Ten Knowledge Domains - Model of a Knowledge-Driven Company?

Many early adopters of the concepts of knowledge management have achieved dramatic benefits: improving the performance of client services; increasing customer value; generating new license revenue; expanding markets; shortening cycle times; re-using knowledge; and creating maps of company experts. This paper will identify 10 domains in which organizations put these knowledge concepts into practice. A framework will also be presented for viewing the depth and breadth of knowledge management - as well as a model of the knowledge-driven company of the future.

After some three years of studying and participating in the early stages of the knowledge management movement, Xerox has identified 10 domains in which organizations are putting knowledge concepts into practice. In the process, we’ve developed a framework for viewing the depth and breadth of knowledge management, and we think we may even have uncovered a model of the knowledge-driven company of the future.

Knowledge management first appeared on our corporate radar screen in 1996 as we were scanning the horizon for signs of change and opportunity in our industry. At first glance we suspected that we were seeing a new business opportunity gain footing – one that could be a natural extension of our business.

As the first company to recognize and study the value of documents in the late 1980s, we understood the role that documents play as people create, capture, and transfer knowledge in the workplace. Our collective feeling was that knowledge management would be a logical next step - particularly for organizations that had embraced quality, re-engineered business processes, and downsized, and were now ready for growth. Our instincts were confirmed as a number of well-respected companies and visionaries, among them Peter Drucker, spoke of the emerging value of knowledge as a strategic advantage:

“The most important achievement of the 20th century was a 50-fold increase in the productivity of the manual worker. The most important contribution of management in the 21st century will be to increase the productivity of the knowledge worker by a similar amount,” Drucker told 350 people at a recent knowledge management conference. “(This) is the biggest challenge of developing countries and will become their only possible source of competitive advantage ... On this rests the prosperity of the Western World and the future of its developed economies.”

Creating a Framework for Understanding a Young Movement

The productivity of white-collar workers is precisely what Xerox had targeted with its initial focus on managing documents. Looking beyond the documents themselves to the knowledge embedded in and shared by them – as the knowledge proponents were suggesting – was not only an intriguing concept; it was an idea that Xerox had been investigating in its research organization in an anthropological sense for almost 20 years.

As Xerox saw the knowledge movement begin to take shape, particularly among professional-service firms in the mid-1990s, we had a number of questions: How serious is this? Is it a genuine trend or an over-promoted management fad? If it’s serious, how quickly should we jump on it? If we do, when and how? And
what kind of resources should we devote? To answer these questions, we set out to create a way to view a movement that was so young even its most earnest practitioners were struggling to define it. We needed our own definition. We needed to get behind the language and the promise of the evangelists to study the companies that were adopting knowledge management and to understand precisely what benefits they were gaining from it.

We looked at 40 case studies outside of Xerox, using our engagements with customers and research we had co-sponsored with the American Productivity & Quality Center, Ernst & Young and Boston University. To get the broadest possible perspective of the market, we selected a wide range of industries: consulting, manufacturing, chemicals, petroleum, insurance, health care, pharmaceuticals, engineering and government. We wanted to know the objectives with which every organization undertook its knowledge management project, the business processes that were involved and the real or desired payoff.

We learned that many companies took knowledge management seriously enough to apply it to their most business-critical work. We found efforts in many realms, including product development, global best-practice sharing, customer support, intellectual-asset management and project management. We were convinced that the movement was real and that there were genuine benefits to be gained from it.

The 10 Domains of Knowledge

We found that the early adopters were not only willing to apply knowledge management concepts to important initiatives, they were achieving or expecting significant benefits: improving the performance of client services, increasing customer value, generating new license revenue, expanding markets, shortening cycle times, re-using knowledge and creating maps of company experts. The projects fell roughly into these 10 domains:

- Sharing knowledge & best practices
- Instilling responsibility for knowledge sharing
- Capturing and reusing past experiences
- Embedding knowledge in products, services and processes
- Producing knowledge as a product
- Driving knowledge generation for innovation
- Mapping networks of experts
- Building and mining customer knowledge bases
- Understanding and measuring the value of knowledge
- Leveraging intellectual assets

Our own knowledge initiatives under way within Xerox, too, fell into these categories, which we believe remain relevant today. We’ve examined a number of ways in which organizations are approaching each domain. This article will contain examples of initiatives under way both at Xerox and in other companies. Because knowledge sharing is the most active of the domains, we’ve devoted the largest amount of space to it.

Knowledge Sharing: Where the Action Is

Two of the domains we identified relate to knowledge sharing. These - Sharing Knowledge and Best Practices, and Instilling Responsibility for Knowledge Sharing - emerged as the most active of the 10. Why? We believe it’s because creating systematic ways to share knowledge that already exists in organizations will make the biggest initial contribution to knowledge-worker productivity, competitiveness and growth. Much of companies’ existing knowledge is ripe for sharing and a growing portion of the technological infrastructure is in place for people to share it - if they have the proper environment and incentive to do so.

A study conducted by Delphi Consulting Group indicated that only about 12 percent of the organizational knowledge in any company is in some sort of knowledge base where it can be easily accessed by others who need it. The largest amount, 46 percent, lies in paper and electronic documents, which theoretically should be available for sharing but aren’t because of paper-to-digital difficulties, incompatible databases, etc. Documents are the most pervasive vehicle that people use to share knowledge with each other, and the gulfs and barriers between paper and digital documents represent serious inhibitors to knowledge sharing.

But our research showed us another and perhaps more significant barrier to knowledge sharing in the workplace: a natural human resistance to sharing in traditional business environments, where knowledge is power and hoarding is common. We saw that improving knowledge sharing in a meaningful way requires a delicate marriage of technology with a keen sense of cultural or sociological awareness. It involves creating an environment that is conducive to sharing.

As we began to apply our lessons in internal knowledge-sharing projects, we found the most success with efforts that drew on our technological capabilities as well as the extensive experience we had gained through anthropological workplace studies conducted at our Palo Alto Research Center.

In one project, called Eureka, we created a system with which service technicians could share tips for fixing copiers. The project grew out of two problems with service manuals: they were out of date almost as soon as they were printed, and...
they failed to embody many of the creative, not-in-the-manual solutions that our repair technicians had improvised in the field. In this project, Xerox social scientists and computer scientists teamed with the service technicians to create a system in which tips were contributed by the technicians, validated by a respected group of their peers, and then quickly made available digitally to the community.

It took us time, but we discovered that this community needed an incentive for sharing. We found that personal recognition was an important motivator in this culture, so our solution involved making the names of the tip provider and those who validated the tip visible on every suggestion in the system.

Eureka allows us to create intellectual capital and social capital at the same time - all while improving our service to customers and the financial performance of our business. In France, where we field-tested Eureka, some 1,500 technicians are accessing more than 5,000 tips every month - with the result that Xerox France has lowered its parts usage and labor costs by more than five percent. Based on the success of Eureka in France, Xerox is now rolling it out to its more than 25,000 service representatives worldwide.

In another effort, we focused on connecting people in a research community that already had a built-in desire to share, but little ability to do so because of organizational, geographic or technological barriers. We found success with an Internet-based document repository and virtual workspace called DocuShare (initially AmberWeb).

This Web-based collaborative environment made it easy for researchers to share information, jointly work on documents, maintain shared calendars, bulletin boards and databases, and stay connected with each other.

We applied our skills in social sciences in designing DocuShare to be easy to use and to give its user communities the ability to organize and maintain the environment themselves. There was no central authority or management. It was phenomenally successful: with no promotion or mandates, its use has blossomed in a grass-roots migration that started with a handful of researchers and now embraces more than 25,000 employees from all corners of the company.

The issue, however, is how to capture this knowledge in a re-useable form without burdening the design team with the task of capturing work beyond the scope of the primary job at hand.

Another and perhaps more significant barrier to knowledge sharing in the workplace is a natural human resistance to sharing in traditional business environments, where knowledge is power and hoarding is common.

Our experience with DocuShare was validation of the idea that if you build a knowledge-sharing tool properly - honoring the nature of a community and the way it works, while giving it sovereignty over the tool's administration - success should come easily.

Capturing and Reusing Past Experiences
The syndrome known as "reinventing the wheel" is a frustrating and costly one for nearly all organizations. Many have sought ways to capture the knowledge that has come from past experience and make it readily available in the present - either to those who were part of the original experience itself or to an entirely new set of people altogether.

One manufacturer included in the case studies is exploring this domain in its product-design process based on the following idea: while a product's final design is the result of the details, specifications and performance characteristics agreed upon during the process, nearly all of the peripheral work is discarded.

A significant amount of knowledge work is lost this way - tradeoffs that were made, assumptions and analyses that went into the decisions, even disagreements that were voiced. This company believes it can shorten its design cycle, lower costs and bring products to market more quickly by capturing and retaining this peripheral knowledge for reuse in subsequent design projects.

To address this challenge, the company is attempting to codify, standardize and make routine a number of processes and tools that would allow this peripheral work to be captured as it happens. It is looking into the use of human knowledge observers and reporters, as well as technology-aided capture and retrieval systems.

One likelihood is that the company will create a single database, driven off existing design-analysis systems, to record all of the changes made to a design during its many iterations. Theoretically, this will allow future designers to see what didn't work, or what might have worked but wasn't used, as they approach the next design cycle. Especially important is that a system like this would preserve the know-how even when important people leave the design team.

Embedding Knowledge in Products, Services and Processes
As the pace of change in business accelerates, more companies are seeing that their unique knowledge - built into products and services - can become a powerful offering in the marketplace.

For that reason, the careful placement of knowledge in products and services is becoming a business-strategy issue in many companies. They are making conscious choices about what blend of knowledge to embed in products and services to generate
the best revenues and profits while competing against fast-reacting competitors. This is becoming one of the more important and yet challenging knowledge domains.

The problem, of course, is that in our fast-paced economy the value of knowledge is becoming more short-lived. Not only does knowledge become obsolete more quickly, knowledge-based innovation embedded in smart products is quickly spotted by competitors; they then copy the idea, improve on it and launch it into a market that the originator has primed. Even products that are extremely heavy in knowledge content can quickly become commodities, if not obsolete altogether. Witness the computer-software industry.

Innovation expressed in services, however, is harder for competitors to copy, but that doesn’t make applying knowledge in the service domain a less daunting challenge. After all, in most cases the knowledge walks out the door each night between the ears of the employees who provide the service. The big question is how to make this knowledge available at any time of day or night, whenever and however a customer may demand it.

Xerox found a number of interesting projects in this domain. Some involve the design of smart products that can learn to adapt to and even anticipate the needs of their users. Other initiatives are aimed at identifying the most appropriate places in a business value chain to place knowledge.

For example, one company we studied made the effort to understand where in its value chain the greatest concentration of proprietary knowledge resides. This company, one of whose businesses is the development and sale of crop seeds, found the greatest contribution of knowledge was actually in the recipe for the DNA at the heart of each seed. This discovery has led to the consideration of a series of strategic business options, including the possibility that the company may outsource everything in its value chain except the formulation and ownership of the DNA recipe.

Producing Knowledge as a Product
Selling knowledge as a product in itself is gaining momentum in the knowledge movement. Professional service firms, whose product traditionally consists of know-how, experience and expertise delivered through people, were among the first to explore this domain. However, manufacturing and financial institutions are increasingly embracing it as well.

Several consulting companies now offer knowledge-related services through the Internet, either to extend the business they do with existing clients or to reach an entirely new set of customers.

One professional service firm has developed an on-line mini-consultancy specially designed for smaller companies that typically can’t afford its traditional services. Through a single Web site customers can buy access to the latest in professional help, tutorials, case studies, best-practice examples, connections to networks of people with similar interests, and chat rooms for the on-line discussion of hot topics related to their business concerns.

Some pharmaceutical companies are becoming knowledge publishers as customers discover that information about administering drugs, avoiding complications and understanding side effects is as important as the drug itself.

A global lending institution has seen its role shift from simple lender to advisor as customers seek the best ways to use the money they’ve borrowed. The company is creating knowledge databases to share with its customers’ best practices in, for example, agriculture, health, housing and family planning. The bank has learned that its product is not just money; it’s the know-how that goes along with it.

In all of these examples, companies that once saw their output as a tangible product or service are learning that the real value often lies behind the scenes in the knowledge that went into developing the product in the first place, or in how it can be used. Knowledge itself becomes a product.

Driving Knowledge Generation for Innovation
One of the least understood of human capabilities is the way in which individual creativity becomes organizational innovation. We know that creativity well managed (in some cases, well unmanaged) can result in innovative companies, but there has been little real-world experience in attempting to understand or systematically shepherd this process.

As we in the West concentrate primarily on efforts to capture, distribute and reuse explicit knowledge - mostly through the use of information technology - our colleagues in Japan are drawn to the more vexing question of how knowledge is created in the first place. They are investigating the social, cultural and environmental conditions in which one person who knows something valuable exchanges this tacit knowledge with another.

Recognizing that this is a difficult problem, we’re not surprised to have found few examples of projects from this domain in active practice. This is an area that is ripe for academic and business research, and companies like Xerox are attempting to develop deeper insight into the creative process and how knowledge flows between and among people within an organization.

To complement and extend the work of our own researchers, Xerox and our partner, Fuji Xerox, endowed a knowledge professorship in the Haas School of Business at the University of California in Berkeley. The first Xerox Distinguished Professor of Knowledge, Dr. Ikujiro Nonaka, places particular importance on what he calls "ba," the socio-spatial "place" in which knowledge is created. He has proposed a model of the way tacit knowledge flows in a continuously expanding, dynamic spiral from the individual to the group and then back...
again. Affiliated with the professorship is an annual forum at which, for the past two years, leading theorists and practitioners have shared their ideas and experiences with hundreds of their colleagues.

Understanding the complexities of knowledge conversion represents one of the leading edges of knowledge management, but we believe it’s one that will ultimately have profound effects on organizations, particularly in their attempts to crack the issue of knowledge-work productivity.

**Mapping Knowledge of Experts**

A troublesome quality of knowledge assets is that they are for the most part invisible. A first step in almost any knowledge management effort is to make knowledge visible so people throughout an organization can see what is available. Otherwise, how can they put it to use?

Often this first step involves creating a map that gives people the ability to locate knowledge assets and access them. We’ve seen several types of knowledge maps in use.

One knowledge map we’ve seen gives help desk staff a pathway into their organization so they can find answers to customers’ questions that exceed their own expertise. The map locates subject-matter experts in the company and provides yellow-pages-style details about their expertise based on such information as work history. The help desk staff can then either get the information from the expert or arrange a conversation directly between the customer and the source.

Another type of knowledge map shows crucial relationships in the company’s decision-making process. Biotechnology companies, for example, can have as many as 100 other companies collaborating on new-product development. A knowledge map in this case shows important context along with the expertise of each contributing partner. The map brings to life the interdependencies linking the companies and the flow of knowledge that feeds product development.

Yet another kind of map is a community map. Every company is full of specialized communities tied together not by organizational bonds but by the work they do or the interests they share. In almost every case, unlike teams or workgroups, these communities grow up on their own with little corporate or organizational sanction or support, yet they are valuable sources of knowledge that can be put to use both within and outside the community.

A community map makes these groups visible, identifies their members along with their collective and individual interests or expertise, and describes the flow of knowledge among members and across the communities’ borders.

**Building and Mining Customer Knowledge Bases**

The digital age has had a number of challenging effects on business. Markets have globalized and become more competitive, the speed of business has accelerated, customers have become more demanding, and products and services are beginning to look more and more alike.

Many organizations are choosing to differentiate themselves through the knowledge they can offer to customers in the form of services or support.

We found good examples of innovative customer-focused knowledge management in a benchmark study recently completed by the American Productivity & Quality Center. Xerox was among 16 companies to sponsor the study, which was called Expanding Knowledge Management Externally.

The APQC studied the 16 sponsoring companies and ten others that it identified as “best-practice” organizations. APQC discovered that 40 percent of the best practice companies had fully operational, customer-focused knowledge management strategies in place. Among the examples identified:

- A software company developed a system in which non-technical employees can provide customer support over the telephone, and in which customers can solve their own problems through the Internet. The company also created a “hint line” in which, for a fee, customers can sign onto the Internet and learn ways to improve their computer game-playing skills.
- Another software company offers a range of knowledge-based Internet services – including a proprietary knowledge base of documents, discussion groups, frequently asked questions and a “hot topics” area that’s automatically created from the most-often accessed documents in the knowledge base.
- A temporary staffing firm offers its clients – the companies who hire its employees – an Internet service that allows them to track every project the firm runs for them around the world. It includes project summaries, costs, locations and success stories.

As information technologies become more sophisticated, exploiting knowledge about customers – including their needs and desires, their buying habits, their interests – becomes an important asset in the creation and delivery of valuable products and services.

**Understanding and Measuring the Value of Knowledge**

This is one of the most discussed and least understood of the knowledge domains. As agreement hasn’t yet been reached on what knowledge is, it will be a long time before a consensus can develop on how to measure it. The knowledge community is, in fact, abuzz with divergent views on whether knowledge value should be
measured at all and, if so, whether it can be measured in a meaningful way.

The predominant western view is that some sort of measurement is necessary so people can understand the success and failure of initiatives, and so they can continuously improve their processes. Nonaka, however, and some of his colleagues from the East have cautioned against this tendency to measure things before their meaning has been well analyzed and understood.

To date, most organizations seeking to measure the value of their intellectual property have done so with traditional yardsticks, such as changes in costs, usage rates, customer satisfaction, accuracy in problem solving, customer response time, etc. – focusing on mostly tangible intellectual property such as patents and trademarks.

A chemical company, for example, analyzed its 29,000 patents in an effort to decide which patents to exploit, which to sell and which to abandon. The company found that it could place a value on these assets: it could earn $125 million by licensing them and save $40 million by reducing the number of patents under management over a period of 10 years.

However, the big potential, we believe, lies in the huge percentage of knowledge assets that are intangible and thus remain elusive when it comes to measurement. For that reason, we advocate an initial approach in which organizations first concentrate on finding ways to make knowledge visible. Managers need to be made aware of the importance of knowledge, of its whereabouts, its effects and its overall state of health in the business before they can approach the idea of measuring it.

**Leveraging Intellectual Assets**

Intellectual property is probably the most widely recognized type of knowledge asset in most organizations. Patents, copyrights, invention proposals and licensing agreements are documents that visibly embody a company’s accumulated knowledge – which the company can buy, sell and trade at will.

Not surprisingly, in an environment in which businesses are pressured to focus on their core strengths, bring products to market at blazing speed and simultaneously reap the best possible return on their intellectual property, managing these assets is garnering considerable attention.

Xerox, for example, established a corporate intellectual-property strategy in 1997. We have reinvented our process (this includes a complete re-examination of how our developing technologies fit the corporation’s business strategy) and we have begun to apply technology to support the new process. We’ve even created a business unit to manage and market our intellectual property. Its goals are to increase our patent licensing revenue and take a tougher stance against those who infringe on our patents.

Since Xerox is a high-technology company, the team that led this effort began by defining five new technology categories to classify nearly 7,000 patents into areas that fit our future businesses, as defined in our strategic plan. An additional “miscellaneous” category holds technologies that don’t quite fit our current view of the world but do hold future promise.

The team is evaluating the entire Xerox patent portfolio against the Corporation’s business goals, in the process of identifying strengths and weaknesses. We’ve plotted a “power spectrum” of patents against those of our competitors; this shows us where we stand against our competitors; it shows us where we’re best able to license our current assets, and shows us where we should concentrate now – so we have a strong and appropriate patent portfolio in five or ten years.

New computer systems and databases help us manage our patent portfolio, monitor the use of licensed technology in the market and track royalty payments. A new Corporate Infringement Lab improves our ability to discover and demonstrate infringement; we’ve already filed suit against two competitors this year.

**To Be Knowledge-Driven Means Mastering All 10 Domains**

Creating the means to view knowledge management has helped Xerox shape our strategy as the movement itself evolves and as our business gets far more complex in a fast-moving, global digital age. We are learning simultaneously from the outside and from ourselves as we ready new tools and services to help our clients address both the technological and cultural aspects of sharing in a world increasingly driven by knowledge.

While every one of the ten domains offers some competitive advantage in its own right, we believe the truly successful company will ultimately be the master of all 10. This is why we see the domains offering a template for the future knowledge-driven company.

We believe the companies that master these domains will be most likely to thrive in the knowledge-based economy that Drucker and others have been talking about. The productivity of their knowledge workers and their ability to set themselves apart because of what they know and the speed with which they can put it into action will give them an advantage that will be difficult, if not impossible, to match.

Business leaders around the globe are beginning to see this and they’re turning to their staffs with a sense of urgency about adopting knowledge management practices.

Three years ago, when those of us involved first took on the job of championing Xerox’s investigation and consideration of knowledge management, it was tough to get division leaders to return our telephone calls.

Today, spurred in part by a new company president’s interest in the topic and the growing credibility of the movement, knowledge management - or managing for knowledge, as we like to call it - is becoming our business.