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Key Performance Indicators for Knowledge Management in a Community of Practice

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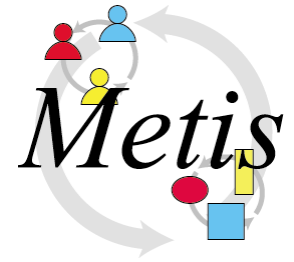
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Key Performance Indicators for Knowledge Management in a Community of Practice



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Synopsis:

This report is the deliverable of work package 7 of the METIS project, focusing on how knowledge management processes can be measured and guided in communities of practice, a basic organizational unit in knowledge-intensive organizations. The purpose of this report is to outline an approach to the definition and use of key performance indicators for knowledge management in a community of practice. Our intention was not to produce a comprehensive literature review, but to show how advanced theory and operational practice can be combined in a workable method.

Preface

The objectives of the Metis project for 2002 are (Metis Workplan April 24 2002):

1. Identify the targets that communities have and describe directions of development for communities given their targets
2. Develop a vision on 'how to manage knowledge management'
3. Analyse and model how knowledge and information flow in supply chains
4. Generate an overview of business models that describes how knowledge and information is bought and sold today
5. Identify problems in extracting knowledge and information from communication and (technical) documentation
6. Experiment with improvements in finding knowledge and information from heterogeneous collections.

This report is the deliverable of work package 7 of the METIS project, focusing on how knowledge management processes can be measured and guided in communities of practice, a basic organizational unit in knowledge-intensive organizations. The purpose of this report is to outline an approach to the definition and use of key performance indicators for knowledge management in a community of practice. Our intention was not to produce a comprehensive literature review, but to show how advanced theory and operational practice can be combined in a workable method. Although we outline a theoretical framework in which this approach was embedded, we do not claim that this is necessarily the best approach from a theoretical point of view. Given, however, that the theories are well-known and applied and that this approach was accepted and partially implemented in an actual company, we do make the case that it is at least a plausible approach. The report should be read as a scenario that could be refined and extended in a follow-up case study in, for instance, Basell or Océ communities of practice.

This report aims to contribute to the following main deliverables of METIS in 2002:

D1.2 Role and effectiveness of Chief Knowledge Officers

D1.3 Corporate learning

D2.1 Learning from customers

D3.1 Mapping knowledge

Table of Contents

1 Introduction	1
2 Case: FundPartners	3
2.1 The Activities of FundPartners	3
2.1.1 Fund development	3
2.1.2 E-Business Portal	4
2.2 The Organization of FundPartners	4
2.3 The Operations of FundPartners	4
2.3.1 Fund development	4
2.3.2 E-Business Portal	5
2.4 Knowledge Development and Management in FundPartners	5
3 A Theoretical Framework	7
3.1 A Conceptualization of the Knowledge Creation Process	7
3.1.1 The SECI Model	7
3.2 Guidelines for Effective Knowledge Creation	11
3.2.1 Towards a Knowledge Strategy	16
3.3 Identification of Knowledge Creation Problems	16
3.3.1 Systems Thinking	17
3.3.2 Relating SECI to Systems Thinking	18
3.3.3 Learning Disabilities	18
3.3.4 Effective Knowledge Management: Reducing the Disabilities	19
3.4 The Measurement of Knowledge Management Effectiveness	20
3.4.1 Measurement Methods for Intangible Resources	20
3.4.2 Applying the IC Method to FundPartners	21
3.5 Using the Measurements for Knowledge Creation Effectiveness	24
4 Discussion and Future Research	26
References	29

1 Introduction

Communities of practice (CoP) are playing an increasingly important role in modern, knowledge-intensive organizations. CoPs foster creative interactions amongst highly specialized experts and help to channel their efforts to where they are most needed. In this way, these communities are a key element in the learning organization. Being at the core of these companies, and knowledge being one of their key assets, a structured process of *knowledge management* is essential to assure the efficacy of CoPs in an organizational context. In order to ensure that knowledge handling in a particular community is indeed effective and efficient, the performance of its knowledge management processes has to be measured. To properly measure what is needed, *key performance indicators* can help to assess and guide the evolution of knowledge management practices. Once a proper set of indicators has been selected, best practices and benchmarks can be collected and systematically used to improve community operations.

How to measure and use key performance indicators in knowledge management in organizational communities of practice?

Before we can address this question, we first need to clarify what we mean by organizational communities of practice. An extensive literature exists on the structure, operations, and evaluation of communities of practice (e.g. Gongla and Rizuto, 2001; Fontaine et al., 2002). However, it often remains unclear exactly what and how to measure. Also, these communities are often examined in general terms of being productive, sociable, etc., but not from a knowledge management perspective.

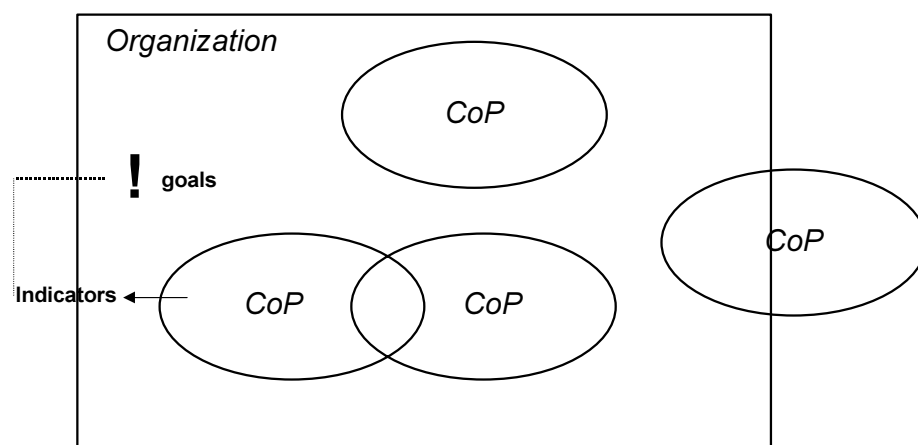


Fig.1 CoP in an Organizational Context

We are interested in the role that communities play in knowledge management practices of the organization (Fig.1). The organization sets certain goals (at various levels: the organizations, teams, community, or individual level). The goals determine to what extent organizational processes, including knowledge management processes, are effective. Indicators measure processes and products resulting from these processes in communities. Depending on the organization, communities play more or less important roles in meeting organizational goals.

For example, in some traditional production organizations, communities are of little importance, whereas in the modern knowledge organization, healthy communities are essential. There are different roles that CoPs can play in the organizational context. A community can operate on its own, interact with other communities within the organization, or with actors outside the organization. In this study, we look at the first, simplest case of an organization consisting of a single community. In future research, more complex cases can be analyzed.

Although a large body of literature exists on knowledge management in general, so far not much specific theory has been formed about knowledge management in communities of practice in an organizational context, let alone on the role that performance indicators play in them. On the other hand, in industry, some successful cases exist.

In order to progress, state-of-the-art knowledge management theory needs to be selected, combined, and applied. Such a theoretical lens should be used to examine successful case studies, resulting in useful and practical guidelines for knowledge management procedures. The purpose of this paper is to construct such a lens, and to apply it to an interesting case. The results should provide a basic framework for follow-up research in an organizational context. The goal is not to come up with the ultimate approach, but to at least identify a viable starting point for future research into the measurement of knowledge management effectivity in organizational communities of practice. Important in our research approach is that it is not only driven by theoretical concerns, but also by intensive consultations with the practitioners in the organization. The approach was constructed by going through the theoretical-empirical cycle multiple times, all the time discussing relevance of theoretical proposals with company officials. We feel that this approach of selecting a combination of applicable theories and discussing their relevance with organizational representatives may help to better ground knowledge management research in real-world practice. In this way, a more holistic and acceptable approach may be developed than by starting from one particular theoretical paradigm only, necessarily changing reality to match the framework. The theoretical constructs used were developed and applied in a typical case: FundPartners, a young company in which communities of practice play an important role

In the next section, we introduce the FundPartners case. We then describe a theoretical framework for effectivity measurement of knowledge management (i.e. creation) in organizational communities of practice, and apply this framework to the case. The basis for this analysis is a case study done by Dijkstra (2002). We then make suggestions for future research and links to other projects within the METIS framework.

2 Case: FundPartners

FundPartners is a Dutch organization operating in the investment fund industry, especially in the development and exploitation of investment funds. Such funds are highly complex products, the development of which requires the selection of specialized roles and service providers, such as *brokers* (traders in investment objects), *portfolio managers* (selectors of investment objects to be sold or bought), various kinds of *analysts*, *fund sponsors* (regulator of whole fund), *accountants*, *administrators*, and *custodians* (processors of investment fund transactions). FundPartners acts as an intermediary in this web of roles (Fig.2). Because of the increasingly required transparency of the investment fund industry, there is a need for more customized and specialized investment funds.

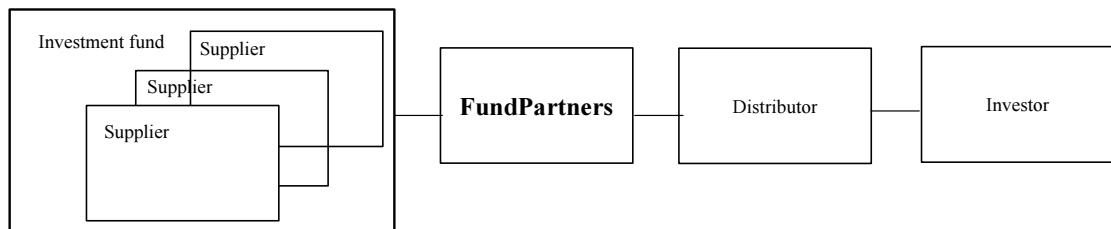


Fig.2 The Position of FundPartners in the Value Chain

2.1 The Activities of FundPartners

FundPartners has two main activities: (1) fund development and (2) the e-business portal maintenance.

2.1.1 Fund development

The core activity of the organization is the development of investment funds for distributors and institutional investors, by finding the best suppliers and service providers in the market. Distributors are organizations that offer funds to investors, like pension funds, insurance companies and banks. Suppliers are all parties, like the roles mentioned above, that contribute something to an investment fund. FundPartners helps its customer to define the fund to be developed. The selection of the various suppliers who will perform the various activities of the fund is an important issue. The market of suppliers is fragmented and each fund requests its own approach. Once the fund has been implemented by the distributor, FundPartners remains responsible for product management activities, such as:

- Replacing the portfolio manager if this party does not make the benchmark.
- Replacing the custodian if it does not fulfill its service level agreement.
- Guarding the legal structure of the investment fund.

2.1.2 E-Business Portal

A second main activity is the development and exploitation of an e-business portal for the investment fund industry. The portal aims to make the industry transparent and sharing knowledge. By doing so, FundPartners aims to become the hub in a network of expertise. Developing the portal is done in stages. In the first stage, a newsfeed and bookmark service for the fund industry is provided. The aim of the second stage is to provide a service that supports the search for suppliers for the construction of an investment fund (*longlisting*). In the third stage, a service for the final selection of a supplier (*shortlisting*) and a service for matching distributors and suppliers will be implemented.

2.2 The Organization of FundPartners

FundPartners is a start-up company, established in 2001. The data presented in this report were collected early 2002. At that time, around 15 people were employed, and staff was growing rapidly in number.

The basis of the organization is the team of investment fund specialists, who form the majority of employees. To promote involvement, all members of the specialist team owe part of the company. The whole team is involved in the strategic and tactical management of the organization. The official title of all team members is 'director', two team members are managing director. There is one CEO and one CTO (chief technology officer), responsible for the ICT infrastructure.

Apart from the maintenance of the e-business portal, activities are organized around fund development projects. All specialists have their own expertise in the development of investment funds, and are responsible for selecting and communicating with the specific suppliers related to their field of expertise.

Since FundPartners is such a small organization, with a high degree of interdependence and collaboration between its members, a de facto community of practice exists. However, there is room for further optimizing structure and operations of this community, something of which the organization is well aware.

2.3 The Operations of FundPartners

In order to understand the role that knowledge plays in FundPartners, we first outline its way of working in more detail, for each of its two main activities.

2.3.1 Fund development

All of FundPartner's specialists have their own expertise on investment fund development. Per project, specialists are selected whose expertise applies most the particular project. These specialists are also responsible for project management.

The expertise of the various specialists is related to the various investment fund roles and activities distinguished earlier. Per activity, the relevant specialist selects the appropriate suppliers for performing the activities. The contacts with the selected suppliers are also maintained by this specialist.

2.3.2 E-Business Portal

The team of specialists is not only responsible for the various investment fund development projects, but also for the development of the Internet business portal. Since the portal aims to share knowledge and make the investment fund industry more transparent, it is important that proper content management takes place. This management is distributed among the specialists, each of which is responsible for the content relevant to his or her domain.

By aggregating information (using automatic text categorization) and making it available to the industry, FundPartners becomes the hub in a knowledge network. The added value for the company is not to have an information advantage, as this is shared with all parties. Rather, the portal opens communication channels to various players in the industry. Through registration procedures, statistical tracing, surveys, etc., FundPartners adds to her knowledge and contacts, thus creating an *expertise advantage* (Sampler, 1996).

2.4 Knowledge Development and Management in FundPartners

FundPartners is very much aware of the strategic role that knowledge and knowledge management play in its business operations. In its business plan, a separate section is devoted to knowledge management (FundPartners, 2000). The organization acknowledges that information, skills, and expertise are its core assets.

FundPartners is a niche player in the financial market, offering specialized services. To develop tailor-made investment funds, it requires the ability to anticipate on trends in the investment fund industry. To be able to do so, continuous innovation is required. Thus, FundPartners can be considered a knowledge intensive organization in which knowledge is the key asset that needs to be properly consolidated and continuously innovated. Therefore, we especially focus on *knowledge creation* processes.

The organizational form in which in this knowledge management takes place is that of a community of practice. FundPartners is not a traditional hierarchical organization. Instead, its organizational structure and operations have all the characteristics of communities of practice.

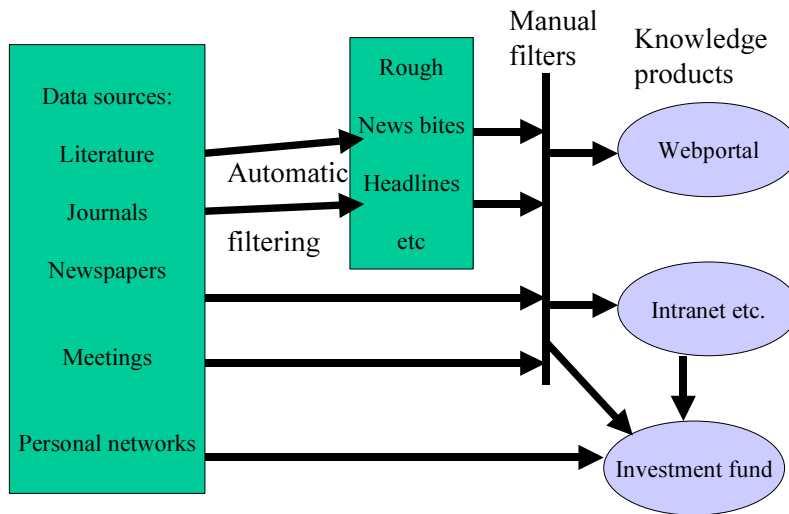


Fig.3 Knowledge Creation Technologies in FundPartners

FundPartners uses a range of information sources and technologies to support its knowledge creation activities (Fig.3). Specialists scan relevant data sources, such as the literature, journals, and newspapers. Part of these sources are automatically filtered to create intermediate knowledge products like newsbites and headlines. They then interpret these sources to update the webportal and intranet. Meetings are held to increase the quality of the organizational tacit knowledge. Together with using their personal networks, all this knowledge is used to develop the investment funds.

Knowledge being the key production factor of the company, the management of the company was interested in developing a clear policy for knowledge management within the organization.

The key research question in which the management of the organization is interested is:

What are the opportunities for effective knowledge management in FundPartners?

To address this main question, it was subdivided into four separate questions:

1. What is the role of knowledge in FundPartners?
2. How is knowledge management currently organized?
3. What are additional opportunities for knowledge management?
4. How can the effectiveness of knowledge management in FundPartners be assessed and improved?

3 A Theoretical Framework

We are interested in knowledge management in an organizational context, mediated through one or more communities of practice. Ultimately, knowledge management needs to be aligned with the strategy and objectives of the organization. Crucial is that staff members can be motivated by becoming aware what knowledge management can mean for them. To implement knowledge management, a large number of technical and organizational means are conceivable. Effectivity measurement of knowledge management in the community of practice may help in selecting the right mix.

Our theoretical framework consists of two main parts:

- (1) To determine what is effective knowledge management (FundPartners research question 1-3)
 - A conceptualization of the knowledge creation process
 - Guidelines for effective knowledge creation
 - Identification of knowledge creation problems
- (2) How to measure this process and feed back measurements into the improvement process (FundPartners research question 4)
 - The measurement of knowledge creation effectiveness
 - Using measurements for knowledge creation

In this chapter, we will first introduce the theory, and then immediately apply it to the FundPartners case.

3.1 A Conceptualization of the Knowledge Creation Process

In this paper, we first construct a theoretical lens. Our objective was not to do an exhaustive theory *construction*, but rather to use *existing* theoretical frameworks for knowledge creation, as we are more interested in developing a practical yet plausible methodology. Starting point is the well known SECI model of cyclical knowledge creation of Nonaka and Takeuchi.

3.1.1 The SECI Model

The SECI (Socialization-Externalization-Combination-Internalization) model (Nonaka and Takeuchi, 1995; Nonaka et al., 2000) treats the concept of knowledge with a focus on knowledge creation. This is a cyclical process, stressing innovation. The model focuses on the interplay between tacit and explicit knowledge in the organization, leading to processes of

knowledge conversion, expansion, and innovation (Fig.4). The result is a growing amount of knowledge within the organisation. Knowledge management concerns the support and stimulation of this cyclical process of knowledge creation.

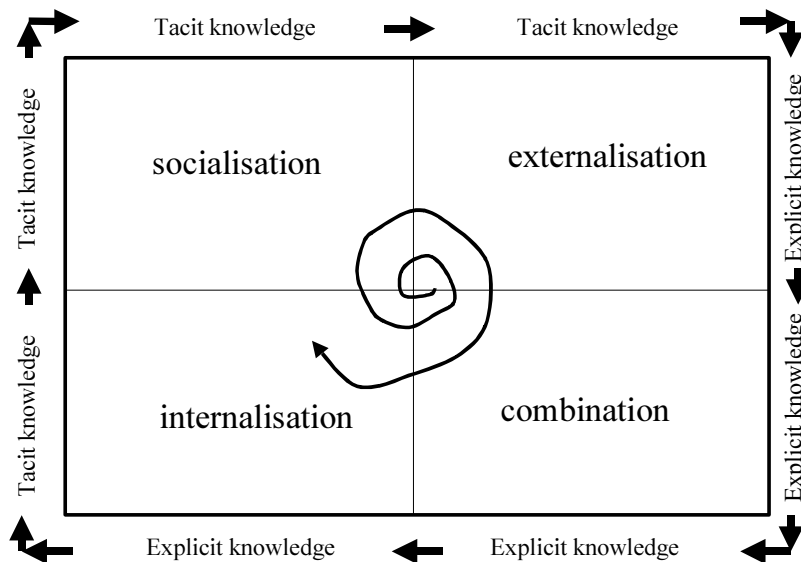


Fig.4 The SECI Model of Knowledge Creation

Types of Knowledge

First, Nonaka and Takeuchi introduce an epistemological dimension in their model, distinguishing between explicit and tacit knowledge. Most attention in traditional (Western) approaches to knowledge management, artificial intelligence, etc. has been on *explicit knowledge*. This can be expressed in more or less formal language and shared in the form of data, formulae, codified procedures, or universal principles. An example of explicit knowledge in FundPartners is its 'Reader on Collective Investment Schemes', a report which explains the principles of investment funds.

Tacit knowledge, is personal and context-dependent. It is hard to formalize, and difficult to communicate with others. It is rooted in an individual's actions, experience, values, norms, and emotions. Tacit knowledge can be subdivided into two dimensions. A *technical* dimension encompasses the informal skills related to the "know-how" of people. The *cognitive* dimension concerns the implicit mental models, beliefs, and perceptions that determine how we perceive the world around us (Nonaka and Takeuchi, 1995, p.8). A good example case example is the tacit knowledge required by a FundPartners specialist to select a portfolio manager for a particular fund. Of course, explicit knowledge such as comparative research reports is used in the process, but the selection itself is mainly based on personal and implicit knowledge.

Knowledge Conversion Processes

Knowledge is created in a continuous cycle of socialization, externalization, combination, and internalization (Fig.4)¹.

Socialization is the process of creating new tacit knowledge, such as shared mental models and skills, out of existing tacit knowledge through shared experiences, for example in informal social meetings. The resulting tacit knowledge is also called “sympathized knowledge”. An example in FundPartners is the conversations internal specialists have to exchange experiences from previous positions or lessons learnt in attended seminars.

Externalization is the process of articulating tacit knowledge into explicit knowledge (called “conceptual knowledge”), such as metaphors, analogies, concepts, hypotheses, or models. An example in FundPartners is the development of a structure for the internet business portal by a project group.

Combination converts explicit knowledge into more complex and systematic sets of explicit knowledge, called “systemic knowledge”. Examples of such a conversion process are sorting, adding, combining, and categorizing explicit knowledge. This is where databases and computer-supported analysis comes in. An example within FundPartners is the creation of bookmark lists out of individual bookmarks for publication on the internet business portal.

Internalization, finally, is the process of turning explicit knowledge into tacit knowledge. Internalization produces “operational knowledge”, for example by training. An example of this process is the use of the e-business portal by a FundPartners customer, resulting in increased personal knowledge

Knowledge Creation

The basis of organizational knowledge creation is the tacit knowledge possessed by individuals. In order to make it accessible to the organization as a whole, this knowledge needs to be ‘mobilized’ through the knowledge conversion processes just described. This results in an amplification of the knowledge in a *knowledge spiral*: from the individual, knowledge grows through expanding *communities of interaction* that cross sectional, departmental, divisional, and organizational boundaries (Nonaka and Takeuchi, 1995, p.72). Nonaka and Takeuchi call this the *ontological* dimension, which exists orthogonal to the epistemological dimension. In the FundPartners case, these different ontological levels can be recognized: individual specialists meet in teams, resulting in organizational advice, becoming available and responded to by many different stakeholders outside the organization.

Platforms for Knowledge Creation: Ba

¹ Note that in practice the four processes take place together, chaotically, some more intensive than others, depending on various organizational and environmental characteristics [see e.g. Dhont, 2003]

Knowledge creation does not take place in a vacuum, but requires a physical and mental context. Nonaka et al. (2000) refer to the concept of *Ba* in this respect, which acts as a platform for knowledge creation by aggregating and integrating knowledge in a specific time and space context. Four types of *Ba* are distinguished, which are strongly related to the knowledge conversion processes:

- *Originating Ba*: a platform for individual and face-to-face interaction. This *Ba* is mainly a context for socialization. From this *Ba*, trust and commitment emerge, which form the basis for knowledge conversion among individuals.
- *Dialoguing Ba*: a platform for collective and direct interaction, mainly a context for externalization. Selection of the rightly skilled individuals and an articulation of concepts are key aspects of this platform.
- *Systemising Ba*: a platform for collective and virtual interaction, mainly a context for the combination of existing external knowledge. ICT can play an important role to collect and disseminate explicit knowledge efficiently and effectively.
- *Exercising Ba*: a platform for individual and virtual interactions, a context for internalization. Individuals try to embody the explicit knowledge by, for instance, getting hands-on experience through simulation programs.

Enabling Conditions for Knowledge Creation

To stimulate the SECI process, an energy flow needs to be created to the various *Ba*. In order to do so, five enabling conditions need to be satisfied:

- *Intention*: the organization's aspiration to its goals, normally in the form of a business strategy. This is the driving force of the knowledge spiral, by fostering the commitment of the employees.
- *Autonomy*: all members of an organization should be permitted to act as autonomously as possible, to increase unexpected opportunities, motivation for new knowledge creation, and organizational flexibility.
- *Creative Chaos*: intentional chaos introduced to the organisation by its leaders to evoke a sense of crisis amongst its members by proposing challenging goals or ambiguous visions. This increases tension within the organisation and focuses attention of employees on defining and resolving the problem.
- *Redundancy*: the intentional overlapping of information about business activities, management responsibilities, and the company as a whole. This helps to promote the sharing of tacit knowledge and build new communication channels.

- *Requisite variety*: the internal diversity of the organization must match the variety and complexity of the environment in order to deal with its challenges. Flat and flexible organizational structures and frequent staff rotation help to promote such diversity.

3.2 Guidelines for Effective Knowledge Creation

To build the Ba platforms and to ensure that the enabling conditions are met, Nonaka and Takeuchi (1995) have come up with a set of guidelines to practically implement their principles. As their framework is extensively grounded in theory and practice, and we are interested in developing a practical methodology for knowledge management measurement, we adopt their guidelines as the basis for assessing the quality of the knowledge management processes in an organization. Each of these guidelines will be critically evaluated, using material from the FundPartners case and elements from the theoretical framework. This analysis thus charts a potentially successful knowledge management strategy as could be employed by organizations like FundPartners.

Create a knowledge vision

Top management should create and communicate a knowledge vision giving employees a mental map and directions as to what kind of knowledge they need to create. It draws from the organizational intention and is the foundation for the knowledge strategy that develops the organizational capability to 'acquire, create, accumulate, and exploit the knowledge domain'.

In its business strategy, FundPartners explicitly mentions its dependence on knowledge. Many different ideas have emerged with respect to the management of this knowledge. So far, only informal, quite successful knowledge management procedures existed. However, this success may be explained by the unusual involvement of current FundPartner team members in strategic issues of the organization. First, they created the organization together. Second, every specialist has a share in the company's profits. In other words, there is strong motivation and *Ba* at the moment. However, in the expected future growth of the organization, this *Ba* will be weakened, as these initially motivating factors will not be there for new members of the organization. A clear and focused knowledge vision will be necessary. To develop such a strategy, a community of practice with knowledge management as its focus of attention can be useful (Warmoes, 1991; Warmoes, 2002; Von Krogh et al., 2001). This community helps to build the organizational knowledge of the knowledge domain. At least part of management should be a member of this community. Topics that have priority in this community are the development of the knowledge vision in general and innovation as a target of knowledge management in particular.

Develop a Knowledge Crew

To improve insights and intuitions, diversity in the pool of talents available within the company is required. Also, evaluation measurement systems need to change. In knowledge-creating organizations, positive instead of negative evaluation criteria are necessary. Crew members should be permitted to make 'meaningful failures' and given incentives to innovate.

FundPartners acknowledges the importance of having specialists with a large experience and knowledge base. The development of an investment fund is a creative process requiring very specialized competences. These competences to a large extent depend on tacit knowledge, as is described in the company's business plan. FundPartners may be a special case compared to the average production organization examined by Nonaka and Takeuchi, as knowledge, not products are the key output of FundPartners. A knowledge crew is thus no option, but essential in this company. Still, recommendations to FundPartners are to more explicitly define the various roles the knowledge crew may play in the different SECI-stages.

Build a High-Density Field of Interaction at the Front Line

A high-density field is an environment in which frequent and intensive interactions among crew members can take place. It is to provide a rich source of original experience to nurture the individuals' mindsets. The main focus of an (internal) high-density field is the externalization of tacit knowledge by crew members constructing a common language and synchronizing their mental and physical rhythms.

In FundPartners, internal high-density fields for three types of frequent and intensive interactions are needed:

1. *Informal interactions*: individual exchange of professional knowledge.

For informal interaction, there is the common and open work environment in which staff are physically located, plus extra facilities for specific meetings. This situation promotes short and effective communication lines. To regulate informal interactions in the joint working environment, there is an explicit silence-policy. Short, informal interactions are allowed, but for more extensive informal interactions other rooms are available.

2. *Formal project-oriented interactions*: exchange of knowledge for internal (fund) development projects.

For the execution of formal, project-oriented interactions, several types of places have been designed, such as meeting rooms and a reading table. To regulate this type of interaction, a digital agenda is used, consisting of software and palmtops.

3. *Formal non-project-oriented interactions*: exchange of knowledge to improve internal common knowledge base.

This form of interaction requires improved support. There are two main issues: its current dependency on project-interaction fora and scalability (in the future).

An example of such non-project-specific formal interactions requiring project-interaction fora is the presentation and discussion of knowledge obtained in seminars. Currently, facilities meant for informal and formal project-oriented interactions are used. Often, ad-hoc sessions emerge in which someone who attended a seminar informs the others working on the specific topic. If the knowledge concerns the whole team, often a project meeting is used as a forum. This is not a good solution, because the effectivity of the project groups is affected and because non-project interactions are not efficient. Therefore, such mixing of interactions should be prevented, and more dedicated fora for non-project-oriented interactions should be created.

Another issue regarding mixing of project- and non-project-oriented interactions concerns the timing of the e-business portal project meeting. Currently, this meeting is combined with the drinks that are held weekly on Friday afternoon. Often, during this meeting also presentations are given and meetings are held which do not directly have to do with the e-business portal. The atmosphere is informal, which is also not conducive for the progress of the portal. Besides, recommendations are made during the meeting which are to be worked out in the following week. Because of the weekend, however, these recommendations lose force. For the discussion of non-project-related matters, however, the informal atmosphere is useful, as discussion and active participation is stimulated. It would help FundPartners if the weekly discussions of the e-business portal are held at the beginning of the week. This would result in complete attention and more effective implementation during the rest of the week. The Friday afternoon meetings can continue to be used for non-project-related interaction which concerns the whole team.

The main problem currently faced with non-project-oriented interactions concerns the mixing with project-interactions. However, in the future there will also be the issue of scalability. As FundPartners grows, the number of specialists interested in specific topics will grow. Whereas at the moment the few specialists interested in a topic can informally exchange non-project-related knowledge, a more structured approach will be needed in the future. One possibility is creating a larger number of specialized communities of practice. Such communities can in principle be scaled to a large size if the proper practical guidelines and technologies are implemented (Shell, 2001).

4. Piggyback on the New-Product Development Process

The new-product development process is the core process for creating new organizational knowledge. To manage the product-development (and the related knowledge management processes) successfully, a highly adaptive and flexible approach must be adapted, allowing for a continuous process and trial-and-error. The development process needs to be overseen by a self-organizing project team, which must be granted autonomy and operate in a mode of creative chaos. Furthermore, nonexperts must be allowed to participate, to add to the requisite variety of the process.

There are two new-product development processes. The first is the development of the e-business portal. The second concerns the development of investment funds. Both processes require the creation of large amounts of knowledge.

FundPartners is in the stage of building up the company. There is a high degree of flexibility and adaptivity in the company. Project teams operate autonomously. Many interactions with non-expert stakeholders, such as customers take place. Therefore, this guideline seems to have been implemented in FundPartners. In the future, explicit attention will need to remain to be paid to the autonomy and diversity of the various project groups, in order to maintain the stimulation of conceptual knowledge creation.

5. *Adopt Middle-up-down Management*

Middle-up-down management is an effective way of managing creative chaos. In this model, top management articulates the vision for the organization, while front-line employees face reality. The gap between dream and reality is narrowed by middle managers who mediate by synthesizing tacit knowledge of top management and employees and incorporating it in new products and concepts.

The organization of FundPartners consists of a small management layer with the other members of the organization directly below it. Management and most other members of the organization (except for secretarial support etc.) form the specialist team. In fact, the goal of middle-up-down management has been realized in FundPartners, as management itself is embedded in reality. Its role is limited. In practice, it ensures that knowledge gaps in the specialist team are addressed, no superfluous redundancy occurs, and activities contribute to the company's goals.

When FundPartners grows, a more complex management structure will emerge, and dedicated middle-up-down management positions can be created. For the moment, however, these are not necessary yet.

6. *Switch to a hypertext-organization*

A knowledge-creating company requires the organizational capability to continuously acquire, use, and create new knowledge and to recategorize and recontextualize it for other and future use. Conventional organizational structures are not sufficient to meet all these demands, instead a hypertext-organization is needed, consisting of three layers. A *hierarchy* is most efficient in acquiring, accumulating, and exploiting knowledge, while a *task force* is best at creating new knowledge. However, a *knowledge base* is also needed to recategorize and recontextualize the knowledge generated in the other two structures. It is not an actual organizational entity, but as a corporate vision and organizational culture for the tacit knowledge, and (IC) technology for dealing with the explicit knowledge.

In FundPartners, both hierarchy and task forces (in the form of project groups) are present and operating satisfactorily. The tacit part of the knowledge base is also well-organized, in that there is sufficient attention for developing an organizational vision and culture. For re-contextualizing explicit knowledge, there is quite an elaborate knowledge management technology structure, part of which was introduced in Fig.3 (where the focus was on

knowledge *creation* technologies). To re-use explicit knowledge, FundPartners has three technologies at its disposal.

The most important application is the database, internally labeled with the term 'knowledge base'. The *knowledge base* is a system in which explicit knowledge related to the activities of FundPartners is indexed and stored. The knowledge classification is mainly oriented toward the commercial use of the knowledge in the e-business portal. This application of the knowledge base limits the knowledge to be registered and the structure in which this knowledge is stored. A second application for the re-use of explicit knowledge is the *shared folder structure* in the e-mail application Outlook. Project-related messages and attachments are stored in this tool. The third application concerns the company's *intranet*.

The three mentioned applications play a useful role in the company, however a re-organization of their functions is necessary. The knowledge base is the most powerful of the three implementations. Advantages are the fixed and clear interface, guided navigation and good accessibility. The intranet provides a flexible platform to quickly exchange knowledge, but can only be used internally. The folder structure provided by Outlook is integrated with the e-mail application and accessible.

Based on the usefulness of the three implementations, a subdivision of their applications can be made. The knowledge base is particularly useful for systematically registering conceptual knowledge. Currently, the categories used to classify information are focused on commercial purposes. The Outlook-folder structure is aimed at registering interactions. It makes the progress of projects transparent, for instance. Other types of communication could also be registered, if necessary. Third, the intranet is applicable to registering regulation. For projects, progress statistics, manuals, plannings, divisions of tasks, rules, agenda items etc. can be registered and made accessible.

Next to maintaining a strict separation in the application of the three technologies, another issue for improvement can be raised. The structure of these implementations is not consistent. As mentioned, the knowledge base needs to be structured on other dimensions than just those related to commercial use. To motivate specialists to work with the knowledge base, internal categories are needed. For example, the knowledge base could be extended with categories like 'Presentations', 'Reports', etc. For structuring the use of the other two media, the Outlook folder structure and the intranet, a project classification seems to be a good structure.

A separate issue concerns the explicit knowledge stored in paper documents. Quite some paper documents (e.g. journals) are used. It is recommended to store these documents at a central location and index them using similar categories as the digital knowledge.

7. *Construct a knowledge network with the outside world*

Knowledge crew members need to actively mobilize the tacit knowledge held by outside stakeholders through social interactions.

For the development of an investment fund very specialized knowledge is required. To acquire this knowledge, FundPartners has an extensive network of contacts with whom knowledge is exchanged. Examples are advisors, suppliers, and distributors.

To manage interorganisational knowledge transfer, Man et al. (2001) outline three issues for the internal knowledge management practices in an alliance:

- Employees must receive clear goals and instructions regarding the knowledge to be acquired and protected in the alliance.
- The absorption capacity of knowledge is determined by the knowledge the company already has, reward policy, and existing management logic.
- Open systems and cultures within the organization aimed at sharing knowledge are a key precondition for effective knowledge management.

3.2.1 Towards a Knowledge Strategy

These guidelines cannot be considered in isolation. They need to be related and balanced in a well-thought out knowledge strategy. Von Krogh et al. (2001) provide a conceptual framework in which four knowledge strategies can be linked. These strategies apply the cyclical process of knowledge creation, each focusing on one or more parts of the SECI-process. The strategies are not exclusive, several strategies can be of relevant simultaneously. The strategies are:

- *Leveraging strategy*: the focus is on sharing internal, existing knowledge
- *Expanding strategy*: the focus is on increasing knowledge in existing knowledge domains
- *Appropriating strategy*: the focus is on attracting new knowledge through external sources.
- *Probing strategy*: the focus is on internally creating new knowledge in new knowledge domains.

For FundPartners, the leveraging strategy becomes especially important during strong organizational growth, and when members of the organization become more physically separated. As the knowledge in the existing knowledge domains of FundPartners requires constant updating, an expanding strategy will always be important. An appropriating strategy may be less relevant, as the company tries to develop strong and cohesive internal knowledge base. A probing strategy, however, is very important, as new investment fund ideas are necessary to keep a competitive edge as a niche player.

3.3 Identification of Knowledge Creation Problems

The knowledge creating organization is first and foremost a learning organization. Such organizations are complex, adaptive systems, which require continuous monitoring of their external and internal environments (Garraat, 2000). Before we can measure the effectiveness of knowledge management in the organization in the next section, we first need to find a way to conceptualize *problems* or breakdowns in the knowledge creation process.

3.3.1 Systems Thinking

To this purpose, we add the Senge's systems view on the learning organization to the SECI model. Senge (1990) describes five component technologies that the learning organization must possess to be able to innovate. He sees these technologies as 'disciplines', bodies of theory and technique that must be studied and mastered to be put into practice. The five disciplines are the following:

- *Personal mastery*: individuals reaching high level of skills mastery by continuous and deep learning.
- *Mental models*: examining the conceptual models that influence how people understand the world and take action.
- *Building shared vision*: developing a shared picture of the future the organization tries to create.
- *Team learning*: stimulating effective team learning; recognizing patterns of interaction that undermine learning
- *Systems thinking*: thinking systematically in terms of holistic patterns, the relationships between elements and the processes of change.

The fifth discipline, systems thinking integrates the other disciplines into a whole. In systems, Senge distinguishes two types of complexity: detail complexity and dynamic complexity. An example of detail complexity is a recipe with different ingredients. Systems analysis normally is concerned with this type of complexity. An example of dynamic complexity is the arms race between the superpowers in the 20th century, which led to a vicious circle of weapons build-up. Senge's fifth discipline, systems thinking, analyzes this complexity by identifying patterns behind the details.

Circles of Causality

Senge sees the organization as consisting of *circles of causality*, which amplify or stabilize processes of, in this case, knowledge management and organizational learning. There are three basic components of these circles

- *Reinforcing feedback* cause growth of the value of the parameter of interest. An example of reinforcing feedback with a positive effect is positive word of mouth of customers about a product sold. Accelerating decline is also possible, for example, in panic on the stock exchange leading to increasing drops in stock rates.
- *Balancing feedback* operates when there is goal-oriented behaviour. The feedback process tries to reduce the difference between what is and what ought to be. The goal itself may change in the meantime.
- *Delays*, interruptions in the flow of influence, which make the consequences of actions occur gradually, also exist in many – reinforcing or balancing -feedback processes.

Archetypes

Key to systems thinking is detecting recurring patterns composed of the basic elements of the circles of causality. Using insights about these structures, one can recognize problems in these circles and define possible solutions.

Senge has identified several archetypes of problems – and their solutions - in these circles, such as *limits to growth*². This is an illustration of an initial growth process that comes to a standstill by an emerging stabilizing process. An example is a company startup that initially grows explosively, but then slows down because there is a lack of managerial skills. The solution would be to reduce the stabilizing process, in this case for instance by increasing the number of managers.

Another example of a *limits to growth*-archetype can be found in the growth of orders a company receives, which can ultimately lead to a decrease in the number of orders. There is a reinforcing process in that an increase in the number of orders leads to an increase in revenues, which in turn leads to more salesmen being hired, which leads to more orders, etc. However, there is also a balancing process: an increase in orders leads to an increase in the order backlog, which increases delivery time. As a result, difficulties in sales start to emerge, which decreases the number of orders. A delay occurs in the second loop, as it takes some time before a growing delivery time has a negative impact on sales.

3.3.2 Relating SECI to Systems Thinking

A key similarity between Senge's systems thinking and Nonaka and Takeuchi's SECI-model is that both models are based on cyclical thinking. Nonaka and Takeuchi introduce a cyclical process applied to the creation of knowledge within organizations. Senge introduces a fundamental way of systems thinking based on the behaviour and disturbances of cyclical processes. In terms of Senge, the SECI cyclical process of knowledge creation can be described as basically a reinforcing process. The process leads to an increasing amount of tacit and explicit knowledge distributed among ever larger communities of interaction. To maintain this growth, balancing processes need to be avoided or reduced. Examples of such balancing processes in knowledge management are a decrease in the motivation for knowledge creation, or the inadequate use of technologies for registering knowledge (i.e. using Outlook when the intranet is a better medium).

3.3.3 Learning Disabilities

Based on the list of archetypes, Senge identifies a number of learning disabilities, which indicate a structural problem in the organizational system. When taking the knowledge creation process, the learning disabilities can affect the efficacy of knowledge management as follows:

² A list of the archetypes and how to use them can be found in App. 2 of (Senge, 1990). The archetypes are: balancing process with delay, limits to growth, shifting the burden, eroding goals, escalation, success to the successful, tragedy of the commons, fixes that fail, growth and underinvestment.

- *Learning disability 1: "I am my position"*. In this situation, people are only interested in their own role in the system, instead of feeling responsible for the interests of the overall system. An applied example here would be if the members of FundPartners would only follow the guidelines derived from the knowledge management policy in a minimalistic way, and not try to see the bigger (and changing) picture.
- *Learning disability 2: "The enemy is out there"*. Instead of solving a structural internal problem, some actor outside the system is blamed. An example would be that knowledge development or knowledge management activities are not carried out because other activities allegedly always have a higher priority.
- *Learning disability 3: "The illusion of taking charge"*. Often, aggressive action is taken to solve a problem, often to act in a pro-active way. However, such actions that have not been thought through sufficiently actually are yet another reactive way of acting. An example would be to make unilateral decisions while conceptualizing ideas, without sufficiently looking at all sides of the problem.
- *Learning disability 4: "The fixation on events"*. Many times, there is a general mentality fixated on sudden events, instead of on the continuous process. An example of such short-term thinking is if knowledge workers are only willing to be active in knowledge management if specifically prompted.
- *Learning disability 5: "The parable of the boiled frog"*. In this situation, there are gradual, subtle processes which threaten the system (if one puts a frog in a pan of cold water and slowly increases temperature, it will not try to escape and be boiled). An example is that motivation to participate in knowledge management may slowly disappear, in this way threatening the effectiveness of the whole system.
- *Learning disability 6: "The delusion of learning from experience"*. People learn best from experience, but the effects of many of the most important decisions are not directly experienced, for example because the time horizon of these effects is different from what people can observe. An example is if the wrong specialists are appointed to fulfill a certain knowledge worker position. The effects of their incapacities may only become visible when it is too late.
- *Learning disability 7: "The myth of the management team"*. In this situation, the management team is considered to magically solve all problems. However, the decisions of the team are often weak compromises, as they cannot stand the pressure. An example is that the team may question the usefulness of active knowledge management when people are not motivated to participate, instead of addressing the problem head-on.

3.3.4 Effective Knowledge Management: Reducing the Disabilities

Summarizing: the cyclical process of knowledge creation as described by Nonaka and Takeuchi is aimed at continuous innovation. They have given a set of guidelines for practical implementation of such a process, which have to satisfy a set of enabling conditions. In Senge's terms, the knowledge creation process can be described as a reinforcing process. His learning disabilities can help to detect problems in the expansion of knowledge, and thus innovation. Using his archetypes, these problems can be modelled in systems concepts, and solutions can be proposed. Some examples have been given of potential learning disabilities in knowledge-creating organizations. Future research will need to go into more depth to

discover typical learning disabilities and potential systems solutions in particular knowledge creating communities and organizations. The current research focused on establishing the framework in which such patterns may be used to increase knowledge management effectiveness.

Whatever these patterns may turn out to be, we need measuring instruments to assess potential disabilities in knowledge and knowledge creation processes.

3.4 The Measurement of Knowledge Management Effectiveness

The next step is to develop the framework for the measurement of knowledge management effectiveness. Only then can be seen if the proposed theory and guidelines actually work, or perhaps need to be replaced or fine-tuned. Such measures need to be focused on (potential) problems in the knowledge creation process. An example could be stagnation in the cyclical process of knowledge creation, in which the amount of newly created knowledge decreases. Given that most knowledge and its associated processes are intangible, we can make use of approaches that focus on measuring intangible resources.

3.4.1 Measurement Methods for Intangible Resources

Bontis et al. (1999) compare four important methods to measure intangible resources. These methods are the Human Resources Accounting method, the Economic Value Added method, the Balanced Scorecard method, and the Intellectual Capital method.

The Human Resources Accounting (HRA) Method

This method measures the added value of the members of an organization by aggregating salary expenses. For measuring knowledge and knowledge growth in FundPartners, the HRA method is too limited as only human knowledge is taken into account. Explicit knowledge resources, however, also need to be captured. Besides intellectual capital, development of social capital is also an interesting aspect of knowledge management. Some authors suggest precise measurement of social capital [Andriessen, personal communication, 2002].

The Economic Value Added (EVA) Method

This method calculates the net revenues minus operational expenses, taxes, and interest. As FundPartners is still in the start-up phase, and as it also does not capture the specifics of knowledge and knowledge growth, it is not well-suited.

The Balanced Scorecard (BSC) Method

The Balanced Scorecard is a management tool that aligns measures with key strategies, tracks progress, and assigns accountability. It measures four perspectives: Customer, Financial, Internal Business Processes, and Learning and Growth. For each perspective, a list of critical success factors and related indicators needs to be produced. Although it has an

interesting approach, it is not specific enough for knowledge measurement purposes and too inflexible because of its focus on evaluating and balancing the four perspectives.

The Intellectual Capital (IC) Method

This method monitors the intangible resources in an organization. Just like the BSC method, it aims to identify critical success factors and related indicators. To this purpose, relevant intangible resource categories need to be identified. First, the method distinguishes between Financial Capital (monetary resources) and Intellectual Capital (intangible resources). Intellectual Capital is further subdivided into Human Capital (intangible resources possessed by individuals) and Structural Capital (intangible resources available to the organisation). The IC approach takes the strategy of the organisation as the basis. Next, relevant categories, critical success factors and related indicators of IC are identified and later aggregated.

For measuring knowledge aspects the IC method is best suited. It provides both a suitable structure that can serve as a context for measuring knowledge and a practical approach for measuring intangible resources like knowledge.

3.4.2 Applying the IC Method to FundPartners

The goal of using the IC method is to assess whether knowledge management within FundPartners is effective. To do so, it must be applied to measure the cyclical process of knowledge creation. An interesting link between the IC method and the SECI model is the similarity its categories and the categories of knowledge distinguished in the SECI model .

IC Categories

There is a similarity between Human Capital and tacit knowledge on the one hand, and between Structural Capital and explicit knowledge on the other hand. Human Capital can be further subdivided in Operational Knowledge and Sympathized Knowledge (which are the categories of tacit knowledge). Structural Capital, in turn, is subdivided into Conceptual Knowledge and Systemic Knowledge, both examples of explicit knowledge.

IC Critical Success Factors

The source of the critical success factors is again the SECI cyclical model of knowledge creation. Each of the SECI processes has one of the IC knowledge categories as its direct output:

- Socialization → Sympathized Knowledge
- Externalization → Conceptual Knowledge
- Combination → Systemic Knowledge
- Internalization → Operational Knowledge

We consider the SECI processes to be the main critical success factors of the categories of knowledge measured in the intellectual capital method. Each of these processes leads to a particular type of knowledge. Often, the knowledge of which the value is to be assessed in the intellectual capital method, cannot be measured directly, as is the case with tacit knowledge. In that case, the interaction processes being critical success factors, we can, by measuring them, have a proxy for the value of the knowledge they generate. Vice versa, sometimes, the knowledge products may be visible, but the processes in which they were constructed may be less clear, as can be the case in face-to-face interactions without proper observational techniques. Of course, different knowledge management communities may have different requirements for the various SECI stages. Thus, benchmarks to be developed have to take into account that preferred values may differ among cases.

Indicators

For each of the critical success factors, a set of indicators needs to be developed. The indicators presented here are not based on theory, but were constructed in dialogue with FundPartners representatives. In future research, it might be interesting to examine how they relate to more theoretically grounded approaches to indicator construction, such as proposed in the quality literature (e.g. Pipino et al, 2002). However, these indicators, although possibly not complete and theoretically justified are considered valuable in practice, so they deserve further investigations.

Indicators for CSF socialization

Socialization leads to *sympathized knowledge*, which is tacit knowledge shared through common experiences. Examples are organizational skills and know-how, and trust between members of the organization. This tacit knowledge cannot be measured directly. Indirectly, however, it can be assessed by measuring the socialization process itself. The following three indicators considered relevant by employees measure the physical and regulating facilities for socialization:

- *Direct communication links*: the average percentage per member of the specialist team of other team members who work in the same room versus the total number of team members. A high percentage is desired, as it is conducive to informal interaction and thus socialization.

- *Non-assigned working time*: the average percentage per member of the organization of the hours not used for meetings versus the total number of working hours (in the past 30 days). A high percentage is positive for socialization, as it generally takes place during non-assigned working hours.

- *Regulated socialization*: the percentage of formally regulated hours in which socialization can take place versus the total number of working hours (per week). One can think of meetings in which professional communication takes place such as seminars, CoP discussions, non-project-oriented meetings, etc. A high percentage is desirable. The

importance of a high value for this indicator gets higher if the values for direct communication links and non-assigned working time are lower.

Indicators for CSF externalization

The output of externalization is conceptual knowledge. Two indicators are presented. The first one directly measures the amount of conceptual knowledge. As this is a very broad indicator, a second indicator is introduced which focuses on the process of externalization.

- *Number of bytes of project documents*: the total number of bytes that project meeting documents consume. Project meetings are regulated facilities for externalization. The size of the project documents gives a rough indication of the degree to which conceptual knowledge has been worked out.

- *Percentage of hours assigned to project meetings*: the average percentage of hours of a working week assigned to project meetings. A high percentage is positive for externalization, because much of it takes place in dedicated meetings. There is a negative correlation with the non-assigned working time. A balance between the values of both indicators needs to be found.

Indicators for CSF combination

The output of combination is systemic knowledge. The amount of this knowledge can be directly indicated by the following indicators:

- *Number of categories in the knowledge base*: the total number of categories in which knowledge in the knowledge base is subdivided. The knowledge base is (in FundPartners) the most important implementation of systemic knowledge.

- *Number of items in the knowledge base*: the total number of items stored in the knowledge base, such as tuples, instances, etc.

Indicators for CSF internalization

The output of internalization is operational knowledge. Both indicators measure the process of internalization.

- *Number of years experience*: the average number of years experience in the investment fund industry for the organizational members. It measures how long people have been involved in obtaining hands-on experience in learning about their trade.

- *Frequency of use of the knowledge base*: The average number of times the knowledge base has been accessed (in the past 30 days). As people use this to learn about new concepts and apply it directly in their work, this is quite a precise indicator for internalization.

Table 1 summarizes the results for knowledge creation effectiveness for FundPartners³

CATEGORY	CSF	INDICATOR	VALUE
Sympathized knowledge	Socialization	Direct communication links	100%
		Non-assigned working time	68%
		Regulated socialization	2,4%
Conceptual knowledge	Externalization	Number of bytes of project docs	47,5 Mb
		Percentage of hours assigned to project meetings	15%
Systemic knowledge	Combination	Number of categories in KB	3
		Number of items in KB	2071
Operational knowledge	Internalization	Number of years experience	9,6
		Frequency of use of KB	39,4

Table 1: Knowledge creation effectiveness measurements for FundPartners

3.5 Using the Measurements for Knowledge Creation Effectiveness

The measurements presented in the previous table give a quick overview of the effectiveness of the various SECI processes in FundPartners. However, by themselves, these measures do not mean much. There are three factors that need to be taken into account for a meaningful interpretation:

- *Typology*: clear typologies of organizational communities of practice are needed in order to interpret the values. In a knowledge-intensive community, a percentage of hours assigned to project meetings of 15% may be normal, whereas in a traditional production environment, this may be excessive.
- *Trends*: a one-time snapshot of a community does not say too much. Much more relevant are series of snapshots, so that trends and patterns in values can be detected.

³ The measurements were collected on January 23, 2002.

- *Benchmarks*: given that a community can be classified and its role in the organization is clear, then benchmarks comparing its performance to those of other communities operating in similar contexts are very useful.

Clearly, the study done here is only a pilot study. In future research, typologies, trends, and benchmarks may be developed for much richer analysis to be possible.

4 Discussion and Future Research

Summarizing, we use the Nonaka model to distinguish between (four) *types of knowledge* and *knowledge development* being the transition between the types. Knowledge develops (is created) in knowledge development processes, also known as ‘social learning processes’ [Boisot, 1995, 1998], indicating the importance of learning for knowledge development on the individual, group (community), and organizational levels. We choose the community as the level of analysis. Measuring knowledge implies determining which knowledge types are present in (the individuals in) a community and scoring on a number of scales (table 1 lists nine scales or indicators).

Knowledge development in a community can be influenced by several factors. Nonaka describes ‘BA’ as the environment that stimulates knowledge development and gives seven guidelines for effective knowledge creation. Senge identifies seven learning disabilities that should be reduced to enable knowledge development.

Knowledge management is related to knowledge and knowledge development in two ways. First, knowledge management implies identifying the types of knowledge in a community and the scales on which these are or will be measured. Second, knowledge management implies identifying the knowledge creation processes in a community and the existing learning (dis-)abilities, according to Nonaka and Senge.

Effective knowledge management is a stronger and more explicit type of knowledge management and includes (1) the decisions on ‘target values’ for the scales of the knowledge types and (2) the decisions on the organization and management of the knowledge creation processes.

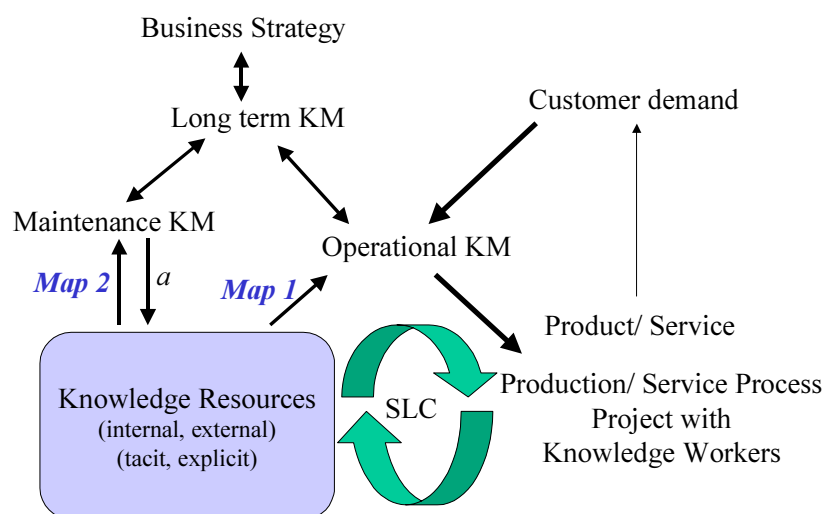


Figure 5. Levels of Knowledge Management for a Community of Practice.

Based on literature and cases we now distinguish between (three) levels of knowledge management in a community of practice (Figure 5):

Operational KM receives (looks for) customer requests for a knowledge intensive product or service. Operational KM then forms a project team consisting of some knowledge workers, coming from the knowledge resources of the organization. Operational KM needs an up-to-date overview of free, available resources (represented in map 1) to be able to effectively create the project team. The project team will learn -develop knowledge- during the project, adding to the knowledge resources after the project has ended. This can be seen as a Social Learning Cycle [Boisot, 1995; Nonaka et al, 2000].

Maintenance KM evaluates the actual (internal and external) existing (free and in use) knowledge resources and decides on training and other maintenance techniques ('control' indicated by arrow a). Maintenance KM therefore needs a map (map 2) representing actual knowledge resources. Case analysis might lead to the finding that map 1 differs from map 2, because operational knowledge managers and maintenance knowledge managers use different indicators for their decision making.

Long-term KM evaluates the findings of KM maintenance, operational KM and the business strategy of the organization at hand. Social Learning Cycles might be distinguished in various parts of the model. KM maps typically consist of knowledge representations of different degrees of formalization and focus, such as task ontologies.

Operationalising the Nonaka model is known to be a complex issue [see e.g. proceedings of ECIS 2002, ICIS 2002, HICSS 2003, and the KnowMe approach {Andriessen, TUD, personal communication}]. FundPartners has made progress in this field in 2002, but further measuring, analysis, and review are needed in 2003. The approach and the model can be tested in a number of cases in 2003, leading to the understanding of the key issues: measurement of knowledge, management of knowledge development, and individual and organisational learning. The question of KM measurement/community measurement is addressed in two other METIS deliverables⁴, which will be used to add to our approach in 2003.

Nonaka and Takeuchi have based their theory on their experiences with large production organisations. FundPartners, however, is a small start-up in the financial service sector, and as such is not necessarily similar to the organizations investigated by them. However, we feel justified in applying their model to our case. We give three reasons:

⁴ Community of Practice measurement and evaluation, in Communities of practice: the inventory of research questions, <https://doc.telin.nl/dscgi/ds.py/ViewProps/File-23025>. KM goals and measurement in practice in Managing knowledge management: a study of Chief Knowledge Officers, <https://doc.telin.nl/dscgi/ds.py/ViewProps/File-24620>.

First, their theory is centered on knowledge development and conversion processes as such, and not on company- or industry-specific features or benchmarks.

Second, their theory allows for ontological scaling of knowledge conversion processes from the individual to sector-wide level. FundPartners is currently mainly positioned in the beginning of their knowledge spiral. However, the SECI-model explicitly deals with scalability issues and as such can remain to be applied when FundPartners grows. Also, various knowledge workers in FundPartners have many years of experience in the same knowledge domain and have worked together for a long time in previous appointments.

Third, the SECI-model turned out to be very useful in discussions, as company representatives could recognize its elements in their own organization. For example, the SECI guidelines for practical knowledge management explicitly promote increasing the motivation of employees to participate in better knowledge management. FundPartners management identified this as an important knowledge management issue in their organization.

Our aim is to translate these combined theoretical findings into a set of heuristics and guidelines that are useful for management in making key knowledge management decisions for their communities of practice. Special attention needs to be paid to specific key success factors of communities. One key factor often used for community assessment is sociability, which is defined as the extent to which the social policies incorporated by the information system support the purpose of the community and are understandable and acceptable to its members (Preece, 2000).

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