Winter 12-5-2004

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ABSTRACT

This paper analyzes how the web-based e-business solutions of three globally operating companies have served their organizational learning. The case companies represent metal and mining, pulp and paper machinery and pharmaceuticals industries. It can be concluded that while the e-business solutions may have been part of larger strategic development process, they were not originally designed to serve organizational learning. During the utilization phase, the learning opportunities had remained quite low or underutilized. However, all case companies had learned considerably as a by-product especially during the design and implementation phase. The study indicates that e-business solutions provide plenty of learning potential that should be taken into account in the design, implementation and utilization phases.

Keywords: e-Business, organizational learning, knowledge management, knowledge creation.

1. INTRODUCTION

Web-based e-business solutions enable efficient and intensive interaction with customers. They make possible to create personalized contents and various methods for producing, exchanging and collecting information. They help organization to reach its customers across time zones and geographic boundaries. These technologies also enable profitable solutions for a limited number of big customer firms, or for an unlimited number of individuals all over the world. The major motivation for firms to implement e-business solutions is to increase efficiency and service capability and to enable new kinds of business processes. It could also be assumed that web-based e-business solutions are used to facilitate organizational learning, knowledge creation and renewal that are increasingly important aspects for the firms' competitiveness. Firms could learn from their customers and markets by using information and knowledge that can be channeled through e-business solutions (Skyrme, 2001). However, it is not clear what are firms' real motivations, opportunities and methods to utilize e-business solutions for learning purposes. For this reason the research project "Strategic Management of Innovativeness, Renewal Capability and Knowledge, and the Role of e-Business" was established to study through selected case studies the following research question: *"How does a company learn and create new knowledge by utilizing e-business solutions?"* The purpose of the study was to create new knowledge and to facilitate learning from their experiences.

2. THEORETICAL APPROACH

The theoretical framework consists of an interpretation of the theory of self-producing systems (autopoiesis theory; Maturana and Varela, 1980; Mingers, 1995). The interpretation, living composition®, emphasizes the role of 'boundary elements'. They consist of various roles, functions and systems that enable the firm's interaction with its business environment, help to absorb and create knowledge, and facilitate organizational change, learning and co-evolution with the business environment (Maula, 2000). The web-based e-business solutions are studied here as such organizational boundary elements.

3. EMPIRICAL APPROACH: WEB-BASED BOUNDARY ELEMENTS IN THREE CASE COMPANIES

The empirical part of the study was conducted in 2001-2003 in three globally operating case companies that were selected among internationally recognized frontrunners in the strategic application of e-business:

- Outokumpu Copper Products OCP Europe – EPC Electrical Power and Components Unit.
- Metso Paper
- A pharmaceuticals company.

The three companies differ considerably from each other in their e-business solutions.

3.1 Outokumpu Copper Products OCP Europe – EPC Electrical Power and Components Unit

The core businesses of *Outokumpu Group* are stainless steel, copper products and technology. The company has customers in a wide range of industries: catering and households, building and construction, transportation, industrial machinery and equipment and electronics and communication. The company has 19,000 people in more than 40 countries. The Group's net sales is EUR 6 billion. *Outokumpu Copper* is one of the core businesses. Its net sales

cover 26% of the Group's sales. Outokumpu Copper is the second largest producer in the world in fabricated copper products. The company employs 7,600 people. It has production plants in 15 countries. The products include anodes, brass rod, profiles, rods & bars, sheets & plates, strips, tubes, welding products and wire. *EPC Electrical Power and Components Business Line* employs 400 people. It has 6 production plants in Finland, England and Austria.

EPC Electrical Power and ComponentsBusiness Linet has created a business-to-business extranet solution for its selected customers. Customer relationships are based on long-term contracts, and interaction with them is complex in nature. EPC Business Line started in 1995 to implement the New Sales Mode solution that included a salesman tool box and back office tools. Based on the experiences and new technological and business opportunities the company started in 1998 the development of the New Sales Mode Web (NSMWeb). The objective was to develop a Key Customer Relationship Management and Service System. The development of NSMWeb was a rapid process. It was part of a profitability development program and strategic masterplan that included both strategy specification and operational improvement. It was based on an analysis of the customer contacts and the work of sales persons.

One of the points of departure for the NSMWeb development was the general development of marketing in Outokumpu Group. It meant a change from production oriented to sales oriented and further on to customer oriented marketing methods. Moreover, at EPC the strategy was specified (vision remained the same) and operative systems, such as order/delivery process, were developed simultaneously. Customer management had high priority, and the sales processes were to be reorganized. The e-business solution was built on existing technology (Lotus Notes) and databases. It was to provide "bullet proof reliability" and improve the image of the firm.

The solution enabled the design of customized business processes. The objectives of the solution was the inquiry & order management for selected key customers. The purpose was to create tailored services and to generalize them later. The development occurred in intensive co-operation between the producer and customer and it aimed at win-win solutions and learning.

One of the major objectives included the transformation of routine sales work into technical services. As a result the roles of the salespersons were radically changed into expert role, and they were supported by NSMWeb solution and incentive bonus plans. The sales work, customer contacts and acquisition of new customers covered earlier only 20 % of the time of the sales persons. The objective was to increase it up to 60-70 % of their time, and the solution reached quite successfully these objectives.
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The development of the NSMWeb solution helped to understand the real needs of the customers especially during the design and implementation phase. EPC could intensify the discussion with the customers, which evoked ideas of new services and products, and new methods to speed up the deliveries. It improved the communication with the customers and made it deeper.

The new roles of the salespersons and the web-based solution constitute thus two kinds of boundary elements that have strengthened customer relationships and enabled efficient order management and integration to scheduling and manufacturing. They also improve customer service, knowledge management, and learning and renewal capability of the firm. The new role definition and NSMWeb solution are examples of boundary elements that help to manage internal and external complexity better. NSMWeb was later developed into the One Common Application.

3.2 Metso Paper

Metso Paper is a business area of Metso Corporation that is a global supplier of process-industry machinery and systems, know-how and aftermarket services. Metso has business operations in more than fifty countries. In 2002, it had 17 technology centers, 30 manufacturing units, 32 service centers and 25 sales subsidiaries. With corporate net sales in 2002 of 4.7 billion euros, Metso had approximately 30,000 employees.

Metso Corporation has as its strategic objective the transformation of the corporation into a networked and knowledge-based technology company. *Life cycle technology*, enabled by the Metso Future Care business concept, forms a central part of this strategy. Life-cycle technology is an umbrella term for RTD (research and technological development) projects based on process life cycle knowledge. It aims to improve the customers' profitability by managing the product life cycles and product-related knowledge. *Metso Future Care* provides a powerful framework for corporate-wide knowledge management and organizational learning. It is a business concept for creating new market potential. It aims at creating new ways of managing customer relationships and developing earnings logic by exploiting previously installed machines and delivered processes to add to the competitiveness of the customer. Over the years, Metso has marketed to its customers 2,000 paper machines, 800 pulp systems, 30,000 crushers, 15,000 screens and 3,000 grinders. In 2002, the main focus

was on after-sales services, remote diagnostics in maintenance, support of the customers in preparing investments, and customer relationship management.

Metso Paper (fiber and paper technology) is the world's largest paper and tissue making line supplier. It covered 38 % of Metso's net sales in 2002. It also has a strong position as a supplier of pulping equipment and systems for the fiberboard and converting industries. In other words, Metso Paper designs and manufactures pulp and paper industry processes, machinery and equipment. Moreover, it provides expert services for developing customers' production processes. Metso Paper has several engineering and manufacturing locations and customers all over the world. Metso Paper's business lines include paper technology, pulping technology, and other businesses.

Metso's e-business solutions can be seen in a broader framework in which both interaction with customers and individual transactions form part of a corporate-wide strategy, customer-wide life-cycle and supplier-wide partnership. In-depth know-how concerning the customers' industrial core processes across the businesses, and the development of value-enhancing solutions necessitates an efficient reciprocal boundary (interface) between the customers and Metso. Specifically, the portals play a central role in organizational learning and knowledge management. The portals not only support internal and external users but also facilitate interaction with customers and suppliers.

Metso Portal is an extranet service that supports the businesses of pulp and paper industry customers. It is a coordinated Metso-wide project, providing an easy doorway to the services of Metso Paper, Metso Automation and Metso Drives through a single log-in. Metso Portal is not a marketplace, but rather enables interaction with the customers, complements other customer-contact channels, and provides a platform for new services. The portal service was started in 2001, and by the beginning of 2002 had over 400 customers using the service (Suvanto, 2002).

PartnerWeb is a tool for the engineering and manufacturing partner network, initiated by materials management. Technically, it utilizes Notes databases and web browsers. PartnerWeb provides several benefits. It improves the flow of information and allows the follow-up of delivery schedules. Engineering and manufacturing instructions are easier to update. PartnerWeb also improves the processing of revisions and claims. Process costs have been reduced at both ends, and document turn-around time has become shorter.

The new r*emote diagnostics* centers in Finland, Sweden, and the USA serve pulp and paper industry customers globally. The remote diagnostics solution involves monitoring, measuring and analyzing various aspects of the processes and machinery with ICT technology from a distance. Service is no longer bound by location. Remote diagnostics tools provide the following benefits: efficient utilization of expertise, reduced traveling, more efficient working time and screening of the essentials from the data.

Especially the portals have contributed to organizational learning and knowledge management at Metso Paper. The implementation phase has provided opportunities to learn about the customers. Also during the utilization phase they facilitate the accumulation, exchange and creation of knowledge. Information about the customers is collected in databases and utilized interactively by the customers and the corporation. Metso's portals help to develop new products, operations and market position. The PartnerWeb supports internal and external users and facilitates interaction with suppliers.

3.3 The Pharmaceutical Company

The Pharmaceutical Company is a globally operating healthcare company that manufactures and markets pharmaceutical products and services. The company has production facilities in almost ten countries, and affiliates or offices in about 70 countries. The Pharmaceutical Company reaches out to almost 200 countries around the world. The company has about 20,000 employees. It is a world leader in the care of one serious illness and also has a leading position in some other pharmaceutical product areas. The illness can occur at all ages and it is becoming increasingly common in developed and developing countries.

The company has implemented comprehensive web-based solutions that are centrally coordinated, locally maintained, and enable interactive communication between the company, consumers and professionals. Development of these solutions has resulted in much of the tacit knowledge becoming explicit. The e-business strategy of the company consists of three focus areas: (1) the websites for patient communities and professionals, (2) corporate communication, which covers the corporate site and all the affiliates, and (3) the websites concerning the products. The focus in this paper is on the first focus area. The web solutions have facilitated interaction with consumer and professional communities. Many parties outside the company have thus become more firmly involved in the learning processes and have gained the opportunity to improve their knowledge.

Although the content of the solutions is basically local, it is based on shared, centrally created structures and principles. The strong orientation towards localization allows for differences in culture and lifestyle, regulations, logistics, and other relevant aspects.

The websites for patients and patient communities are open to anyone in about 20 countries. They do not include any recommendations for the patients. Instead, they provide patients with tools to keep better track of their condition, such as 'Living with the illness' sites for sharing experiences, personal profiles, diary and scorecard for keeping track of the development of the person's own illness. All recommendations should come only from their own personal physician. The solution includes many kinds of applications that provide information for the patient. Examples of them are a library, dictionary (the medical words people don't understand), 'ask the experts' sites, an expert panel, a game for smaller children, and a jeopardy about the illness.

The "Illness information for the professionals" website is offered as a service from the company to health care professionals, such as physicians, nurses, pharmacists, and trainers. The site contains professional information and research, such as up-to-date medical information, educational resources, and the latest research in the illness. An editor reads through medical journals and creates a short calendar describing events and current debate within the field. An abstract database allows physicians to search in journals for abstracts. The site also includes praxis tools and a monthly newsletter co-edited by an in-house doctor, a medical advisor.

The Pharmaceutical Company is a knowledge-intensive company. The success of the company is based on the development and application of explicit scientific knowledge. However, also market knowledge and the understanding of the customer needs are important for the success of the firm. The development and maintenance of the websites have facilitated organizational learning in several ways on local and global levels. The development of the products occurs through a long and complex procedure overseen by R&D specialists. Through the web solutions, The Pharmaceutical Company has become more aware of its business environment and of many changes occurring within it. During the implementation of the web solutions, a large amount of knowledge that was previously in tacit form has now become explicit. This has facilitated organizational learning at the coordinating and local levels. For example, the creation of community sites has made the eBusiness Department and the affiliates more sensitive towards the different perspectives of the various customer groups and professionals, and of the cultural and regulatory differences.

The Pharmaceutical Company's web solutions also facilitate interaction within the consumer and professionals' communities, and promote their educational aim. These solutions have thus allowed The Pharmaceutical Company to reach many parties outside the company, to more tightly connect them to the learning process, as well as provide these stakeholders with an opportunity to improve their knowledge. The websites serve as interactive boundary elements that help to distribute knowledge between the firm, user communities and professionals, as well as to monitor and collect information. The solutions facilitate the utilization of experts and opinion leaders within and outside the company.

The sites provide access to an extensive amount of data. However, the capability of the solution has not been fully utilized. Many regulations prevent the firm from using the information and knowledge produced by the system. Even that information which could be used within the confines of the regulations has not been very efficiently utilized. The legally available data has great potential as a source of organizational learning on global and local levels for market analysis, product development and other learning purposes. This potential has remained underutilized mainly due to the absence of a shared explicit framework or concept of organizational learning. Such a framework would help to coordinate various processes, knowledge resources and ICT systems to facilitate the learning process.

4. COMPARISON AND SUMMARY

The results of the research project are summarized in Table 1 in the last page of this paper.

This paper analyzes how three globally operating companies have utilized their web-based e-business solutions for organizational learning. The case companies represent metal and mining, paper machinery and healthcare industries. All companies are among global market leaders in their industry. They differ from each other as to the type of customers (industrial, consumers) and their number (tens, hundreds, hundreds of thousands / millions). The solutions depend, for example, on the type and life-span of the product. In the metal industry company the sales is based on annual agreements with relatively few clients. Each individual sales activity of the products requires complex calculations and expertise. The e-business solutions are targeted to facilitate the sales process and to provide information about the products to the customers.

In the paper machinery company the products are very complex technical systems that may consist of hundreds of thousands of parts. The life-span of the product may cover tens of years. There is increasing need for faster design and delivery of the product and many kinds of services. The purpose of the e-business solution was to enable extended collaboration between the company and its customers and partners. The collaboration was enabled through a network centered around the case company as a business hub. Technically, the hub was based on the Internet and it

connected the customers' and partners' devices and solutions with the company's own systems and networks. Life-cycle thinking was developed on the corporate level to highlight the need for long-term partnerships, continual and accumulating learning, and the transformation of reactive services towards preventive and further to proactive type. The corporate Internet portals supported remote diagnostics, proactive services and integrated business solutions.

In the pharmaceuticals company the products are sold to millions of customers. However, the sales depend on various kinds of medical experts. The patients use the medicine daily, normally throughout their lifetime. The treatment of the illness requires education of the patients and experts. Because of many local legal restrictions that vary country by country the e-business solution cannot be used as a direct sales channel. Instead it is used mainly for education, for providing information and creating communities among patients and professionals. The solution is interactive, but the legal aspects restrict the storing, analysis and utilization of the data for learning purposes.

While the development of e-business solutions may have been part of a larger strategic development process, they were not originally designed to serve organizational learning and knowledge creation. The solutions targeted mainly to providing information to the customers, not to providing information about customers and market to the case companies. However, the study shows that web-based e-business solutions can create many opportunities for organizational learning. All three companies had learned considerably as a by-product. Learning had occurred mainly during the design and implementation phase because then the company was compelled to transform tacit knowledge about the products, company itself and the customers into explicit form and to share it within the company and among various partners. As to the utilization phase of the e-business solution, the learning opportunities had remained quite underutilized. Information that is channeled through the e-business system is used mainly for operational purposes. It is not consciously collected, analyzed and transformed into new organizational knowledge.

The study indicates two major aspects that could be taken into consideration. First, the emerging learning opportunities during the design and implementation phase could be utilized more consciously. In the case companies the learning occurred as a by-product. Second, the e-business solutions could be designed so that they help to absorb new knowledge about the market and customers continually and to transform it into organizational leaning, renewal and competitiveness.

5. BENEFITS OF THE RESEARCH PROJECT

The research project analyzes the role of e-business solutions from new angles, the ones of organizational learning, renewal and knowledge creation. These aspects have not been the main objectives for the firms when planning the solutions. The study also provides empirical evidence about boundary elements, and thereby helps to develop further the theoretical and methodological living composition® framework.

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INTERVIEWS

Juhani Horelli, Manager, Portal Solutions, Metso Paper

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Ismo Rautiainen, President, Telecommunications and Electronics, Perlos Corporation. *Earlier:* Managing Director, OCP Drawn Products Unit (1995-1997) and Business Development Manager, Outokumpu Copper (1999-2002)

Web-specialists of the Pharmaceutical company.