

# **Enhancement of Knowledge Sharing via Enterprise Portal in Network-Based Knowledge Society**

**Xiuhua Zhang**

Norwegian Computing Center

Gaustadalléen 23, Post Office Box 114 Blindern

N-0314 Oslo, Norway

Telephone: +47 22 85 25 00 Fax: +47 22 69 76 60

## **Abstract**

Our society has become a network-based knowledge society in which data, information, knowledge, human beings and organizations are connected and integrated without restricting to organizational and national borders. The networked knowledge provided by Internet has given tremendous impacts on our society, our everyday and professional life. Prerequisite for the impacts is that information and knowledge integration works satisfactory. On the basis of a discussion of basic concepts such as data, information, knowledge and business processes, the semantic integration and information usefulness are considered as the most crucial factors. An enterprise portal focuses the enterprise and Internet resources most important to users in a single Web page, a very easy way to obtain knowledge. Developing an enterprise portal is a way to manage the enterprise knowledge and offer inside and outside users to share their knowledge bases, applications and other enterprise resources one the one hand, and combine all resources to deliver personalized content based on what each user is actually doing. Enterprise portals act as the gateway between the Internet and myriad proprietary networks. Enhancement of knowledge management at the enterprise's level could contribute to the knowledge sharing in the network-based society. Using knowledge management tools, content and knowledge can be easily published and integrated into a computer network to enable the knowledge to be shared widely.

## **1. Introduction**

Knowledge and knowledge management have ever become so important for individuals and enterprises while the development of the society has ever developed and relied on the knowledge that much, on the one hand, knowledge capture has ever become so easy on the other hand. The involvement of people and process indicates that the application of technology should be suitable for people and process also. With the increase of amount of knowledge and applications, having an easy way to sharing knowledge is essential because knowledge management should aim at knowledge sharing. Portal technology can be regarded as one of such technologies, which provides people with integrated knowledge and applications. This paper addresses how knowledge management takes place in practice and how to use the portal technology to enhance the knowledge sharing by reflecting changes of knowledge in a dynamic environment.

## **2. Knowledgeable, Intelligent People and Knowledge Society**

A Chinese proverb says that the intelligent people know everything without going out home. It reflects a big expectation of people for something that can bring them knowledge to home. In the old time, only a small number of populations could be regarded as such intelligent people. It's hard to become an intelligent person. By Chinese definition for the intelligent people, they must be knowledgeable and know much more than what the ordinary people do. The knowledgeable is dedicated to those intelligent people. Knowing a lot is another characteristics of the intelligent people. There is no doubt that education is one of the factors to promote people intelligent and knowledgeable in the long history of human society. It is easy to associate knowledge with academic success. Those who attend university and get the best pass grades in examinations may be thought of as the most knowledgeable people. People who consistently do well in the pub quiz may also be thought of as knowledgeable. To some extent, it is education first and experience then that promoted people knowledgeable and intelligent. The biggest difference between the old time and today's society lies in how people become knowledgeable and intelligent. In the modern society, it's very easy to know many things without going out home. According to this classification, there will a big number of populations who can be regarded as the intelligent people.

### **Knowing and Knowledgeable**

The intelligent people have the capacity to know better than other people do. Thus, they can be regarded as knowledgeable. Knowing is the first step to go one step further, the knowledgeable. What they know could be about things that the most people don't know. Knowledgeable is about knowledge they have learnt and inherited from earlier generations or experience. By making differences between the knowing and knowledgeable, we found that in nowadays society, not only the intelligent people but also the normal ones have such knowing ability if they are connected to the Internet, say by a computer, anywhere even at home and anytime, because all happenings can be seen or read from the computer or other devices. The technologies applied in the society aid people easily get to know something. Knowing something becomes an easy thing to do, whereas the capacity for being knowledgeable differs from people to people. The ways people gain knowledge have been changed dramatically. We have the possibility to know a lot through difference channels and devices. The progress made in the society offers equal right to all people to become knowledgeable, but not everyone can. Knowledge has very much influence on our society not only at an individual level but also at a social level. It requires more people to be knowledgeable and makes more people live with their knowledge and rely on it. This should be seen as one of major features of our knowledge-based society. We have never felt so free and easy to know what we want to know just through any available device such as a computer or even a mobile phone.

Today, we can search and acquire information and knowledge just simply as using a web browser or other devices. The technology has changed the way we become knowledgeable, the way we gain and use knowledge, and the way the knowledge is shared and distributed in the society. As technologies provide new ways to access knowledge, we could utilize and transfer knowledge in new ways also. For instance, due to the development of XML, computerization of knowledge resources can be realized. As a

consequence or the next step, it will be an urgent priority to turn information resources into knowledge resources to utilize them.

### **Network-based Knowledge Society**

No matter what we call our society either the network-based society or the information society, knowledge itself takes on a more significant role in the society. A network society is a society where the key social structures and activities are organized around electronically processed information networks (Haynes, 2003). According to (Amenomiya, 1996), Advanced Network Society means that the infrastructure of the society is an advanced information network. So it's not just about networks or social networks, because social networks have been very old forms of social organization. It's about social networks which process and manage information, and are using micro-electronic based technologies, as pointed out by (Castelles, 2001). New information and communication technologies will enable procedural simplification and integration based on real time, transparent information transfer, as well as management of costs over the lifecycle of buildings and infrastructure. The shift to the information society reshapes conventional value chains in all areas of businesses. Therefore it is proper to call our society network-based knowledge society by combing the technology aspect into the social context.

In spite of the difficulty to define a Network-based knowledge society, the following characteristics could reflect the significant features of such a society. They include:

- Moving information from one system to another one. Information and system integration turns as a key issue of systems development where semantic integration seems more interesting for human beings to directly utilize shared knowledge on the web. The society emphasizes on the knowledge and information causing a “paradigm shift” in social and economic relations.
- From function-oriented organizations to process and customer-oriented organizations. This indicates that business processes oriented towards legacy issues can be carried out almost automatically in the network-based society, giving more time for establishing relations and creating values.
- From satisfying public needs to satisfying individual needs. There will be more need for personalization and security, i.e. secured information dissemination in the digital environment where global communications transcend national and organizational boundaries. The “post-industry society” (Bell, 1974) is characterized by the individualized knowledge-adept social actor. The “third wave” (Toffler, 1984) represents an era of leisure and rise of ‘knowledge economy’.
- From face-to-face communication to web-based communication and collaboration. Communication and solidarity will be the main uniting forces. Web-based communication includes either synchronous and asynchronous communications or face-to-face and distributed communications.
- From the technical focused to the social interactions. The usefulness of the information is very difficult to measure but it is beyond all doubt that the usefulness is the very base for all information processing.
- From single function provision to application service provision and value-added services. Knowledge about how work gets done has huge financial ramifications.

### **3. Knowledge, Knowledge Management and Knowledge Sharing**

Knowledge is a widely used term in our society. However, knowledge management has been accepted as a new concept in the 90s of last century. In fact, it has a historical long tradition, which can be traced back to the history since human beings have created knowledge. New meaning has been added into these concepts as advanced information and communication technologies are applied in the area. One difference between the knowledge management of many years ago and that of today is that many tools are being developed to help in the complex task of capturing knowledge from people and representing it in the ways that are accessible to other people for their effective use.

## Knowledge and Enterprise Knowledge

Knowledge is becoming a more significant concept in modern life including professional life and private life. It is a concept that is closely relevant to concepts such as the intelligence and the knowledgeable historically from the old time, and data and information from the information and communication technologies used.

From the historical point of view, the Collins Dictionary of Artificial Intelligence states that knowledge includes facts, beliefs and heuristic rules. More standard definitions for knowledge found in Artificial Intelligence texts are similar to the one found in (Graham & Jones 1988). This explains knowledge by pointing out that data can be a number (31.8°C), information provides context to data (31.8°C at Bergen, July in 2003) whilst knowledge is more (31.8°C is the record high temperature at Bergen in the last hundred years. High temperature is one of consequences of global warming). However, for the purposes of knowledge sharing, there are some useful observations that can be made.

- Knowledge must be true
- Knowledge should and could be justified
- Knowledge does not have to be complex although much of it is

The three statements identified above have implications for knowledge management. For instance, if a company knowledge archive is created and there is no way of preventing things that may not be true getting into the archive then statement 1 is not satisfied. Even worse, at some time in the future the knowledge archive may become worthless, containing as much that is not true as things that are true. In other words, the shared knowledge should be protected from failure. A knowledge archive that provides no justification for pieces of knowledge may also be of little use to the human users of the archive. A justification may set important constraints on the truth of the knowledge that would prevent it from being used in an inappropriate context.

From the technical point of view, knowledge is better understood as a product and a process (Hansen et al. 1999). The "product" view implies that knowledge is a thing that can be located and manipulated as an independent object. Proponents of this approach claim that it is possible to capture, distribute, measure and manage knowledge. This approach mainly focuses on products and artifacts containing and representing knowledge; usually, this means managing documents, their creation, storage, and reuse in computer-based corporate memories. This approach is also referred to as 'content-centered' or 'codification' approach by referring them to enterprise repository.

The "process" view puts emphasis on ways to promote, motivate, encourage, nurture or guide the process of knowing, and abolishes the idea of trying to capture and distribute knowledge. This view mainly understands knowledge management as a social communication process, which can be improved by collaboration and cooperation support tools. In this approach, knowledge is closely tied to the person who developed it and is shared mainly through person-to-person contacts. The main purpose of information technology in this case is to help people communicate knowledge, not store it. IT tools in this case comprise e.g., e-mail, real-time chat and web awareness tools, video-conferencing, workflow management systems, systems for the distributed authoring of hypertext documents, group-decision support systems, etc. This approach has also been referred to as the 'collaboration' or 'personalization' approach.

Therefore, knowledge in this study is defined as the interpretation from information and data or the abstraction of discrete facts and things. Enterprise knowledge is devoted to address the knowledge that belongs to the enterprise and stored in by enterprise application systems. Such knowledge will be eventually shared by people inside and outside enterprises regardless where they are and when they connect to the system. Knowledge management manages the changes in knowledge creation, whereas knowledge sharing is always a goal to achieve for knowledge management. Knowledge should be thought of as a strategic asset, which is an essential organizational component. The strategic nature of knowledge means that it must be part of the decision making process during the management of change.

## **Knowledge Management**

By following the definition of knowledge above, knowledge management can be defined as a process to manage information and knowledge asset of the enterprises. Knowledge Management is the process by which a company both values its knowledge resource and seeks to manage it effectively within the main stream of company activities.

Knowledge Management is primarily focused on knowledge possessed by people. Most commentators on knowledge management also include systems that store and process information, such as databases, knowledge bases and distributed information systems. To fail to account for knowledge during managed change can lead to serious problems. Unless one is managing knowledge, one is very probably not managing change. Therefore, we view knowledge management at a strategic level - a level that does not require precise detail but which can provide decision support during the management of change.

Technology and information systems develop very quickly. Knowledge of their potential application and their operation has to develop in step with these improvements. Organizations are no longer as stable as they used to be. There is a rapidly shifting world of created and recreated organizations, or structures within organizations that disperses the articulated knowledge around the company. As organizations reduce their headcount, knowledge (articulated and tacit) moves out of the organization). Consequently the deep knowledge about the organization (the tacit knowledge) is less strong, and the articulated knowledge can be diminished and weakened.

## **Knowledge Sharing as Aim of Knowledge Management**

A knowledge sharing system is the application and integration of the principals of knowledge management, relational database technologies, distributed and collaborative computing, and the Internet. The purpose of a knowledge sharing system is to convert individual or local knowledge into enterprise knowledge that can be easily managed and effectively utilized by its users to achieve organization's strategic goals.

It is often said that it is essential to create a "Knowledge Sharing Culture" as part of a knowledge management initiative. An isolated knowledge management programmed looked after by a privileged few is a paradox in itself and will not survive for long. Only effective collaboration and communication which spans across the whole company structure will give knowledge management the boost it really needs (Gurteen, 1999).

In its broadest form, knowledge management is the identification, storage, transfer, diffusion, measurement, creation, and use of knowledge throughout an organization. It does not focus on databases or information technology, although it may use both. It does focus on people and process. Its concern is with the knowledge of the organization: creating, storing, protecting, disseminating and applying it.

## **Knowledge Management as Change Management**

Change is always the fact we have to face and handle. Knowledge management (system) offers a systematic way to manage changes occurred in the organization, which are usually turned as the knowledge. Often, we tend to resist change rather than embrace it. Knowledge management should reflect the changes in knowledge itself. This means that the new knowledge should be available to the users when it is created and integrated into the system, which requires quickly access, integrate and act on the new knowledge.

Today, the creation and application of new knowledge is essential to the survival of almost all businesses. Organizational culture can be thought of as a relatively rigid tacit infrastructure of ideas that shape not only our thinking but also our behavior and perception of our business environment. It effectively establishes a set of guidelines by which members of an organization work and how those organizations are structured. It

is rigid mainly due to our paradigms - we don't recognize why we do so much of what we do. There are many reasons for this. Some of them can be found in Gurteen (1999). They include:

- Intangible products like ideas, processes, and information are taking a growing share of global trade from the traditional, tangible goods of the manufacturing economy.
- Increasingly the only sustainable competitive advantage is continuous innovation, the application of new knowledge.
- Increasing turn over of employees. People don't take a job for life any more. When someone leaves an organization their knowledge walks out of the door with them.
- Many big and small organizations do not know what they know. Expertise learnt and applied in one part of the organization is not leveraged in another.
- Accelerating change - technology, business and social. As things change so does our knowledge base erode - in some businesses, as much of 50% of what you knew 5 years ago is probably obsolete today.

### **Challenges of Knowledge Management**

Corporations around the world are confronting and accepting the challenge to manage the sharing of knowledge inside and outside their walls. The challenges of knowledge management are big, but so are the rewards. Tighe (2003) has figured out those challenges below.

- *Getting Employees on Board*  
Employees as individuals in the enterprise have their own knowledge and experience. The major problems that occur in knowledge management usually result because companies ignore the people and cultural issues. In an environment where an individual's knowledge is valued and rewarded, establishing a culture that recognizes tacit knowledge and encourages employees to share it is critical. The need to sell the knowledge management concept to employees shouldn't be underestimated; after all, in many cases employees are being asked to surrender their knowledge and experience - the very traits that make them valuable as individuals. Ideally, participation in knowledge management should be its own reward. If knowledge management doesn't make life easier for employees, it will fail.
- *Allowing Technology to Dictate Knowledge Management*  
The concept of knowledge management has been accepted and applied widely in enterprise businesses. This can give us wrong impression that the knowledge management is based on the technology. While technology can support knowledge management, it's not the starting point of a knowledge management program. Make knowledge management decisions based on who (people), what (knowledge) and why (business objectives). Save the how (technology) for last.
- *Not Having a Specific Business Goal*  
A knowledge management program should not be divorced from a business goal. While sharing best practices is a commendable idea, there must be an underlying business reason to do so. Without a solid business case, knowledge management is a futile exercise.
- *Knowledge Management Is Not Static*  
As with many physical assets, the value of knowledge can erode over time. Since knowledge can get stale fast, the content in a knowledge management program should be constantly updated, amended and deleted. What's more, the relevance of knowledge at any given time changes, as do the skills of employees. Therefore, there is no endpoint to a knowledge management program. Like product development, marketing and R&D, knowledge management is a constantly evolving business practice.
- *Not All Information Is Knowledge*  
Companies diligently need to be on the lookout for information overload. Quantity rarely equals quality, and knowledge management is no exception. Indeed, the point of a knowledge management program is to identify and disseminate knowledge gems from a sea of information.

Here they have been regarded as common challenges for knowledge management in organizations. In addition to the above, we found from our practice that influence of knowledge management on organization culture is a challenge also. More discussion is given in the following section. Shall we build up an intelligent organization and how?

### **Knowledge Management at NR**

Norwegian Computing Center (Norsk Regnesentral in Norwegian, NR for short) is a research institution running as a private foundation. NR has focused on applied research on information technology and statistical analysis and modeling such as communication security, multimedia and multi-channels communications, remote sensing and statistical modeling as well. This makes NR a knowledge based organization to invest knowledge management at a strategic level in order to achieve more effective communication and collaboration with inside employees and outside customers because NR has to reply on external research and consulting projects to survival economically.

NR has 50 years long history, in which NR has been changed quite a lot. Currently, it is organized in a rather dynamic way to perform better in undertaking different projects. Briefly, it's built up on project- and team-oriented working style, even administration work and their service to the research departments has been organized in projects. This requires more cooperation and communication cross three research departments and a technical support department, each of which has its own research focuses. Knowledge management relevant to project work include mainly how to manage intangible products, how to make information flow move efficiently and effectively, how to cooperate with outside customers and how to share NR with new employees and how keep and maintain the knowledge no matter who is leaving etc. Project management covers project idea formulation, application proposal provision and project partner searching and smooth project performance and project results delivering. An intern web was used as a knowledge management tool against other standard applications like documentation, correspondence and others. The cooperation between the departments turns success. But there is still a problem for researchers to find out the information they need. Some projects have been badly documented because there is a no proper tool than a file system used. Beyond above, another problem arises. NR as an "old" organization, its culture and tradition are shrinking down in terms of social environment. Both leadership and employees have noticed this problem in the last years because the hard competition in applied research market.

An enterprise portal to all standard applications was suggested to support the best practice at NR to meet the employees' needs and solve the problems in knowledge sharing and project management. Before the development, NR has organized a number of discussions with its staff to figure out what NR's needs in knowledge management, what tool and platform is suitable for NR. The requirements from the discussion were documented as "need to have" and "nice to have". The "need to have" requirements for the new technical solution mainly include: internal and external news publishing, provision of project cooperation support tool through this one-stop access, particularly the cooperation with inside and outside partners in project implementation to increase the contacts with customers, forum functionality, internal resource management like CV profiles, calendaring, integration with current applications, and information search as well. First version of the portal has been developed and tested based on the "need to have". The "nice to have" requirements like common resource (conference room and device booking on-line system management, accounting system integration and so on) will be implemented in the second version or later. The enterprise portal is one way to show the intelligent face of the organization, while how individuals' intelligence could be integrated into the organization intelligence and how the individuals like employees feel about their organization intelligence are still under explosion. In the network-based knowledge society, it's inquired for both intelligent and knowledgeable persons as described earlier by The Chinese proverb and intelligent organizations whose knowledge is an important part of the society knowledge and should be shared.

### **Organization Culture as Part of Knowledge Management**

NR's experience in knowledge management gives us some thought, how to remain and update organization culture with assistance of knowledge management. We have noticed that knowledge management has

become a strategic plan undertaken in organizations. So has NR. Organization culture is certainly part of its strategic plan. Some features of organization culture like closer cooperation with colleagues could vanish and other features like remote access regardless space and time, and mobilized working style could be brought in when the new tools offer people more interaction with systems. A creative approach to knowledge management can result in improved efficiency, higher productivity and increased revenues in practically any business function. There is no exception for NR. For the organization, relationships between customers, employees and consumers can quickly grow deeper and broader in a network-based knowledge. Innovation is increasingly a collaborative discipline, creating a whole new world of intellectual property issues. To get the most value from an organization's intellectual assets, knowledge management practitioners maintain that knowledge must be shared and serve as the foundation for collaboration. The community-based collaborative environment like BSCW<sup>1</sup> taps the Internet to deliver organization wide Web-based knowledge-sharing capabilities. Yet better collaboration is not an end in itself. Enabling connections between employees is of little use unless they are willing to collaborate by sharing knowledge and actively working together.

Today, an organization is its presence in the flow of information and ideas, in which marketing, customer feedback loops, and knowledge must all be connected in rich networks. According to Dawson (2002) business is now conducted in the flow economy, which is the convergence of every industry that is driven by the flow of information and ideas. The distribution of digital content, including entertainment and high-value information, is quickly shifting, while the world of services is already an intrinsic part of the flow economy. Organizations should begin by identifying the informal communities, that is, the groups that communicate and get together for no other reason than because they find it a valuable part of their work and personal development. They often don't think of themselves as communities, but they're likely to be quietly doing marvelous things for the organization. In the network society, no single can exit without connecting to the others in one way or in another. So is the organization. The appearance of virtual community is a good example. Any single organization will not implement everything that is covered by the term knowledge management. What is important though is that the organization identifies a real need for knowledge management and is clear about what is to be solved, improved or changed by knowledge management.

#### **4. Enterprise Portal for Knowledge Sharing**

By an enterprise portal, we would define it as a gateway and web applications that provide users with a quick, flexible gateway to corporate data. Enterprises are now investing directly in new approaches to the management of knowledge and are beginning to appreciate its significance. Developing different kinds of portals is one of them. In Rudy and Christopher (2003), an enterprise portal has viewed as a core component of software architecture-the universal interface for enterprise applications. That puts portal development plans center stage in overall enterprise technology strategy, and it raises the stakes for software suppliers to extend deployment and integration platforms with a standards-based presentation layer. Enterprise portal can reflect the changes in enterprise knowledge through its integration mechanism. As a gateway, it brings people together and connects different applications into one single access.

##### **Relationships between Knowledge and Portal**

Knowledge is about know-how, know-why, know-what and know-where (Gurteen, 1999). Knowledge is often seen as a rich form of information. It is important to notice that we need information in order to make knowledge utilized effectively and productively. Here, we could use tool metaphor to explain the relationship between the knowledge and portal.

A tool could aid people to achieve a result or a goal. A result will be that the nails are placed in the place they should be when we hammer nails with a hammer. The result can be seen as a goal, too. The result is consistent with the goal. Both of them are to have nails in place. A portal, to some extent, functions a tool

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<sup>1</sup> BSCW (Basic Support for Cooperative Work) enables collaboration over the Web. For more information, please see <http://bscw.gmd.de/>.

for us to obtain knowledge and information from data. A goal is to gain knowledge from information search, one of major functions of a portal. We achieve the goal when we get the right information and knowledge. What we understand, learn and share is the knowledge, but not data. As we read a book to absorb knowledge, we read a portal to gain knowledge also. Here, the portal is viewed as an electronic book. Developing an enterprise portal is to provide users a tool to gain the knowledge and information they need. That is the right information at right time to right people. Better management of knowledge within the enterprise will lead to improved innovation and competitive advantage. The goal can be set up better utilization of internal and external knowledge.

### **Knowledge Management and Collaboration as Core Functions of Enterprise Portal**

Davenport and Prusak created the term knowledge management in 1995 to make sense of a number of trends that were emerging in businesses following the disruptive stage of "re-engineering the corporation". Knowledge management has provided a common language set for multidisciplinary projects that support how people work - access, create and share knowledge - with systems and how organizations can leverage the knowledge for competitive advantage. The next stage of knowledge management is emergent - from the properties and activities that are already in place: networked architectures, models for community development and collaboration, from the application of complexity adaptive systems theory to knowledge and learning (Anklam, 2002).

### **Enterprise Portal as a Platform for Knowledge Sharing**

Now an enterprise portal is part and parcel of the technology infrastructure, an infinitely customizable view into the real-time information, applications, and processes of the enterprise. Nor is it a single piece of software, but a complete environment including the architectural framework for building portals, an expansive set of portal services for specific functions, a set of development tools, and an administration console. In brief, portal technology has been developed from information provision through application integration to process management. In each development, knowledge management system has respectfully focused on document systems, systems/application integration and workflows.

Building new knowledge-based systems today usually entails constructing new knowledge bases from scratch. It could instead be done by assembling together reusable components. System developers would then only need to worry about creating the specialized knowledge and reasoners new to the specific task of their system. Their new system would inter-operate with existing systems, using them to perform some of its reasoning. In this way, declarative knowledge, problem solving techniques and reasoning services could all be shared among systems. This would facilitate building bigger and better systems cheaply. The infrastructure to support such sharing and reuse would lead to greater ubiquity of these systems, potentially transforming the knowledge industry. Definition of conventions enabling sharing among collaborators is the essential first step toward these goals.

### **Different Ways to Increase the Knowledge Sharing via Enterprise Portal**

The enterprise portal can help inside and outside users communicate knowledge. This can be seen as knowledge sharing activity in the enterprise context. Knowledge sharing can take several forms. An organization could invest in a system for a centralized computerized knowledge resource that employees can add to and interrogate. This could mean that employees applying knowledge can get support at any time for a central database. We would rather see this as the utilization of information and data. Systems like this are now readily available and have proven track records. They will often solve many business knowledge related problems and will also ensure that the organization itself is better protected against knowledge loss. Some systems also allow for an expert in a knowledge area to be located and contacted by someone with a particular problem. This is not the same as document storage but can be very effective in some cases. It should be remembered however that document systems themselves, although useful, do not archive knowledge, just information.

The role of knowledge within organizations is becoming more vital as technology to effectively manage that knowledge becomes more widespread. Knowledge management systems offer an environment for organizations to manage their information assets (e.g., documents, databases, etc.). Existing knowledge management systems passively employ knowledge by querying a database, showing a document, displaying a Web page, etc. Knowledge management systems can be extended to incorporate active components, such as expert systems and business rule systems.

### **What an Enterprise Portal Is and Is Not?**

In summary, enterprise portal like other applications can lead to the effective knowledge sharing through knowledge management systems. We can conclude the followings according to our portal development practice.

- Enterprise portal is a way to manage enterprise knowledge including information and data assets, but not the only way to share knowledge. To manage knowledge we have to start with information and data. This indicates that knowledge comes from information and data processing;
- Developing an enterprise portal is a knowledge management decision on how to share enterprise knowledge, but not a decision on how to manage changes occurred in the enterprise;
- Enterprise portal is a way to reflect changes in enterprise knowledge asset, but not a way to create knowledge;
- Enterprise portal is a tool to make the process work properly, but not the process itself although knowledge has been regarded as a process in Section 2;
- Enterprise is a search engine to seek the enterprise -wide findings, but not the way to conduct findings;
- Enterprise portal provides a means for communication and collaboration in order to improve knowledge sharing both inside and outside enterprise with a single access to enterprise knowledge and applications, but not the only way for communications.

## **5. Conclusions and Further Research**

Knowledge sharing is not only a technical issue, but also a social one. Therefore they should be concerned in developing an enterprise portal that provides a platform for knowledge sharing.

1) Evolving the intranet into a corporate portal. Corporate portals link organizational intranet, extranet, and website systems together and provide real-time access to information and knowledge as and when users require it. Organizations should evaluate their business strategy and technical infrastructure and then make the decision whether they can migrate from an intranet to portal capability and how.

2) Although we encourage and plan knowledge management systems to manage the enterprise knowledge, knowledge specially the tacit/implicit knowledge is difficult or impossible to manage. Only data and information can be managed in database and information systems. Assume that the tacit knowledge can only be shared via face-to-face communications, what we share through the portal is the constructed information, if it can be called knowledge, which has been constructed and managed in one form/format or another. Users interaction and interpretation is needed for knowledge sharing. In general, knowledge can be shared broadly if information or data can be organized and managed better.

We have created a virtual world on purposes and by information and communication technologies in parallel to our real world we lived with for thousand years. Take education as an example. Teaching and learning in a physical environment are traditional means to transfer and obtain knowledge, which mainly involves face-to-face communications, whereas e-learning in the virtual classes is about knowledge sharing in a well-organized learning environment, a virtual space for learning. Using portals to share enterprise knowledge is an e-learning alike process, in which what people get is what the system offers. Therefore, the organization of knowledge beyond the content itself can make the differentiations for people to share the knowledge. How to distribute and share knowledge in the virtual world still needs further study.

3) In the network-based knowledge society, knowledge comes from the network possibly by any device via multiple channels. The Internet network is one of options among many others. It's believed that the traditional ways to gain knowledge will last forever. In the interrelated information systems and even databases, information and data are intended to be interpreted by people as knowledge when they are searching for. Knowledge will never be shared without the interactions of human beings because knowledge sharing is a kind of human activity. People play an important role to get knowledge shared. We have to think of how an portal can meet users' needs in knowledge sharing.

4) Successful knowledge management is an integrated effort involving people and processes as well as technologies. How to combine these aspects into one portal development is still rather weak. Portal development is a kind of post-action to the existing information and application systems and can provide new looking and feeling for users. Too much information on one screen shot bothers users. How to reflect the integrated effort in simple and effective ways should be explored.

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