6
Knowledge Capture and Organisation

Michael Rosemann and Roy Chan

The outcome of any serious research can only be to make two questions grow where only one grew before. *Thorstein Bunde Veblen*

**Introduction**

Knowledge Management is widely accepted as a recognised management discipline. However, it is often not linked to other prominent management approaches. This chapter suggests, with a focus on modelling issues, how Process and Knowledge Management can be interrelated. The conception of knowledge is positioned between the well-discussed strategic Knowledge Management and widely available IT-solutions for Knowledge Management. This chapter will demonstrate how Knowledge Structure Diagrams can help to differentiate relevant knowledge more precisely. Knowledge Maps are later introduced in order to show the link from knowledge to the resources of an organisation. Using these models, it is shown how knowledge can be captured and organised in business process models.

This approach of modelling knowledge is applied to the context of Enterprise Systems. Enterprise Systems appear to be one of the most complex applications ever implemented in the field of Information Systems. Increasingly, organisations realise the need to better leverage their knowledge resources as they
lack in-house knowledge related to Enterprise Systems, and the costs of engaging experienced consultants are paramount.

A case study shows an application of how a framework is used to manage knowledge in Enterprise Systems. The framework is applied through the proliferation of reference process models. Process models have been widely used by organisations to map their business processes and gain a better understanding of how businesses are run. However, process models often capture the flow of processes and do not describe specifically how and what knowledge is required to run these processes. By integrating knowledge objects into the models, it is demonstrated what types of knowledge can be captured and how this knowledge can be managed in organisations. In order to show the framework’s applicability in the real-world context, participants in the case study have not only been interviewed but also encouraged to engage in capturing knowledge for their own business processes. The outcome of the application of the framework resulted in the completion of a reference model for selected processes in financial accounting, which exemplifies how process models can support employees in managing their knowledge. Findings from the case study demonstrate what knowledge types are required for the business processes.

The Need to Manage Knowledge Resources

Implementing comprehensive IT applications such as Enterprise Systems (ES) is a knowledge-intensive task. As such, it requires a great amount of experience from a wide range of people such as representatives from business departments, technical specialists from the IT department and project managers within the organisation to external business and implementation consultants. The total cost of engaging these people and the lack of in-house knowledge have proven to be enormous when implementing an ES. Organisations implementing Enterprise Systems have recognised this and realise that they need to manage knowledge, as it is both strategically advantageous and has an impact on a significant cost component in IT projects.
While most existing Enterprise System literature has focused on the need to identify knowledge, methodologies and critical success factors required for the implementation of ES software (Clemons 1999, Kirchner 1999, Scott 1999, Slooten, Yap 1999, Sumner 1999), it has not sufficiently addressed issues related to the operational Knowledge Management. The question eventuates “How can knowledge be managed?” This question addresses among others when knowledge is needed and what managers and consultants can do to more effectively select, implement, use and upgrade an Enterprise System.

In related research, Haines and Goodhue (2000) found that, while organisations want to reduce the engagement of costly consultants, they are faced with not having the necessary internal knowledge and skills to implement an ES system successfully. Consequently, Haines and Goodhue (2000) suggest that transferring and retaining knowledge within the organisation become essential to the overall success of an ES implementation. Thus, organisations become conscious that managing knowledge deals with one of the most significant costs of an ES project.

The interrelation between Knowledge Management and Enterprise Systems has two facets.

- On the one side, implemented ES can serve as a main source of knowledge for a company’s Knowledge Management. As ES often support various areas of a company such as procurement, manufacturing, warehousing, sales and distribution, and accountancy, an analysis of the runtime data can provide the knowledge manager with useful data about the current process performance or further organisational performance indicators. This perspective can be described as "Enterprise Systems for Knowledge Management".

- On the other side, the management and especially the implementation of an ES solution requires enormous knowledge. Thus, a separated ES-related Knowledge
Management can be identified that covers the entire management of knowledge in an ES project. This perspective can be characterised as "Knowledge Management for ES" and is the focus of this chapter.

**Types of Knowledge Required for the Management of Enterprise Systems**

In order to set the context of the study, it is imperative to establish what ‘knowledge’ is when implementing an ES. An intensive literature review discussing the critical success factors for the ES implementation (Chan and Rosemann 2001) led to the identification of six different types of knowledge for the successful management of Enterprise Systems. These types of knowledge are:

*Business knowledge* covers the business issues in the management of Enterprise Systems. Most of the attributes of this dimension should be addressed before the actual implementation of ES in an organisation. Business knowledge includes (1) functional-knowledge in areas like general ledger accounting, purchasing, sales, human resource management, or strategic planning, (2) organisational-knowledge like business process management, communication policies, or document management, and (3) knowledge about the business/industry standards processes (e.g. Oil and Gas industry, Pharmaceuticals, Education).

*Technical knowledge* represents knowledge that is necessary for tasks such as network management, management of client-server-architectures, performance measurement, etc. It also requires knowledge about applications like database management software, middleware solutions, add-on solutions, etc.

*Product knowledge* reflects the need for knowledge specific for a unique ES solution. Most ES solutions are comprehensive packages with a high degree of complexity. This area of knowledge includes an understanding of the architecture of the product, knowledge about its functionality and constraints of
applications, the implementation methodology, the release strategy or knowledge about the ES-specific programming language (like SAP’s ABAP).

Company-specific knowledge is the most individualistic type of knowledge. It covers knowledge, which is specific for an organisation and its individual organisational population, organisational culture, social norms and practices, rules and policies. ES cannot be managed successfully without having a precise understanding of these company-individual characteristics. This is the reason why the participation of the end users is often cited as a critical success factor for ES implementation projects.

Project management knowledge covers the management of human resources, time and cost to accomplish the objectives of a project. The implementation of an Enterprise System in an organisation often requires project management for a time between 6 to 24 months. Project management involves planning, organising and controlling a project with various time and cost constraints, as well as harnessing senior management support.

Further areas of knowledge cover the fact that a capability to combine the five types of knowledge discussed above must exist for successful Enterprise Systems management. Usually different project participants contribute different types of knowledge. Consequently, communication, coordination and cooperation knowledge is indispensable in order to integrate the five types of knowledge. The missing capability to efficiently interact between the involved knowledge owners is a key reason for a project failure. The absence of this knowledge is often due to the fact that it takes a significant amount of time to develop the required communication, coordination and cooperation knowledge and to get the knowledge from different project members.

Zmud (1983, p. 258) suggested six types of knowledge and skills required by all employees:

- Organisational Overview – objectives, goals, purposes, opportunities, constraints, internal and external functioning;
- Target Organisational Unit – application of organisational skills to internal or external unit;
- Organisational Skills – interpersonal behaviour, group dynamics, project management
- General IS Knowledge – hardware and software concepts, IS policies and plans, and IS applications
- Technical Skills – methods and techniques required to perform implementation tasks
- IS Product – Purpose, design, required procedures, impacts on individuals.

Zmud’s (1983) organisational overview, organisational skills, target organisational unit, general IS knowledge, technical skills and IS product correspond to Chan & Rosemann’s (2001) business knowledge, project knowledge, company specific knowledge, technical knowledge (general IS and technical inclusively) and product knowledge respectively. A significant part of communication knowledge exists in Zmud’s (1983) organisational skills (interpersonal/group skills). More obviously, the common thread is seen in Martinsons & Cheung’s (2001) treatment of business knowledge, project management knowledge, technical knowledge (programming languages), product knowledge (software packages), and communication knowledge (interpersonal skills). It is apparent that the categories of knowledge and required skills do not differ significantly in the last 20 years (Zmud 1983, Martinsons & Cheung 2001 – paper officially submitted in 1996, Chan & Rosemann 2001).

The Enterprise System Lifecycle
ES have life-spans that spread over a number of phases. Varying types of knowledge and skills are required over these different phases. It is crucial to pay attention to what is required to be known, who knows what and when the knowledge is required. The selection stage includes the definition of the companies’ requirements, a pre-selection of ES solutions, a request for proposals, detailed system evaluation, economic
evaluation and final ES selection. The implementation consists of the configuration of the ES software and the introduction of corresponding organisational and technical changes like the definition of new responsibilities or the design of new interfaces (Kirchmer 1999, Keller and Teufel 1998). In relation to the entire life span of Enterprise Systems software, the implementation phase is rather short. An ES can be in use for up to 15 years without major changes. In order to execute the ES processes the staff member needs a precise understanding of the software and related business knowledge. In contrast to the implementation, explicit knowledge is more widely available during the use of an ES. Eventually, an Enterprise System has to be continuously changed as it usually reflects a major part of the organisations' businesses.

**Integrating Knowledge within Reference Process Models**

Enterprise Systems are designed for the comprehensive support of entire business processes. Consequently, it seems appropriate to analyse the interrelation between Knowledge Management and Enterprise Systems from a process viewpoint.

A process is defined by Green and Rosemann (1999) as “a self contained, temporal and logical order (parallel or serial) of those activities that are executed for the transformation of a business object with the goal of accomplishing a given task”. Similarly, Garvin (1998) defines processes as a collection of tasks and activities that together transform inputs into outputs. “Processes open the ‘black box’ of the firm without exposing analysts to the ‘part-whole’ problems that have plagued earlier research” (Garvin 1998). Organisations are comprised of many processes that occur simultaneously. However, these processes are often ‘invisible’ and not evident to the personnel from one department to another department. Organisations are unable to visualise how an entire process flows within inter-departments or intra-organisation. Process models are thus introduced to the organisation to facilitate a holistic understanding of business processes.
Dean et al. (1994) state that process models “support conceptualisation, communication, analysis, and design for development and improvement of business processes and information systems”. Business process modelling is the complete description of how an enterprise will implement the ES package to support its business activities. It is a design document that serves in the next step, configuring the system, as a template for the realisation of the requirements of the enterprise in the ES system package (Appelrath and Ritter, 2000).

Dennis et al. (1999) view that the “essence of process modelling is capturing and representing information about business processes.” While process models attempt to capture knowledge about business processes, Curtis (1992) notes that “the methods for capturing the information for use in process models has received virtually no research attention.” Huang et al (2001) found that there are few studies, which explores the processes of knowledge integration. The need for understanding knowledge integration processes can be seen as a theoretical gap in the literature on IT implementation. Without understanding of how knowledge can be integrated into process models, it is not possible to capture knowledge about processes. While current process modelling research focuses on the technological aspect of process modelling (Dean, 1994), there is little research on identifying what knowledge is required to carry out these processes. The following sections will explain how process modelling is applied to ES.

Using an existing framework (Rosemann and Chan, 2000), we examined process models in ES by focusing on the two of the three dimensions espoused (i.e. ES Lifecycle and types of knowledge). These two dimensions are extended by a perspective that depicts the role-specific and the process-specific viewpoint of an ES. Thus, this approach will allow one to identify who possesses what type of knowledge with relevance to what processes in which phase of the ES lifecycle. In order to do this, existing reference process models are used. The following section
explains the characteristics of reference process models and how they can be applied to integrate knowledge.

![Diagram of a simple ES-specific reference process model](image)

**Figure 6.1 Exemplary ES-specific reference process model (extract)**

There is a variety of methods for modelling business processes. Many ES providers have designed comprehensive reference process models in order to document how their solutions support various business processes (e.g. Curran and Keller 1998). With this approach, they have simultaneously captured knowledge about their product. Figure 6.1 shows as an example of an extract from a simple ES-specific reference
process model. The example below shows a part of the dunning process in SAP R/3. The modelling grammar used is known as the Event-driven Process Chain (Schéer 1998a). It consists of events (hexagons) and function (rectangles) as well as control flow constructs (AND, inclusive and exclusive OR), which describe joins and splits in a process model. The model below shows an AND-split.

Though application reference models contribute significantly to the understandability of software functionality, they still have core weaknesses.

- As the models are focused on the description of the process execution and the information managed by them, it is not obvious what configuration alternatives exist. The analysis of a reference model shows what is possible in general, but not what might be recommended alternatives. Application reference models represent the entire functionality with the assumption that the complete functionality of the given application will be used: these models are not designed for configuration. Their modelling techniques do not support constructs that cover possible decisions during the implementation phase, i.e. decisions at buildtime. Thus, they do not differentiate between decisions on instance level (in the particular implementation) and type level (in the reference model).

- Application reference models concentrate on the elements that are of importance for a specific Enterprise System. Particular aspects of the organisation, business objectives or manual tasks cannot be seen in these models. They do not include any references to the involved or required knowledge.

- Besides the missing transparency regarding possible choices during the configuration process, it is also not clear what consequences a configuration of one process or data structure has on other processes or data structures.

- Moreover, the models do not have any link to the actual process execution or database design. Thus, it is not possible
(e.g. in the form of model attributes) to see the process performance expressed in key performance indicators such as processing time or resource utilisation.

In order to overcome at least the missing link between ES-specific reference models and managing knowledge, it will be proposed how ‘knowledge’ can be integrated into process models using extended reference process models. With eEPCs, it is possible to identify what type of knowledge is required in which processes. This is done by adding further knowledge objects, which are related to Knowledge Management (Scheer 1998b). These knowledge objects represent knowledge, which is connected with the functions of a process.

Figure 6.2 shows an example of how general customer knowledge can be broken down into more specific knowledge components. On a lower level, other object types such as applications or folders can be linked to knowledge objects in order to document, for example, how and where the individual knowledge is stored. Knowledge Structure Diagrams can serve as the conceptual basis for knowledge repositories. A knowledge object is a symbol in a conceptual model that represents relevant knowledge. As such, it can be compared to an entity type in a data model or to a function type in a process model. A knowledge object has attributes that characterise this 'knowledge' further into knowledge types such as business, product or technical knowledge. Knowledge objects can have interrelations with each other (e.g. 'is part of', 'is a'). Furthermore, knowledge objects not only have static attributes, but also behavioural attributes (Rosemann 2001). Mentzas et al. (2001) state that knowledge objects represent the explicit knowledge required in a specific business process. Knowledge objects facilitate and leverage knowledge creation and sharing activities by providing to humans the information they need. They facilitate the knowledge transfer from person to person or from media to person and are used to search, organise and disseminate knowledge content.
In Allweyer (1998), a knowledge map gives an overview of who in the organisation owns which kinds of knowledge. For each employee-knowledge pair, a degree can be shown, indicating whether the employee has only little, some, or significant knowledge of the respective subject. Such a knowledge map can be used for getting an overview of the staff's knowledge and its distribution. This helps finding the right person for a job, which requires certain kinds of knowledge. The map can also be used as a kind of electronic "yellow pages", i.e. for finding experts who can be contacted about questions in their fields of expertise. With knowledge maps, a company's knowledge profile can be documented and assessed. It can be found out which relevant knowledge areas are currently not sufficiently covered. Sometimes there are important fields of knowledge, which are
covered only by a single person. If this person leaves the company, the knowledge is lost. Such problems can be detected by analysing the knowledge map. The map helps to define desired employees' knowledge profiles and to develop this knowledge by training or by using these profiles as selection criteria when hiring new people. It is also possible to aggregate the information about each employee's knowledge profile into knowledge maps indicating the fields of knowledge covered by working groups or departments.

While the related literature acknowledges the importance of knowledge and the dynamics and strategies of managing knowledge, a widely accepted taxonomy of relevant knowledge types has not been established. Numerous authors have used a multitude of different, yet often analogous, synonyms and adjectives to represent the different types of knowledge. The attributes of knowledge for this context is adapted from the perspective of knowledge in the procedural and declarative sense as reviewed by Zack (1999, p. 45):

- **Declarative knowledge**, or knowledge about, refers to the ability to recognise and classify concepts, things and states of the world.
- **Procedural knowledge**, or knowledge how, refers to the understanding of an appropriate sequence of events or the ability to perform a particular set of actions. This may include organisational ceremonies and rituals as well as everyday operating procedures and routines. Procedural knowledge can be represented as ordered sequences of events associated with particular roles and relations.

Therefore, types of knowledge may have procedural or declarative attributes. For example, the declarative attribute in business knowledge would be reconciling the reasons what happened in the event of a failed negotiation process with a contractor. The procedural attribute will be the ability to carry out the steps in order to remedy the situation.

This distinction of knowledge from Zack (1999) has also been reflected by many other authors (Anderson 1980, Machlup...
The Case Study

The interviews were highly structured and designed around the types of knowledge while providing scope for the interviewees to propose their own factors. Dennis et al. (1999) found that participants had a higher appreciation for semantic quality when they had strong ownership and responsibility of the model. Their study showed that the participants felt that “it was their model, not the facilitator's or the project manager's. They also invested a good energy in defining the model and ensuring its accuracy, including calling their offices and colleagues in other offices to validate their information”. In order for the process modelling exercise to be successful, participants must be actively involved in the decision-making processes, making them ‘own’ the processes and the intellectual property of the process models. Employees who had direct interaction with a selected business process (dunning process) and involved in the ES implementation were interviewed in order to understand the ES use in practice. The aim was to elicit experienced practitioners’ perception about the types of knowledge required for the selected business processes.

Organisation A (ASC) is a government agency in Australia that was established in July 1996 to meet the corporate services’ needs of other government agencies. ASC comprises three service areas in Business Advisory, Support Services and Corporate Information Systems and these areas are supported by a Development and Strategy Unit. The organisation delivers a range of corporate services under a Service Level Agreement (SLA). It is responsible for operational and processing functions for corporate services with the strategy and policy functions remaining with client departments.

ASC has a staff of 270 employees and a financial budget of A$20M. Its shared services provider - whose number of employees total to approximately 8000 - utilises ASC’s products
and services. This delivery of corporate services covers areas in the aspects of Finance, Human Resources, Administrative and Corporate Information Systems capabilities. ASC is currently running a ‘live’ SAP R/3 (Version 4.6c) system. Its ‘live’ R/3 Finance system has been up since November 1998 with ‘live’ HR since late April 1999. It has been shown that through the use of these reference process models, process-improvement projects have been proven to be successfully carried out in ASC.

The case study was conducted in two parts. The first part was carried out by interviewing the Financial Manager of the Accounting Department in ASC. The second part was conducted with two accountants in ASC and required their active participation. The interviewees were then asked to evaluate the applicability of the extended process models. Especially in the second part of the case study, the employees had to evaluate the existing reference models and to add knowledge objects that they felt were relevant to their daily activities. This provided valuable insights into the acceptance and the ease of use of the proposed approach.

Results

Manager perspective

The Financial Manager (John Reid) was a Certified Professional Accountant who has had an experience of 20 years in the industry. John was involved as a Project Manager for the implementation of SAP and the FI (Financial) module and was therefore familiar with the SAP R/3 system and the business processes in Financial Accounting. In the interview, John was asked to express his opinions and critique on the applicability of the extended process models. John was also asked to evaluate if the recommended types of knowledge were relevant to manage ASC's business processes and if there was any additional knowledge required. Following this, John was also asked if he felt that the process models would be of value to employees in the ASC.
Observations

When asked about the applicability of the extended process models, John felt that the recommended process models were useful and that the extended process models will fill the knowledge gap in ASC. John appeared to be concerned when he pointed out that extended process models were ‘useful’ for managing knowledge for employees in ASC. John shares the view that communication between knowledge owners is indispensable. John was aware of who has the necessary knowledge in the organisation and how to retrieve it. John felt that from his experience, knowledge was extremely time-dependent and that the dynamism of the organisation, policy changes and unexpected regulatory events attributed to the impediments of managing knowledge in organisations. John was sceptical about managing knowledge when he expressed concerns about the issue of the “half-life of knowledge”.

The term ‘half-life’ is borrowed from the world of physics and is described by Shapiro (1985) as “the time after completion of training when, because of new developments, practicing professionals have become roughly half as competent as they were upon graduation to meet the demands of their profession.” This impression is supported by the fact that knowledge has a temporal dimension. This is highlighted in Chan (1999), “Temporal factors - knowledge is a process of reuse, review and renewal. The renewal of knowledge occurs relative to time: knowledge captured may be valid during the time of implementation but may not be as useful post-implementation.” It is important to note that while knowledge may be dynamic, it is essential to capture the ‘critical’ knowledge. This critical knowledge is described as knowledge that is both important and essential to the executing of the organisation’s daily and strategic activities.

John further expressed that their business processes were different and unique from other private organisations. Being a governmental organisation, John brought to light issues in which certain processes required sensitivity to governmental
procedures. As an example, John illustrated that, even after sending multiple reminder letters to customers, they cannot be brought to legislative action due to government policies. Although these processes are not documented in any models, it is observed that this knowledge could be a potential area, which could be critical to the organisation. Problems faced by John such as context-specific (governmental) and industry-specific elements are not new, but they have to be taken into consideration, as they are sensitive issues in the construct of extended process models.

**Process Owner perspective**

This part of the case study seeks to evaluate the framework through the application of the extended process models. Interviews were conducted with two accountants in ASC, who had been working directly with the dunning process. The *dunning process* is essentially a process, which checks the items that are overdue by the customers, after which, dunning notices are sent to inform customers of late payments. Dunning can occur at different levels and different dunning notices are sent based on the relevant dunning levels.

As the accountants were empowered with decision-making capabilities and not mere ‘drones’ in the organisation, they are therefore referred to in this study as the *process owners*. Process owners have specialised knowledge of the company’s business processes in their assigned business area and have ultimate ownership of the business process, or groups of processes. The process owners were shown the EPCs from SAP reference models (without any knowledge objects). They were then asked to evaluate the EPCs and to add knowledge objects, which they felt were relevant for executing and performing their daily tasks. A follow-up meeting was conducted with the process owners to review the amended process models and confirm the statements made in regards to the types of knowledge. This review serves to enhance the validity and reliability of the interview results as well as ensuring that the changes to the process models were exactly what the process owners expressed.
Table 6.1 Summarises the key observations and the quotes supporting the statements.

<table>
<thead>
<tr>
<th>Key Observations</th>
<th>Extracted quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The process owners felt that knowledge used during implementation was not</td>
<td>“In determining dunning levels, this has been done at the project level so we</td>
</tr>
<tr>
<td>important to them during the execution of their daily tasks. Understanding the</td>
<td>don’t really do this.”</td>
</tr>
<tr>
<td>SAP terminology and learning to configure the dunning process was only critical</td>
<td>“System takes care of dunning parameters automatically”</td>
</tr>
<tr>
<td>for them during the implementation phase of the ES. They felt that project</td>
<td></td>
</tr>
<tr>
<td>management knowledge was only required during implementation and henceforth</td>
<td></td>
</tr>
<tr>
<td>“expired” and not of high value to them in their daily tasks.</td>
<td></td>
</tr>
<tr>
<td>Although the EPCs display the overall processes that occur during dunning, the</td>
<td>“If an employee needs to enter the dunning data, on a data entry, they don’t really need a lot of business knowledge. It is just 3 clicks and they are done”</td>
</tr>
<tr>
<td>process owners only come into contact with the operational side of the business</td>
<td></td>
</tr>
<tr>
<td>processes. The process owners only see it from the system interface point of</td>
<td></td>
</tr>
<tr>
<td>view and the transactions that take place. The process owners seem to be more</td>
<td></td>
</tr>
<tr>
<td>interested in a functional view of the process.</td>
<td></td>
</tr>
<tr>
<td>Business knowledge is not regarded as highly important in executing a process.</td>
<td></td>
</tr>
<tr>
<td>However, a good understanding of business is desirable to more efficiently carry</td>
<td></td>
</tr>
<tr>
<td>out a task.</td>
<td></td>
</tr>
<tr>
<td>Much of the knowledge that is required to carry out the process is tacit. The</td>
<td>“...the employee would need some understanding of debt management but to execute</td>
</tr>
<tr>
<td>employees emphasised a number of times the concept of “familiarity”. This</td>
<td>the process is just a number of clicking the screens and following through.”</td>
</tr>
<tr>
<td>familiarity draws from the employees’ experience in dealing with the customers</td>
<td>“But again, it really boils down to familiarity, being familiar with who the</td>
</tr>
<tr>
<td>and knowing intuitively how to treat each customer differently. There is no</td>
<td>customers are.”</td>
</tr>
<tr>
<td>documentation of how each customer should be treated.</td>
<td>“...when you have negotiated with the customer, you will know instinctively [what to do]”</td>
</tr>
</tbody>
</table>
Analysis

Project management knowledge is seen as crucial to an organisation during the implementation phase as it is usually 'new' and unavailable to employees of the organisation. Organisations also realise that they rely heavily on external knowledge (consultants). However, the process owners place this type of knowledge outside the realm of conducting their daily businesses. The participants feel that project management knowledge is not critical to their performance of the daily tasks. As indicated previously, there are different perspectives following the ES lifecycle, these results were reported from the use perspective.

Product knowledge is perceived to be of importance to the business processes. The process owners felt that this knowledge type has a “one-off” attribute. This meant that once the process owners were familiar with the environment and functionality and the terms used in the ES, it did not need to be constantly revised.

Business knowledge is required for understanding the generic concepts but not highly essential for the operational aspects of executing the process. To operate the ES from a transaction point of view, it requires only menial data entries to the system. However, an understanding of the business rules helps to understand and appreciate how the processes are carried out.

Technical knowledge is also not often strongly associated in the use of the ES. The reason for this is that ASC has part of its processes outsourced to other service providers. Garvin (1998) identifies processes into two categories: “operational processes” are processes that create, produce, and deliver product and services that customers want, and “administrative processes” are processes that do not produce outputs that the customers want, but are still necessary for running the business. The process owners were more involved with the operational processes than the administrative processes.
Company-specific knowledge is the most important knowledge perceived by the process owners. The process owners repeatedly expressed that this knowledge comes with experience. This 'experience' is learnt often by dealing directly with the customers and knowing who they are and why not to 'block' the customers' transactions. The process owners also stated that there is no easy way to achieve this 'familiarity' and a good grasp of 'common sense' of intuitive knowing is required. This knowledge is not documented but essential to operating the dunning process. This 'familiarity' with the customers is not something that can be taught or written down, it requires the actual contact, communication and learning. In dealing with customers, it is often from learning from mistakes and having gone through the actual experience that one would know how to handle a certain type of customer.

Extended Process Models

Figure 6.3 shows the process model for the dunning process with the knowledge objects attached to the functions as evaluated by the process owners. The un-shaded boxes in the completed dunning reference model show functions/events that are not used. As mentioned previously, process models do not make configuration alternatives explicit. By showing which activities are active with the shaded boxes, the extended process model addresses this weakness. The contribution to knowledge integration by the participants forms the pragmatic aspect of the research. Other weaknesses cater for enterprise-individual aspects and linking to the actual process execution or database design are complemented as follows. In ASC, the participants suggested that the knowledge types in the process models should have hyperlinks to intranet documents that describe the business rules or policies to facilitate in the work process. These hyperlinks would then connect the related knowledge types to the existing documentation and also describe what roles possess these knowledge types. For example, in the case of business knowledge for a specific activity, the hyperlink would describe the existing company policies or rules and how to approach
them, followed by a link to the roles in the organisation that might assist in locating the respective information.

Figure 6.3 Extended process model – partial view
Concluding Issues

Huang et al. (2001) found that the nature of knowledge integration in ES can be conceptualised based on four distinctive but interrelated dimensions, namely structural, technological, intellectual and socio-emotional. Huang et al. elaborate that the adoption of ES was aimed at installing an integral system that promoted the use of common language interpreting information generated by different divisions. Similarly, in a process management perspective, Garvin (1998) states that a ‘process lens’ provides new insights into managerial behaviour. Garvin (1998) suggests three approaches to organisational processes: work processes, behavioural processes and change processes. In a knowledge management perspective, Earl (2001) provides a framework that proposed three schools; namely the technocratic school, the behavioural school, and the economic school.

Essentially, there are two main views – technological perspective and the socio perspective. The technological perspective is one used to support aspects of the information system, and how activities are governed by the technology to aid in the fulfilment of the tasks. The socio perspective covers areas in which the organisational factors that influence the technological decisions are made. This perspective covers areas such as organisational strategies, structure, culture and subcultures (Huang et al., 2001). The following discussion takes these two views:

**Technological Perspective**

The following issues were identified from the case study. These issues do not refer directly to process modelling itself but an application, which requires an understanding of the factors that emerge from the use of process modelling.

- Understanding of terminology
  - The case study showed that the process owners need to have an understanding of the terms used in SAP parlance. Some of the terms for describing the
processes were not immediately understood by the process owners.

- **The need to identify critical business processes**
  - Not all business processes require all types of knowledge. In order to successfully use knowledge integration for sustaining and improving business operations, it is important to map the critical processes and not every single process. This critical process is described as the process that is both important and essential to the executing of the organisation’s daily and strategic activities. Only such a focus allows a feasible cost-benefit ratio.

- **Static processes vs. dynamic processes**
  - In the analysed organisation ASC, the evaluated process model was dynamic. The inputs to the process model were changed regularly according to company specifications, making it a difficult task to consistently update and maintain the model. Processes change from time to time. While some processes remain static and do not require a great amount of effort in maintenance, other processes need to be frequently updated. It is highlighted that the challenge in knowledge integration has a dependent relationship on the static/dynamic attributes of the business processes.

**Socio-perspective**

From a socio-perspective, process models on their own cannot serve the purpose of capturing knowledge. Attention has to be paid to the social structures within an organisation that might impede or promote the use and understanding of process models.

- **Outsourced processes and knowledge**
  - In the interviews, it was found that part of the activities in the process models were outsourced to other service providers. This phenomenon was perceived to have a knowledge drain on the overall transparency of the
business processes. While literature supports that outsourcing enables the firm to focus on its core competencies, at the same time, it also involves a risk in losing part of its organisational knowledge.

- Two different levels of perception to the application of process models.
  - One outcome of the case study is that there were two different levels of perception of the application of process models. The process owners who dealt directly with the business processes appreciated the extended reference process models from a different viewpoint than senior management. The senior management valued the models more from a strategic point of view. The second level takes the perspective from the operational point of view from the process owners. In Marchand et al. (2001), it was found that senior managers seem to perceive the practice of maintaining information slightly less clearly than collecting, organising and processing information. “Managers do recognise that the time and financial resources expended in collecting quality information may be wasted if it is not maintained... senior managers recognised information management practices as a separate high-level information capability” (Marchand et al., 2001).

**Conclusion**

This chapter discussed how a framework (Rosemann and Chan 2000) could be applied for the management of knowledge in Enterprise Systems. It looked into what knowledge can be captured in ES and how knowledge can be integrated through the use of extended reference process models. Participants in the case study who had evaluated the proposed models generally accepted the use of these models. The completion of an extended reference model of the SAP’s dunning process serves as a reference point for organisations intending to evaluate a
way for managing their enterprise knowledge. It is important to note that not all types of knowledge (culture, power, experience, beliefs, etc.) can be integrated into process models. The limitation in process models restricts such connotations of 'tacit' knowledge.

The case study has demonstrated that while reference models supplied by ES providers are beneficial for the general understanding and implementation of the system, they do not focus on enterprise-individual aspects, business objectives or Knowledge Management issues. It has been proposed and evaluated how these models can be extended for the purposes of Knowledge Management.

References


