

# **Knowledge Retrieval Processes in Multinational Consulting Firms\***

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## **Abstract**

Previous discussions of knowledge transfers within multinational corporations (MNC's) tended to focus on the process as an isolated phenomenon, and the factors that impede these transfers. Less attention has been given to the identification and personal codification processes of knowledge prior to transfer. A model for understanding how knowledge is retrieved in MNC's is proposed in this paper, with a specific focus on the retrieval of information located in information technology (IT) systems. The model is derived from (1) a critical examination of knowledge management theory, and (2) the empirical research results gathered from Computer Sciences Corporation (CSC). Our survey of CSC reveals that the company is able to overcome the problem of identifying valuable knowledge in a geographical dispersed organization by establishing virtual communities of practice via its portal system. Virtual communities of practice are seen as a combination of the codification and the personalization strategies in this paper.

## **Introduction**

Knowledge intensive corporations, like consulting firms, tend to view their employees as knowledge workers (May et al., 2002). This highlights the corporations' understating of knowledge as key to success. Knowledge management strategies are used to identify where best practices and experts are located in the organization (Davenport & Prusak, 1998). However, MNC's face the problem that knowledge is dispersed widely and hidden within the organization. Therefore, knowledge is inaccessible to relevant knowledge workers, which causes inefficiencies. Teece (2001, p. 128) writes: *"Knowledge, which is trapped inside the minds of key employees, in filing drawers and databases, is of little value if it is not supplied to the right people at the right time"*.

The consulting industry is knowledge intensive, covering all types of business strategy. As an outcome, the consultant depends on an internal supply of advanced and recent corporate knowledge, though the global firm is often localized in various sub-units (Hedlund, 1999). In order to overcome the fragmentation problem, firms have intensified their efforts to make knowledge available across the organization. Strategies like "total openness in internal communication", where everyone has full access to the organization's information and is aware of the others' repertoire (Grant, 1996), allow a tremendous amount of information to be available to the individual. To exemplify this, Ernst and Young estimates that it has 1.2

million documents in its general unfiltered repository, 875,000 documents in its discussion databases, and 50,000 documents in comprehensive packs of material on specific topics (Wenger et al., 2002). In practice, this situation is impossible for the consultant to handle, simply because of information overflow. A selected base of knowledge is of higher relevance in this situation. Without this base, superfluous knowledge platforms are built, and in general, fragmentation and data overflow increase, leading to unused databases, characterized by McDermott (1999) as “information junkyards”. The large amount of information causes asymmetric distributions of knowledge and uncertainty (Becker, 2001).

To solve this problem is of particular relevance for MNC’s, since knowledge acquired at one site can be beneficial to other sites (Buckley & Carter, 2002; Olivera, 2000). Efficient knowledge identification and transfer processes are, therefore, a key element of knowledge management practices leading to new ways of exploiting existing valuable knowledge (Cohendet et al., 1999; Dunford, 2001). Two processes are of importance. First, existing knowledge must be somehow stored somewhere. Second, the individual consultant must be able to retrieve the stored knowledge, so he can service the client without re-inventing the wheel.

The retrieval processes take place in an interface between social interaction and technology. Knowledge retrieval is a two-folded process, starting with identification of information within the organizational memory and continuing with personal codification of the accessed memory. This division reflects the fact that organizations typically operate with two different knowledge management strategies, a *codification* strategy, where knowledge is stored in databases, and a *personalization* strategy, where information technology is only a tool for communication between people (Hansen et al., 1999). The consultant has to orient himself both in his personal network and the IT-solutions offered by his firm.

This paper addresses the fragmentation and overload problem by developing a model of different retrieval methods. The argumentation focuses on the combined use of weak and strong tie-binding practices through the establishment of virtual communities of practice. Previous research often views personalization and codification solely as instruments, seldom taking the perspective of their interdependency. Furthermore, much of the debate concerns knowledge transfer processes *per se* and the factors that impede these transfers, such as “Not Invented Here” syndrome (Katz & Allen, 1982), suspiciousness of the unknown (Birkinshaw & Ridderstråle, 1999), knowledge sharing hostility (Husted & Michailova, 2002), and

organizational struggles for bargaining power (Forsgren & Johanson, 1992; Szulanski, 1995; Hansen, 1999). Less attention has been given to the identification and the personal codification processes of knowledge.

The study originates in the consulting industry. Hansen et al. (1999) state that consulting firms were among the first to use and invest in knowledge management, since knowledge is the core asset of consultants. Furthermore, such companies were among the first to heavily explore the use of information technology to capture and disseminate knowledge. However, most examples in the literature originate from an either/or approach, where consulting firms focus on either codification or personalization strategies. For example, firms like Andersen Consulting and Ernst & Young focus on codification strategy (Davenport & Prusak; 1998; Hansen et al, 1999; Wah, 1999), whereas companies like Bain, Boston Consulting Group and McKinsey emphasize personalization strategy. Consultants in the latter firms use brainstorming group meetings, followed up by meetings, videoconferences and one-by-one sessions, often heavily based on traveling, to develop very customer-specific requested services (Hansen et al, 1999; Wenger et al., 2002).

One notable characteristic of the consulting industry, when compared to the manufacturing industry, is the small amount of attention paid to entrepreneurial activities and formal product creation through R&D activities. Instead, consulting firms create methodologies to tackle particular classes of problems through on-the-job learning (Teece, 2001). In this sense, the focus on knowledge management is more natural for the consulting industry, since knowledge management is a practice of operating people and information rather than knowledge creation *per se* (Alvesson & Kärreman, 2001). The research focus on the consulting industry further distinguishes the role of knowledge workers. An R&D engineer in manufacturing typically stays within the same specialized area, whereas a consultant, in principle, moves into a new area of business activity every time he or she enters a relationship with a new customer. The consultant, therefore, needs to search for knowledge unfamiliar to him, which sets up specific criteria for knowledge retrieval processes.

In this paper, we investigate how the combination of these two approaches is present in a case survey of CSC Denmark, a subsidiary of the CSC Corporation. When including the full process of knowledge retrieval, we find that the consultant still has to rely on additional information given by his personal network in his use of codified knowledge to further decode retrieved knowledge from the organizational memory. In the following section, the term

“knowledge retrieval” is defined and the knowledge retrieval model is presented. Then the case background and research methods are described, followed by a description of CSC’s knowledge management system. In addition, analytical insight into knowledge retrieval processes based on interview statements is offered. Finally, our conclusions are presented.

### **The Knowledge Retrieval Process**

There are many highly diverse understandings of knowledge. Davenport & Prusak (1998, p. 5) define knowledge in the following way: “*Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents of repositories but also in organizational routines, processes, practices, and norms.*” Important, knowledge is here seen as a mixture of various elements, which are sometimes codified and sometimes tacit. In this paper, a specific type of knowledge, such as individual skills, is not selected. Rather, knowledge is interpreted as every piece of information needed for serving a specific need. However, the division of knowledge as either codified or non-codified at the organizational level is accepted. Some knowledge is meaningful to the individual, but not to the organization. The focus here is how the individual is able to retrieve knowledge from the organizational memory.

To define “retrieval” The American Heritage Dictionary defines the term as “*The process of accessing information from memory or other storage devices*”. The emphasis lies on how to create meaningful information that becomes part of organizational memory and is therefore codified by someone. In a knowledge system, the processes that take place after the creation and storage of information, but before the transfer and (re)application of this information constitute the act of retrieval (Holzner & Maarx, 1979; Pentland, 1995; Alavi & Leidner, 2001). The transfer of knowledge process is dyadic and synchronous in nature, often aimed at developing new knowledge, whereas retrieval processes are anonymous and asynchronous, drawing on existing organizational knowledge. In the mnemonic process, retrieval is the final act, coming after acquisition, retention, maintenance and search (Stein & Zwass, 1995).

According to Krippendorff (1975), distinguishing between search and retrieval is fruitful. Search is the process by which retained information is selected as relevant to a particular problem or goal. Retrieval is the reconstruction of the selected information to satisfy the

user's request. It is, therefore, useful to divide the retrieval process into two steps: the identification of knowledge, and the receivers' individual codification of the accessed knowledge. Not all information is directly analyzable and shows or reflects the known problem solving methods. Rather, some information is not analyzable, and only gives directions for problem solving (Walsh & Ungson, 1991). IT makes it possible for an individual to identify and select a specific piece of schematized information, but retrieval, in the sense of creating meaning, is problematic. Context specificity and lack of absorptive capacity in general cause a problem (Cohen & Levinthal, 1990; Szulanski, 2000). As Cowan *et al.* (2000) write, knowledge codified for one person may be tacit to another and a complete mystery to a third. The knowledge receiver, then, often needs the original informant to codify a particular piece of information. However, the informant may be unknown to the retriever (Alavi & Leidner, 2001), and might even have left the firm.

An important consideration when storing knowledge is, therefore, including context. When the context surrounding the knowledge creation process is not shared, it is questionable whether retrieval will result in effective uses (Alavi & Leidner, 2001). An individual retrieving knowledge needs some kind of "codebook" to understand the written document. However, this codebook is often not manifest in communities of individuals who share a context. To the outside observer, this group appears to be using a large amount of tacit knowledge (Cowan *et al.*, 2000).

### **The Model**

In the literature, two approaches are discussed in relation to knowledge transfer: personalization and codification. These two approaches have also been related to the use of weak and strong ties.

Weak ties cover distant, infrequent relationships between individuals and reflect the codification approach, whereas strong ties refer to close, frequent, long lasting, personalized relationships, and reflect the personalization approach. Weak ties between units can help a search or scan for information, but strong ties are needed to transfer complex knowledge (Granovetter, 1972; Hansen, 1999; Steensma & Carley, 2000). Complex knowledge is hard to retrieve through communication technologies (Huber, 1991). The individual first and foremost retrieves "additional and peripheral" knowledge through electronic modes. Complex knowledge is therefore likely to be transferred through socialization processes in which

knowledge is transferred in tacit form from one actor to another (Cohendet *et al.*, 1999; Nonaka and Takeuchi, 1995).

Often these two different approaches are treated as opposite ends of one scale. In this paper, the two strategies are treated as different dimensions of knowledge retrieval mechanisms, dimensions that complement each other. The coexistence of these strategies leads us to the following model.

**Figure 1: Knowledge Retrieval Means**

		<b>Use of Personalization Strategy</b>	
		Low	High
<b>Use of Organizational Codification Strategy</b>	High	Database	Virtual communities of practice
	Low	Individual memory	Social capital

**Individual Memory**

Codification processes take place at different hierarchical levels of the firm. Individual memory is developed through a person’s observations, experiences, and actions (Alavi & Leidner, 1999) and consists of semantic, episodic and skill-based memory. Semantic knowledge refers to general knowledge stored in a network of concepts, whereas episodic knowledge refers to individual experiences, and skill knowledge refers to implicit knowledge of how to do things (Stein & Zwass, 1995; Tulving, 1983). Knowledge of this type makes sense to the individual and is “codified” at this level, not at the organizational level. This

knowledge is not part of the organizational memory, since it is not stored and can only be brought to bear on present activities, resulting in organizational behavior changes (Walsh & Ungson, 1991; Stein & Zwass, 1995). The simultaneously low degrees of organizational codification and personalization strategies reveal isolated retrieval processes, drawing on individual memory alone. Such organizations develop experts who solely retrieve information from their personal memory, and make use of neither personal networks nor databases.

However, this paper focuses on the processes of retrieving knowledge from the organizational memory in MNC's. In such organizations, organizational memory is formed by the integration of people and documents, of which IT and social capital are essential parts (Olivera, 2000). Therefore, individual memory is not addressed by this paper's research premise.

### **Databases**

Taking the large amount of fragmented information into consideration, the use of IT in this respect is viewed as central to the internalization of the MNC's knowledge (Wright & Edwards, 2001). The use of electronic communication technology raises the frequency of contacts among individuals and, in general, increases the opportunity for dialogue. By establishing linkages between units and individuals, and by standardizing information flows (Ensign, 1998), IT is a preferable and cost efficient instrument for building knowledge platforms. These knowledge platforms provide a repository of codified knowledge (Purvis et al., 2001) and, in the long run, the technology reduces the efforts of individuals needed for in exchanging information, individuals whom are often separated in time and physical proximity (Huber, 1991). In fact, through the use of databases, more people, or at least their written documents, serve as sources of information to the individual. Establishment of a link between local and function-based knowledge and making it computerized and globally accessible is key (D'Adderio, 2001). By "globalizing" knowledge, all members of an organization are, in theory, able to retrieve similar information from organizational memory. Through these "thought collectives" (Halbwachs, 1992), individuals prompt each other to recollect information and remember the past more efficiently.

The risk of data overflow has emphasized the need to reduce data into recognizable patterns of information through the use of computer algorithms (Norton, 2000). Databases have further been used to systemize information offered to the knowledge worker and have

been developed to effectively guide the user in his selection process. A database provides access to different knowledge sources like the corporate intranet, the Internet, and more specialized search software. Among search possibilities are: a) localization of competences through curriculum vitae of colleagues, b) best practices and codified procedures, c) corporate goals, like ethical statements, and d) customer and competitor intelligence, such as market reports. This blueprint idea systemizes and, in fact, trivializes knowledge needed for serving clients. In a way, this combination of codification and personalization strategies deskills the knowledge worker, who does not need to possess certain qualifications to carry out a task (Alvesson & Kärreman, 2001)

### **Social Capital**

This study employs an "egocentric" perspective on social capital (Lesser 2000). The term social capital refers to "the value of an individual's relationships with other individuals in helping to get things done in a firm" (McElroy, 2002) or, in other words, "the sum of actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or a social unit" (Nahapiet and Ghoshal, 1998). These authors also state that there must be series of connections that individuals have to others. In other words, individuals must perceive themselves to be part of the network. In addition, a sense of trust must be developed across connections.

The concept of social capital is attributed to Coleman (1988), who refers to Granovetter's (1985) social structure importance. Social capital has originally been addressed in sociology, political science, and economic development literature (e.g. Coleman, 1988, Putnam, 1995, Woolcock, 1998, Portes, 1998) and has recently been applied to business and management issues (e.g. Burt, 1997, Walker, Kogut, Shan, 1997, Cohen and Fields, 1998).

Social capital is included in this study for various reasons. First, social capital can be defined on both individual and unit/organizational levels. This allows use of the concept for a given knowledge worker and for a group of knowledge workers dealing with a client request. Second, the definition highlights the fact that the object needs to be aware of its membership. This is important for the discussion of knowledge retrieval, as it reduces the random aspect by pronouncing the systematic and intended use of social capital to retrieve knowledge. Third, the notion of trust is important because only qualified sources will be accounted for in the

knowledge transfer process. Finally, the common understanding allows an efficient retrieval because sender and receiver share a common code (Cowan et al., 2001).

### **Virtual Communities of Practice**

According to Wenger et al. (2002, p.4): “*Communities of practice are groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge & expertise in this area by interacting on an ongoing basis*”. It is often the passion for something that brings people together, since an individual naturally seeks to share insights and build knowledge in areas they care about (McDermott, 1999). This differs from informal networks of people who communicate, share information and build relationships, since the community of practice is about something specific. The group intends to build up practices and develop domains of knowledge with a unique perspective. Given this uniqueness, newcomers to the community need to learn how to function in the entity (Lave & Wenger, 1991; Nonaka et al., 2001).

Through the establishment of virtual communities of practice, it is possible to combine the codification and personalization strategies. Essentially, virtually connected teams often need to build a relationship through face-to-face meetings before they can effectively collaborate electronically (McDermott, 1999). Moreover, communities normally build on social capital rather than on technostructural structures (Alvesson & Kärreman, 2001).

A firm is a constitution of different communities of practice and these communities are interdependent groups rather than isolated entities (Brown & Duguid, 1991; Gherardi & Nicolini, 2002). The boundary of each community is defined by its task, culture and history (Nonaka et al., 2001), and its participants are well defined rather than randomly selected (Kuhn, 1962). This might lead to encapsulated structures facing Not-Invented-Here problems (Katz & Allen, 1982), since specialists intend to further specialize rather than move into new areas (Kuhn, 1962). Knowledge, therefore, flows more easily within the communities than among them (Kogut & Zander, 1995; Teece, 2001). As Kuhn (1962, p.177) states, communication within a community is “*relatively full and professional judgment relatively unanimous.... professional communication across groups lines is sometimes arduous, often result in misunderstanding, and may, if pursued, evoke significant and previously unsuspected disagreements.*”

However, information travels fast within communities and is readily accessible by other members (Brown & Duguid, 1991). Establishment of a community focused on a topic narrows identification processes, since the group of participants will include the group of experts, regardless of where they are physically located in the organization. Furthermore, the ongoing codification practices will be improved over time, since stable communication practices are foreseeable and the consultant knows persons in the organization who can be helpful in the codification process of the given information. The question is whether these fluent knowledge transfers are evident in a virtual context. As Wenger (1998, p.74) writes *“Given the right context, talking on the phone, exchanging electronic mail, or being connected by radio can all be part of what makes mutual engagement possible.”* On the one hand, geographical distance obviously creates problems for the distributed communities, people do not meet by chance, face-to-face contact is rare, no informal network relationship building takes place, participants are locked in different cultures and represent organizational units possessing different powers, and finally trust building is unlikely (Wenger et al., 2002). On the other hand, distributed communities exist among scientists spread across the globe who are still able to create new knowledge. In fact, Kuhn (1962) states that the creation of new scientific paradigms is based on the foundation of scientific communities. The need for trust and face-to face communication for the transfer of complex knowledge is, therefore, an open question (Wenger et al., 2002).

### **The Empirical Case Background**

Two young computer analysts founded computer Sciences Corporation (CSC) in 1959: Roy Nutt and Fletcher Jones. CSC went public in 1963 and was listed the following year on the Pacific and American stock exchanges. CSC began by developing assemblers for computer manufactures and the firm soon became an important software developer in the industry. In 1964, CSC’s focus changed to serving users rather than computer manufactures, while servicing the U.S federal government created further growth. In the mid-1980’s, system integration was added to the service portfolio, and in the 1990’s, CSC entered the IT outsourcing market. Today, the firm offers services within three areas of consulting: strategic use of information technology, system designs and integration, and outsourcing. CSC’s consulting also includes other areas of business activity, such as knowledge management.

CSC has concentrated its services on the following industries: aerospace and defense, chemical, communication and high tech, consumer products, financial services, government, health services, and retail. In 2001, CSC had activities in 23 countries, generated annual revenue of USD11.4 billion and employed 66,000 people worldwide. More than 38,000 employees have joined CSC via outsourcing and acquisitions, and CSC acquired 85 firms worldwide in the period from 1986 to 2001. CSC can be characterized as a knowledge-intensive company that builds its internal administrative procedures on knowledge management practices.

CSC Denmark, our focus unit, was founded in 1996 through the acquisition of the government owned Datacentralen, which offered IT solutions to the public sector. Later, Mynd, e-Huset and Scandichealth were acquired, and today 1,700 people are employed in Denmark. CSC's turnover was 1.545 billion DKK (approximately USD200 million) in 2001. Today, the Danish unit divides its activities into four categories: consulting, system integration and outsourcing to large public and private firms, and small and medium-sized firms respectively, and IT solutions to the health sector.

## **Research Methods**

Several interviews with managers and employees from various departments at CSC Denmark have been conducted all centered on CSC's knowledge management practice. At all interviews, at least two researchers were present and the interview was taped. During the interview, a semi-structured questionnaire was followed, although the questionnaire was adapted to the specific function of the respondent. Additional information was retrieved from the company's website and from internal documents.

## **CSC's Knowledge Management System**

Given the dynamics of the corporate environment and the goal of securing and expanding competitive advantages, CSC began to focus globally on knowledge management in 1996. The ability to learn and innovate faster than the competitors as today's only sustainable competitive advantage was acknowledged. As CSC's CEO Van B. Honeycutt puts it: "Knowledge, and our ability to build and leverage it, has become the critical source of sustainable competitive advantage." Other CSC employees made such comments as:

”If you manage the collection, storage and accessibility of your corporate knowledge, and encourage the sharing of that knowledge, you will be able to deliver better solutions to clients, quicker, and more cost effectively.” (Insider C)

“We need to learn from each other – the overall board has acknowledged that years ago but how to do it was a different matter”. (Insider B)

“It is going a bit slowly, but the vision is to integrate the company more across borders, sub-units, and cultures.” (Insider A)

That the knowledge initiative has an impact is demonstrated by a report from International Data Corporation (IDC), which “gave CSC the top rating of very strong for its knowledge management program”. IDC pointed to two key strengths of CSC’s knowledge program: the knowledge communities and the worldwide view. Secondly, the report remarked on the advantages gained by avoiding a narrow focus and taking an enterprise-wide view of the firm’s knowledge environment.” CSC has recognized that knowledge originates and resides in the mind of the employees.

”Our achievements stem as much from the skills, the thinking and the values of the remarkable individuals who make up CSC.” (CSC annual report 2002, p. 1)

The challenge, however, is to make this wealth of knowledge available across the organization, thereby leveraging the knowledge base.

### **CSC’s Knowledge Retrieval Processes**

“Every knowledge worker should have one place to go to work virtually.” (Insider B).

At CSC, every employee’s virtual workplace is the Portal – an Internet based platform with many functions, including access to databases, interactive spaces, and personal storage. The initiative started in 1996 as CSC Sources, which is now known as the CSC Sources Knowledge Portal or “the Portal”. In March 2002, the web-based portal became a so-called

single entry portal, i.e. one place where knowledge workers can search and exchange knowledge.

A large corporation, such as CSC, has a huge amount of information and experiences piled up around the organization. The challenge is to make existing knowledge available across countries, subsidiaries, and departments, and to share and use it. In response to this challenge, the Portal is designed to increase company effectiveness and add value to clients.

Without an effective knowledge program, most professionals spend about 80 percent of their time resolving old problems and only 20 percent exploring innovation. At CSC, we're turning that ration upside down and therefore have more time to develop creative solutions for our client's competitive advantage. The stimulating and dynamic environment of CSC Sources offers learning opportunities and ready access to the knowledge resources and expertise employees need, around the clock and around the world." (CSC Sources brochure downloaded at <http://www.csc.com/solutions/knowledgemanagement/ds/sources.shtml>)

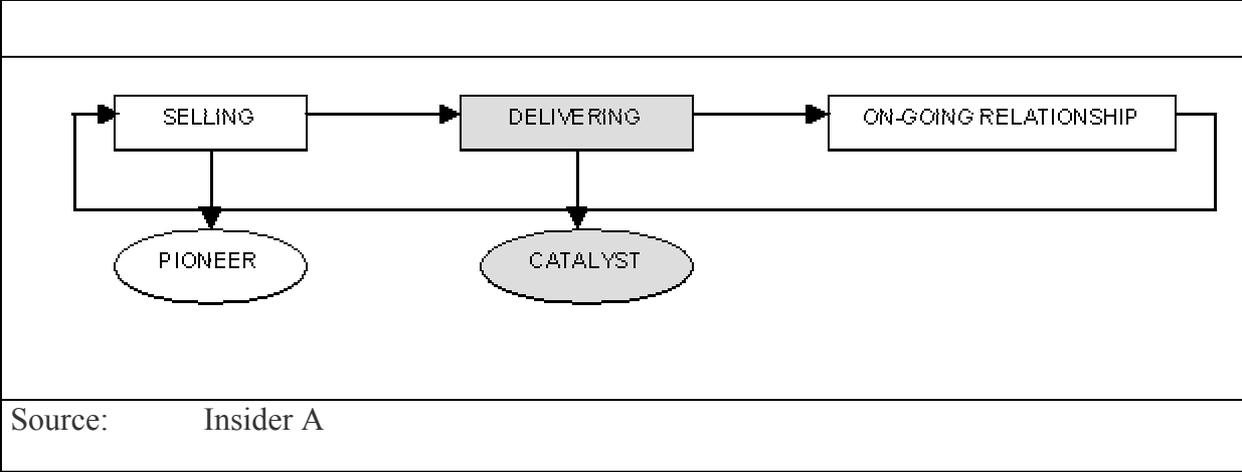
The Portal content comes from CSC employees, their clients, and from the external environment. Clients add knowledge about problem solving, best practices, and industry insight. External environment information is gathered through such sources as newspapers, the Internet, Reuter's business briefings and, GartnerGroup. In 2002, the Portal had 40,126 registered users.

There are a number of different elements present at CSC that fit the three identified knowledge retrieval processes.

## **Databases**

CSC has developed a business model that consists of three phases: selling, delivering, and on-going relationships, as indicated in Figure 2.

**Figure 2: CSC’s Business Model**



Both Pioneer and Catalyst are information databases that are part of the Portal. Through these databases, CSC ensures consistent, reliable and flexible solutions for its clients. Pioneer supports and coordinates the daily sales efforts, whereas Catalyst supports products content (what is delivered) and process (how it is delivered). Catalyst is organized in four phases (4-D): discover, design, develop and deploy. In 2002, there were 39,667 assets published on the Portal.

In addition to Pioneer and Catalyst, the Portal gives access to more than 1,600 computer-based training courses, seminars and workshops, contact and qualification information for CSC’s experts and practitioners, technical presentations, technology trend reports and award winning programs, sales materials, presentations and proposals for business development, CSC project histories, client information, and competitive analyses.

**Social Capital**

CSC has also initiatives to create and strengthen the social capital of its employees. As an organization, CSC has started projects that can be seen as formal attempts to develop social capital. Some examples are described in Table 1.

**Table 1: Examples of Social Capital Instruments in CSC**

NECTAR	A newly founded network that brings together young and senior employees from within the whole organization and across units. (Network of <u>Early Carrier Talent and Role Models</u> ).
Mentors	For junior consultants. Mentors are linked and facilitate access to a broad, established network.
International Forum	A social gathering in London for all junior consultants in European units. The goal is to “feel” the corporate spirit and to establish networks across countries and sub-units. In the organization process of this event, employees use other means in addition to the Portal for knowledge sharing such as teleconferences, e-mail, and a few meetings.
International Activities	Consist of such events as picnics and team-building activities.
Personal & Colleagues	Important in expanding the network in order to search for complementary knowledge resources. Encouraged and supported by management. Gained from workshops/seminars, project groups, and training courses.

In addition, several parts of CSC use video- and teleconference across borders. Senior management mostly uses these tools because they have to communicate internationally quite often. The divisional knowledge managers of Scandinavia, i.e. Denmark, Norway, Sweden, Scandichealth A/S and CSC Consulting Group A/S, coordinate their activities weekly through video- and teleconferences. This interaction is viewed as a good supplement to face-face meetings, as communication is richer than in emails. The Portal also offers tools for creating social capital. It provides contact and expertise information for CSC’s experts and practitioners, material about the company and specific operating groups or business units, external and internal communications, community connections, and information about CSC job opportunities, events and conferences.

**Virtual Communities of Practice**

The portal also offers access to so-called “interest communities”. The communities consist of groups of employees who possess complementary knowledge and have a shared interest in particular problems, processes, or practices in the organization.

As Carol Bothwell, Chief Knowledge Office of CSC Global, states: ”Knowledge communities have become more and more essential to CSC business. Many of our business units now view these communities as an organizational form essential to achieving business goals, and they have sponsored additional communities on topics critical to the industry or

geography in which they operate.” The CSC Portal enables the employee to join, visit or leave a community. CSC does not manage this process, but relies totally on the individual employee’s interests. For each community, a specific newsletter is included with links to articles of interest. Member can access community documents or contribute documents to a shared database, or contact a colleague anywhere in the world for assistance. In 2002, 631 communities were registered.

On addition to the communities, the Portal provides project and service delivery teams with the opportunity to store information, access project tools, and carry out dialogues. The tools available are similar to those in the community space. Therefore, project communities co-exist beside interest communities.

### **Retrieval Processes**

After receiving a new assignment, the typical workflow of a knowledge worker is as follows:

- Search the Internet to find good web sites.
- Read the Catalyst book about the subject matter. Personal contacts in the global network are used to identify relevant chapters in Catalyst for specific problems.
- Join the on-line community, as identified in CSC Portal
- Phone colleagues within CSC, as identified by the skill-database
- Read documents from the knowledge base. (Insiders E and F)

In other words, “having a task at hand, before start re-inventing procedures about how to do things, the employees will search in Catalyst to find the best packaged knowledge. Then use Catalyst as a base and adjust it to the problem facing you.” (Insider A)

Clearly, employees use a mixture of the different knowledge retrieval means. They typically start with impersonal means, even if they originate outside CSC. If something of interest or nothing at all is found, they start using social capital. They may then contact new people identified via the Portal. The new contacts are not strong, but they will enter the social capital after the initial contact is made. Respondents reported that communication within CSC is open, even between people who have not met before. Therefore, the process of building

social capital is very short, creating a speed advantage. The joint umbrella of the CSC CORPORATION creates trust.

Pioneer and Catalyst guide project teams in determining the most effective approach to a business problem. As such, Pioneer and Catalyst are databases from which employees retrieve packaged knowledge and use it.

As one employee states: “Some employees literally think that it is like going into a Boeing 727 and switch on the autopilot and applying it to the client. Projects have been seen to go down due to this and that is really a challenge to secure that it will not happen,” (Insider A)

However, parts of these databases, especially the process documents, also enable more efficient interaction between employees. As such, they can be seen as supporting retrieval via social capital.

“Having Catalyst is a great help. Catalyst is aligning our work! It is a framework to describe our project. It is useful when our developers are documenting a project and we are using developers from CSC Denmark. We have to make them aware of what we have to do and then we can just give them the statement of work and they will know exactly what they need and where to look.” (Insider D)

“The CSC Portal will effectively change the way we work at CSC. It takes us to the next level of becoming a virtual organization in which colleagues collaborate, take advantage of common set of tools and reuse information from around the world to get their jobs done smarter, faster and better.” (Web)

## **Conclusion**

In this paper, several ways of knowledge retrieval have been discussed. Based on theoretical contributions, a matrix has been developed in which several means for knowledge retrieval have been placed. With this matrix, some topical concepts, such as knowledge databases, social capital, and virtual communities of practice, were placed in relation to each other. The matrix allows for a holistic view of the knowledge retrieval issue.

Furthermore, the CSC example has shown how these elements are used in practice in an international IT consulting firm. Special emphasis has been placed on the retrieval process. Hereby, we have seen that a combination of these elements is as optimal. This leads us to the conclusion that firms should review their knowledge management practice in order to detect if their system covers all discussed areas.

However important and useful the Portal is, technological solutions cannot create or destroy social capital. It is therefore important to provide resources not only for the high-tech knowledge management solutions, but also for the socialization process.

## References

- Alavi, M. and Leidner, D. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, **25**, 1, 107-136.
- Alvesson, M. and Kärreman, D. (2001). Odd Couple: Making Sense of the Curious Concept of Knowledge Management. *Journal of Management Studies*, **38**, 7, 995-1018.
- Becker, M. C. (2001). "Managing Dispersed Knowledge: Organizational Problems, Managerial Strategies, and Their Effectiveness". *Journal of Management Studies*, **38**, 7, 1037-1051.
- Birkinshaw, J. and Ridderstråle, J. (1999). "Fighting the Corporate Immune System: A Process Study of Subsidiary Initiatives in Multinational Corporations". *International Business Review*, **8**, 2, 149-180.
- Brown, J. S. and Duguid, P. (1991). "Organizational Learning and Communities-of-Practice: Toward a Unified View of Working, Learning and Innovation". *Organization Science*, **2**, 1, 40-57.
- Buckley, P. J. and Carter, M. J. (2002). Process and Structure in Knowledge Management Practices of British and US Multinational Enterprises. *Journal of International Management*, **8**, 1, 29-48.
- Burt, R. S. (1997). The Contingent Value of Social Capital. *Administrative Science Quarterly*, **42**, 339-365.
- Cohen, W. M. and Levinthal, D. A. (1990). „Absorptive Capacity: A New Perspective on Learning and Innovation". *Administrative Science Quarterly*, **35**, 1, 128-152.
- Cohendet, P. and Kern, F. and Mehmanpazir, B. and Munier, F. (1999). „Knowledge Coordination, Competence Creation and Integrated Networks in Globalised Firms. *Cambridge Journal of Economics*, **23**, 2, 225-241.
- Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. *American Journal of Sociology*, **94**: S95-S120.
- Cowan, R. and David, P. A. and Foray, D. (2000). "The Explicit Economics of Knowledge Codification and Tacitness". *Industrial and Corporate Change*, **9**, 2, 211-253.
- D'Adderio, L. (2001). "Crafting the Virtual Prototype: How Firms Integrate Knowledge and Capabilities across Organizational Boundaries". *Research Policy*, **30**, 9, 1409-1424.
- Davenport, T. and Prusak, L. (1998). *Working Knowledge, How Organizations Manage what they Know*. Boston, Mass.: Harvard Business School Press

- Dunford, R. (2000). "Key Challenges in the Search for the Effective Management of Knowledge in Management Consulting Firms". *Journal of Knowledge Management*, **4**, 4, 295-302.
- Ensign, P. C. (1998). "Interrelationships and Horizontal Strategy to Achieve Synergy and Competitive Advantage in the Diversified Firm". *Management Decision*, **36**, 10, 657-668.
- Forsgren, M. and Johanson, J. (1992). "Managing Internationalization in Business Networks. In Forsgren, M. and Johanson, J. (Eds.), *Managing Networks in International Business*. Philadelphia: Gordon and Breach.
- Gherardi, S. and Davide, N. (2002). "Learning in a Constellation of Interconnected Practices: Canin or Dissonance?". *Journal of Management Studies*, **39**, 4, 419-436.
- Granovetter, M. S. (1972). "The Strength of Weak Ties". *American Journal of Sociology*, **78**, 6, 1360-1380.
- Granovetter, M. S. (1985). "Economic Action and Social Structure: The Problem of Embeddedness". *American Journal of Sociology*, **91**, 3, 481-510.
- Grant, R. M. (1996). "Toward a Knowledge-Based Theory of the Firm". *Strategic Management Journal*, **17**, Winter Special Issue, 109-122.
- Hansen, M. T. (1999). "The Search-Transfer Problem: The Role of Weak Ties in Sharing Knowledge across Organization Subunits". *Administrative Science Quarterly*, **44**, 1, 82-111.
- Hansen, M. T. and Nohria, N. and Tierney, T. (1999). What's your Strategy for Managing Knowledge? *Harvard Business Review*, **77**, 2, 106-116.
- Halbwachs, M. (1992). "*On Collective Memory*". London: University of Chicago Press.
- Hedlund, G. (1999). "The Intensity and Extensity of Knowledge and the Multinational Corporation as a Nearly Recomposable System (NRS)". *Management International Review*, **39**, 1, 5-44.
- Holzner, B. and Marx, J. (1979). *The Knowledge Application: The Knowledge System in Society*. Boston: Allyn-Bacon.
- Huber, G. P. (1991). "Organizational Learning: The Contributing Process and the Literatures". *Organization Science*, **2**, 1, 88-115.
- Husted, K. and Michailova, S. (2002). Diagnosing and fighting knowledge sharing hostility. *Organizational Dynamics*, **31**, 1, 60-73.
- Katz, R. and Allen, T. J. (1982). "Investigating the Not Invented Here (NIH) Syndrome: A Look at the Performance, Tenure, and Communication Patterns of 50 R&D Project Groups". *R & D Management*, **12**, 1, 7-19.
- Kogut, B. and Zander, U. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science*, **6**, 1, 76-91.
- Krippendorff, K. (1975). "Some Principles of Information Storage and Retrieval in Society". *General Systems*, **20**, 15-35.
- Kuhn, T. S. (1996). "*The Structure of Scientific Revolutions: Third Edition*". Chicago: The University of Chicago Press [1962]
- Lave, J. and Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. New York: Cambridge University Press.
- Lesser, E. (2000). *Knowledge and Social Capital*. Boston: Butterworth Heinemann.
- May, T. Y. and Korczynski, M. and Frenkel, S. J. (2002). "Organizational and Occupational Commitment: Knowledge Workers in Large Corporations". *Journal of Management Studies*, **39**, 6, 775-801.
- McElroy, M. (2002). Social Innovation Capital. *Journal of Intellectual Capital*, **3**, 1, 30-39.

- McDermott, R. (1999). "Why Information Technology Inspired but cannot Deliver Knowledge Management". *California Management Review*, **41**, 4, 103-117.
- Nahapiet, J. & Ghoshal, S. (1998). Social Capital, Intellectual Capital, and the Organizational Advantage. *Academy of Management Review*, **23**, 242-266.
- Nonaka, I. and Takeuchi, H. (1995). "The Knowledge-Creating Company - How Japanese Companies Create the Dynamic of Innovation. Oxford: Oxford University Press.
- Nonaka, I, and Toyama, R. and Konno, N. (2001). "SECI, Ba and Leadership: A Unified Model of Dynamic Knowledge Creation". In Nonaka, I. And Teece, D.J. (Eds.), *Managing Industrial Knowledge: Creation, Transfer and Utilization*. London: Sage Publications.
- Norton, M. (2000). Knowledge Discovery with a Little Perspective. *American Society for Information Science. Bulletin of the American Society for Information*, **27**, 1, 21-23.
- Olivera, F. (2000). "Memory Systems in Organizations: An Empirical Investigation of Mechanisms for Knowledge Collection, Storage and Access". *Journal of Management Studies*, **37**, 6, 811-832.
- Pentland, B. T. (1995). Information Systems and Organizational Learning: The Social Epistemology of Organizational Knowledge Systems". *Accounting, Management and Information Technologies*, **5**, 1, 1-21.
- Portes, A. (1988). Social Capital: Its Origins and Applications in Modern Sociology. *Annual Review of Sociology*, **24**, 24, 1-24.
- Purvis, R. L. and Sambamurthy, V. and Zmud, R. W. (2001). The Assimilation of Knowledge Platforms in Organizations: An Empirical Investigation. *Organization Science*, **12**, 2, 117-135.
- Putnam, R. 1995. Bowling Alone: America's Declining Social Capital. *Journal of Democracy*, **6**, 65-78.
- Steensma, H. K. & Corley, K. G. (2000). "On the Performance of Technology-Sourcing Partnerships: The Interaction Between Partner Interdependence and Technology Attributes". *Academy of Management Journal*, **43**, 6, 1045-1067.
- Stein, E. W. and Zwass, V. (1995). "Actualizing Organizational Memory with Information Systems". *Information Systems Research*, **6**, 2, 85-117.
- Szulanski, G. (1995). "Unpacking Stickiness: An Empirical Investigation of the Barriers to Transfer Best Practice Inside the Firm". *Academy of Management Journal*, Best Paper Proceeding, 437-441.
- Szulanski, G. (2000). "The Process of Knowledge Transfer: A Diachronic Analysis of Stickiness". *Organizational Behavior and Human Decision Processes*, **82**, 1, 9-27.
- Teece, D. J. (2001). "Strategies for Managing Knowledge Assets: The Role of Firm Structure and Industrial Context". In Nonaka, I. And Teece, D.J. (Eds.), *Managing Industrial Knowledge: Creation, Transfer and Utilization*. London: Sage Publications.
- Tulving, E. (1983). "Elements of Episodic Memory". Oxford: Oxford University Press.
- Wah, L. (1999). "Behind the Buzz". *Management Review*, **88**, 4,, 17-26.
- Walker, G., and Kogut, B and Shan, W. (1997). Social Capital, Structural Holes, and the Formation of an Industry Network. *Organizational Science*, **8**: 109-125.
- Walsh, J. P. and Ungson, G. R. (1991). Organizational Memory. *Academy of Management Review*, **16**, 1, 57-91.
- Wenger, E. (1998). "Communities of Practice: Learning, Meaning, and Identity". Cambridge: Cambridge University Press.
- Wenger, E. and McDermott, R. and Snyder, William M. (2002). *Cultivating Communities of Practice: A Guide to Managing Knowledge*. Boston, Mass.: Harvard Business School Press.

- Woolcock, M. (1998). Social Capital and Economic Development: Towards a Theoretical Synthesis and Policy Framework. *Theory and Society*, **27**, 151-208.
- Wright, M. & Edwards, P. (2001). "Modes of Integration and the Diffusion of Best Practices in the Multinational Enterprise". In Taggart, J. H. and Berry, M. & McDermott, M. (Eds.), *Multinational in a New Era: International Strategy and Management*. Houndsmill, Basingstoke: Palgrave.