out, Six Sigma is a systematic way of reducing variance (such as errors and performance differences between teams) by finding adequate knowledge, exploiting it and, if needed, creating new knowledge by measurement and experimentation. To separate fact from mere belief, the respondent

in the *pensions* case would hand out stopwatches and time registration forms to gather precise knowledge on process characteristics, rather than relying on expert opinion, which is characteristic of a combinatorial approach.

Two distinct standardization strategies were observed in the cases. One direction is to require that local departments *adapt* their process to *comply* with the features of the proposed reference process. The other is to *replace* their representations with a uniform, single set of new representations. The *adapt-to-comply* approach is often used in practice, because it requires much less change. Besides, it is quite hard to explain why compliance to quality or efficiency requirements is not enough. Yet, conservation of old, contextual representations greatly complicates standardization.

Examples of such representations are paper forms, product specifications and information systems. In one case, one of the brands had not understood the decision to have "just one product type". They thought that their products would still be based on old specifications, but would be made compliant with uniform requirements such as fitting in a particular information system, and offering certain product features. However, management's understanding of the "just one product type" decision was that there was to be only one, highly complete and flexible set of product specifications, one set of paper forms, legal specifications, financial models, and so forth, that could be *trimmed down* as appropriate for each of the brands. This difference in understanding was discovered months too late, leading to a delay and a compromised outcome.

Failing to transfer a best practice from one context into another is called *stickiness* by Szulanski (1996). Szulanski concludes that cognitive difficulties are a significant cause of failure, even more so than motivational factors. A later paper (Szulanski and Jensen, 2001) zooms in on the process of transfer, and finds out that *replication accuracy* is a variable that mediates cognitive difficulties. That is, the accuracy with which a recipient party copies a practice has a strong influence on success. Attempts by a recipient party to adapt a practice to supposed contextual circumstances usually leads to failure.

Keeping old representations brings with it inflexibility and double maintenance, but is much easier to attain than starting from scratch. What makes it especially problematic, is that, from top management perspective, the *adapt-to-comply* and *replacement* strategies look similar, whereas in practice they are not. As a hypothesis, we contend that *replacement of representations* is a refinement or perhaps a constituent of the *replication accuracy* construct*.*

5 Conclusions

We now summarize our findings to find answers for the research questions.

How are business processes embedded in organizational memory?

In par. 2, we discussed a preliminary model of process knowledge, in which agents try to plan actions that yield an optimal outcome, and need knowledge of causal relationships to do so. In order to make such choices, agents use *category systems* to relate perceived events to variables in causal relationships. Examples of categories are lists of codes in information systems, or multiple-choice fields on paper forms. These category systems are strongly shared between agents, and therefore hard to change. Moreover, changing the category system makes existing routines and information stored on the basis of the old category system unreliable.

Category systems are used to form representations, such as paper forms, computer screens, database tables, and spreadsheet models. The formation process usually happens in a limited context. Representations therefore rely on hidden assumptions about that context, which "entangle" the representation with its context of operation. Standardization often entails a process of disentangling representations by making usage contexts and the hidden assumptions they bring along, explicit.

What is contextuality: how do subtle differences between similar processes depend on context of operation?

In section 4, we have described a number of features that comprise contextuality, along with the factors that influence them. The features can be divided into three dimensions. "Horizontally", processes differ in the way activities are grouped into processes or departments, ordered in time, and segmented. This determines the allocation of required process knowledge to agents along the process chain. "Vertically", processes differ in the way exceptional cases are handled, errors are detected and corrected. In the third dimension, we find the variables automation, formalization and documentation, that have to do with the carrier, shape and explicitness of the knowledge along the process chain.

Also, in paragraph 4.1 we have described the strategic or historic choices that influence these features. *Product features*, *value discipline* and *customer binding* have an important and not to be ignored influence on process structure, whereas *size*, *asynchronicities in process innovation cycles* and *complexity reduction efforts* are

merely historic circumstances that cannot be ignored but that should not be maintained in the future situation.

How is knowledge disentangled, decontextualized, and transferred to a new context?

Disentanglement, identifying how an activity is connected to other activities, is problematic in many cases. Respondents complained that they had no systematic way of enumerating all the connections, and so connections were often overlooked, leading to "pendulum swinging" (see below).

Decontextualization, identifying how knowledge developed in a particular context can be used in another, seems not to be problematic. However, respondents did stress that the *process* of deliberating the use of new knowledge in a particular situation needs to be paced right. At the outset of a standardization effort, the reference process is to a more or lesser extent abstract and causally ambiguous. A reference process usually starts out either as a broad idea, or as a template, possibly imitated from a competitor. During a project, features of local processes will be abstracted to make them comparable to the reference process, while the ideas in the reference process will be instantiated by matching them with features of local processes. In this way, local process and reference process will slowly converge to each other. If this is done too quickly, often wrong process design decisions are made.

Cases differ in the degree of causal ambiguity of the reference process. For example, in the *care brokering* case, the reference process consisted just of a broad body of knowledge on the topic of procurement, with some effort spent on making this body of knowledge suitable for the domain of care procurement. In the *document services* case, on the other hand, the reference process consisted of a concrete business process, with computer hardware and software, and a physical output production line, along with the people to operate it. This imposed much more concrete requirements on client departments wishing to outsource their output, which requires a more careful, intensive transfer of knowledge from reference to local processes.

One of the hypotheses we had, was that modularity would be helpful in standardization. In much of the contemporary literature on product and process innovation, modularity is seen as an enabling principle (see for example Sanchez and Mahoney, 1996). However, we have found few examples of this. Regarding the concept of modularity, respondents showed considerable hesitation. In the *mortgages* case, the respondent advised against pursuing modularity, because any kind of flexibility offers people the opportunity to keep open too many options to retain the status quo. It is better to have

one complex product, and make simpler versions of it for different market propositions. Still, the idea of having a complex product as a template for simpler ones, is a kind of modularity.

Knowledge creation and transfer was discussed in par. 4.3. All three mechanisms – benchmark, copy, experimentation – were observed in the examined cases. In most cases a pragmatic, combinatorial approach was chosen with respect to existing knowledge items. Also, we discussed the two standardization strategies of *adapt-to-comply* and *replacement-of-representations*. In most of the cases, *replacement* was much more effective.

What mutual effects do contextuality and standardization have on each other?

Standardization leads to a number of structural changes in process knowledge. Foremost, it leads to disentanglement: isolating context specific distinctions in one defined process step, usually "at the front" of the process. This is accompanied by a generalization of distinctions in the, less context sensitive, standardized part of the process. This means knowledge is transferred up-stream: process participants have to take distinctions into consideration for decision making earlier than they were used to. This is most clearly seen in the *document services* case. Whereas checks used to be performed on a printed document, ready to be sent out to a customer, checks now have to be performed using more abstract digital information, possibly dispersed over different computer screens. This is more demanding and will initially yield a higher error rate. In the *pensions* case, decision trees were used as a highly formalized means of transfering knowledge up-stream.

The cases show that as standardization is pursued while a diversified value proposition is maintained, the length of process chains increases. More steps are needed to handle a larger variety, and this translates to more specialization along the chain. On the other hand, because exception handling is often integrated into the normal process flow, the knowledge needed for their handling now has to be transferred to more employees, leading to more generic work practice.

Through the lengthening of process chains, sometimes "middle men" are introduced. Their role is to transfer work from a specific part to a generic part of the process. However, this often disturbs the proper distribution of shared knowledge. Because the direct link between a data producer and a data consumer is broken, problems and exceptional circumstances will go unnoticed and will disturb the down-stream process. As Grant (1996) writes, between each pair of collaborating employees must exist the

proper kind and amount of mutual shared knowledge. Improper knowledge distribution in a newly formed process chain is often very difficult to correct because of lack of trust between collaborating parties, and lack of resources allocated to the ramp-up phase.

Lack of the ability to assess case difficulty level is problematic in a number of ways. In order to be able to standardize, exceptions need to be kept out of the standardized process, assigned to a special-purpose process, or their occurrence should be prevented. However, deciding on the difficulty of a case up front is hard. In the *pensions* case, this issue was tackled explicitly using decision trees.

The difficulty of assessing complexity of business processes, interwovenness with their environment and the required effort to disentangle this, is problematic. In many cases, this led to "pendulum swinging", repeated back-and-forth movements between standardization and diversification because of bad process design decisions.. For example, in the *property underwriting* case, administration of life insurance products was transferred to the property underwriting department, because it was thought they were experts at handling large volumes of paper forms. Later, it was decided to transfer this work back to the life insurance department, because complexity of handling those products was such that it outweighed the logistical advantages. In the *mortgages* case there were multiple instances of pendulum swinging. The first version of the mortages center centralized only the back-office and did not realize sufficient economy of scale. Then it was decided to centralize the whole mid-office. However, during the project it was decided that there should be specific teams for each sales channel. Still later, one of the brands chose not to replace their product portfolio with the new generic portfolio. In all, four swings were necessary to reach the final situation.

These findings are consistent with those of (Rolland and Monteiro, 2002) and (Lassila and Brancheau, 1999): the process of balancing local and global interests is dynamic, non-linear and punctuated. Change efforts that start out as "grand and visionary" often evolve into an organic and hard to control process of mutual adaptation between global vision and local needs. This is also consistent with findings in the ERP implementation literature (Robey et al., 2002).

Differences in sequencing of activities can lead to harder decisions on whether to assign activities to local or to central processes. In the *mortgage* case, the direct writer business unit wanted more control over the sales process than the intermediary business unit, leading to less standardization across sales channels.

The way exceptions are handled differs substantially across local processes. Excessive exception handling has a strongly adverse impact on standardization efforts, because each exception type warrants deviations from standard handling., Being able to effectively deal with the exception handling is an important success factor for standardization efforts.It seems that having a clear policy on exceptions is helpful. For example, *document services* left them to their clients for handling, while property underwriting didn't allow them to become explicit in the workflow. *Pensions* installed special tools (decision trees) to assess, reduce and handle exceptions. In multiple cases (*pensions*, *mortgages*), it was expressed that the ability to accurately assess difficulty level of a case was important but challenging.

Differences in the extent and quality of information technology usage lead to many problems. Information systems in different local processes are integrated with their environment in different ways. Proposed changes have slightly different consequences for different local processes, making the change harder to coordinate. People try to isolate *process* change from *IT* change, but often fail at doing so. Process and IT changes need to be coordinated hand-in-hand If a new system offers less functionality than an old one, then this will often lead to a struggle to maintain the old system alongside the new one, increasing operating cost. End-user IT solutions (such as spreadsheets) are the most difficult to standardize, because their functionality is highly dependent on local working practices and tacit conventions and assumptions.

Local processes differed substantially on formalization and documentation, but this was hardly seen as a problem. The quality of existing process documentation is deemed not very relevant, because their contents are often outdated and it is considered best practice to do redesign in a participative fashion, inviting employees to express their knowledge interactively. This means that the existence of up-to-date process documentation is a bad proxy for the level of understanding of their process that personnel and management have. In the *document services* example, the respondent indicated that a client department's doing insufficient process analysis and not having adequate understanding of their process would often lead to over-ambition and under-implementation, and to pendulum-swinging between concentration and dispersion of output activities.

The consequences of local differences in formalization and documentation for standardization efforts are similar to those of differences in IT systems, but with two additions. For one, local *norms* will likely command discussion and consensus building during the redesign phase, and changing them will stir up resistance. Second, locally

ingrained *representations* will significantly impede the implementation phase, because their meaning and range of applicability is often not well understood by anyone.

What is the role of standardization in spreading knowledge? Is contextual knowledge destroyed by standardization, or is valuable knowledge preserved and spread?

We did not find any examples of loss of valuable knowledge. However, a limitation of our research design is that our respondents were generally *proponents* of change, and therefore relatively uncritical. We did find many examples of knowledge spread, such as the marketing action plan in the *property* case, the workflow features in the *care brokering* case, and systematic variance reduction by best practice transfer in the *pensions* case.

However, we also found many examples of "pendulum swinging", repeated back-and-forth movements between standardization and diversification because of wrong process design decisions. This indicates that, whenever standardization threatens to destroy valuable knowledge, this is recognized and prevented by cancelling the proposed standardization.

6   Future research

The research reported here was exploratory in nature and therefore relatively uncritical. It sought to establish the relevancy of a particular domain (business process standardization) and develop variables and hypotheses by comparing many practical examples. More research is needed to elaborate and confirm the findings.

Our findings confirm those reported in fields such as ERP implementation (e.g., Robey et al., 2002) and information infrastructure development (e.g., Rolland and Monteiro, 2002): attempts to fit an existing work practice to some new standard occur very often in contemporary organizations and lead to many problems. It is reasonable to expect that standardization will remain relevant and problematic for a long time to come. More insight is needed on effective strategies for assessing business process complexity, choosing an appropriate extent of standardization and implementing this choice.

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