THE DOCUMENT COMPANY XEROX

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# Sharing KNOWLEDGE Through DOCUMENTS

What if you could benefit from other people's knowledge—without investing an overwhelming amount of your time and effort, without needing to have their experience, but with the ability to put what they know to effective use?

Chances are you'd make better decisions, act more swiftly and confidently, and bring new ideas quickly to life. Your company would get more out of what it knows and be in a position to grow more quickly and be more profitable.

These are the goals of knowledge management, one of the most talked-about trends of the 1990s. This paper describes Xerox' view of and evolving capabilities in a movement that we believe will become a business imperative—combining information, technology and culture into an entirely new way of working together.

## The New Currency of Business

Knowledge is becoming the new currency of business, and intellectual property a more important asset in some industries than the traditional triad of land, labor and financial capital.

Senior executives are turning to their companies' intellectual assets as a source of competitive advantage, growth and profit. Financial and operational managers are seeking the best possible return on core assets, including information and knowledge. Technology managers are working to better align their systems and the information they contain with business strategies and goals.

Throughout their organizations businesses are looking to explicitly manage what they've learned, what they've experienced and what they know. To re-use ideas. To make knowledge workers—prized corporate assets—more effective. To hold onto valuable knowledge when employees leave. To speed innovation. To see and seize new product or service opportunities.

But what is knowledge? How do you share it? Can it actually be managed?

## Documents and KNOWLEDGE

**According to research done by The Delphi Group, only 58% of most companies' tacit knowledge has been codified or made explicit in accessible form. Virtually all of it that has been codified, the company found, lies in documents—half of them paper, half of them digital.**

**Xerox continues to focus on the document as the primary carrier of information around which knowledge gets created, captured, consolidated and communicated. We see ourselves as enabling a sort of knowledge-generating conversation through documents—combining technology with an understanding of how people work and bringing paper and digital information together to help our customers grow.**

**In the digital world, by the way, documents take many forms—paper, audio and video files, hyperlinked Web pages, even digital paper that acts like a computer.**

# MANAGING *for*

**Knowledge in business is the accumulated information and experience of an organization put into action.**

Knowledge is not the same thing as information. It's less quantitative, more dynamic and more organic. It exists in different places: in databases and file cabinets, for sure, but also tacitly in the minds of people and in the processes and relationships that link them.

In the purest sense, we may never be able to manage knowledge itself. After all, knowledge is a highly personal, almost spiritual accumulation of unique experiences, lessons, observations and perspectives.

So while we may not be able to manage knowledge itself, we can create an environment in which knowledge can be better shared, used, re-used and acted upon. This is because knowledge is essentially information in action—put to use by people who understand how, why, when and where to use it. The more knowledge is shared and used, the more it grows.

At Xerox we speak about "managing for knowledge"—creating an environment that fosters the continuous creation, collection, use and re-use of knowledge in support of new business value. In helping our clients create such an environment, we're focusing on tools, services and cultures that facilitate knowledge sharing.

Knowledge sharing involves identifying, capturing, storing, retrieving and exchanging key information assets—initially to make knowledge that exists in documents more accessible and relevant to groups of users. Over time, knowledge-sharing solutions will more directly involve cultural issues and will ultimately change the way businesses put their corporate memory to use.

Because information is converted into knowledge in a social process, managing for knowledge requires a different, more human approach than information management. In our view, if managing for knowledge is to be successful it must start with people, address their work culture and information needs, and use technology to enhance their collaboration.

Many organizations will fail in their knowledge-management efforts if they rush to a technological solution. They'll create impressive high-tech systems that no one will use. While technology clearly will be important in dealing with such real impediments as incompatible information systems, data representations and application program interfaces, knowledge management will be most effective when it stresses the importance of people, their work practices and culture.

## A Unique Intersection of Trends

Why the sudden interest in knowledge management?

Knowledge has actually been of keen interest to some companies, including Xerox, for some time. But five trends have recently come together in today's fast-moving and ultra-competitive global marketplace to push knowledge management to the front burner.

First, the content of knowledge in products—software, for example—is increasing. Second, the life cycle for the usefulness of knowledge is shrinking as technologies evolve, times to market shorten and entire industries shift at ever-faster rates.

Third, the Internet has brought the world closer together, providing a structure for and a link to huge amounts of information—making something that's known in one place theoretically knowable somewhere else.

Fourth, pressures of worldwide competition have forced companies to be selective about the businesses they're in and the intellectual assets they must own to succeed in them; because of this, improving the productivity of knowledge work will be one of the most important and challenging issues in the early part of the coming century.

Finally, businesses are more focused on growth than they have been in decades. Having adopted quality disciplines throughout their businesses and re-engineered core processes, many companies are in a new phase of growth.

There are, of course, many additional factors, but growth is fueled largely by innovation and innovation thrives on knowledge. A number of companies, particularly in the computer industry, are using knowledge-management systems to help them service and support customers during times of exceptional growth.

# KNOWLEDGE

**Knowledge begins with people.**

### The Human Dimension

Xerox has adopted a human-centered strategy for managing knowledge both to support our own effectiveness and to help our customers improve theirs. Internally, we're becoming a knowledge-driven company. Externally, we offer an expanding portfolio of products and services to help organizations manage for knowledge on an enterprise-wide scale.

Our appreciation for the cultural aspects of work led us to hire anthropologists in our Palo Alto Research Center (PARC) in the 1970s. They've helped us understand how people work, how we relate to technology and how we exchange knowledge with each other. Under the umbrella of Knowledge Ecologies, managing for knowledge is one of the five primary research areas at PARC today.

Xerox has also benefited indirectly from the non-profit Institute for Research on Learning, which we formed in the 1980s as a way to pursue and publicly share cutting-edge research on the optimal ways in which people learn and apply their learning.

For this reason, advances in technology at Xerox have always been put in cultural perspective and our products continue to be built with interfaces emphasizing the human element.

These experiences form the core of our approach to managing for knowledge in a technological age. Our competencies lie in four general areas: supporting communities of knowledge workers; creating and smoothing access to repositories of documents; and providing tools and services both to help people navigate huge amounts of information and to support the flow of knowledge throughout organizations.

All are built on network-based services and software to optimize the use and re-use of knowledge in all its forms, paper and digital, tacit and explicit. And all embody Xerox' understanding of the way people work. In some cases, this knowledge is built into a product's features or its associated software; in others it is a service delivered on its own or in conjunction with technology.

# The First Solutions:

# Software AND Con

**As knowledge management gains a foothold in business, the industry's first solutions are being delivered primarily in the form of consulting services and software.**

Most are built on software designed to make tacit knowledge more explicit and accessible. This includes tools to bring scattered information silos together, to search large databases and document files for relevant information, to communicate and exchange information and to manage collaborative work flows.

The Gartner Group predicts that by 2001 some 20% of the Fortune 500 will have some form of unified access to disparate sources of information through a single coherent interface.

Xerox, in fact, has created some of the industry's most innovative of these "windows," as well as the methods of finding and viewing information within them. Among them are the enterprise document management system at the heart of knowledge solutions offered by Documentum, a Xerox spinoff; linguistic-analysis and document-summarizing technology that is embedded in several of the leading Internet search engines; a three-dimensional information browser that lets users see both the forest and the trees; and an intranet-based community knowledge repository called DocuShare.

Xerox' professional services group offers knowledge-management services for large enterprises. We survey, review, redesign and re-engineer document-intensive processes. We also provide analysis and consulting aimed at matching business processes and strategies with the knowledge, documents, organizations, culture and technical infrastructure needed to achieve desired results.

Our recent formation of Xerox Connect will substantially bolster our capabilities. The network-services specialists that joined Xerox in our acquisition of XLConnect Inc. will help us develop document- and knowledge-management solutions for virtually any networked environment.

## *The* Knowledge Panel

**In 1997 Xerox formed a panel of more than 100 knowledge-managers in large organizations in eight countries around the world. The painstaking effort was a way to identify the pioneers in an important but young movement; to track their successes and failures; to help Xerox and our customers better understand the trend; and to share insights that could make knowledge-managers more effective in their work.**

**Xerox surveys these panelists two or three times a year and shares the results with all of them. Among the findings of the first survey, conducted in late 1997:**

- **25% of the companies they represented had knowledge-management budgets of more than $1 million a year, and a somewhat larger number, 27%, had 11 or more people dedicated to managing for knowledge.**
- **A majority said their chief mission was to facilitate the sharing of information; 32% said their formal job was to integrate technology to provide tools for knowledge sharing and use. Those who felt most satisfied with their progress described themselves as change agents rather than managers.**
- **42% said the chief barriers to their work were their organizations' resistance to change and a culture that worked against sharing.**

# sulting


## Unique QUALIFICATIONS

Xerox brings a unique perspective, experience and qualification to managing for knowledge, built on:

- A deep knowledge of the cultural aspects of work and the way people relate to each other both through and without technology, combined with a rich history of developing innovative technologies to capture, view, access, share, distribute and print information;
- Decades of experience with the document, the most prevalent means of knowledge sharing among people and the primary interface to information in today's networked work world; and
- The ability to bring paper and digital information together to improve the effectiveness of knowledge workers, who now comprise more than a third of most work forces.

### *The* Knowledge Professor

Xerox and its partner, Fuji Xerox, created and endowed the Xerox Distinguished Professorship of Knowledge at the University of California in Berkeley—the first academic position of its kind in the world. The chair is currently held by Dr. Ikujiro Nonaka, a Japanese knowledge-management expert and author of the book *The Knowledge-Creating Company.*

# The Future: Brokers, Pumps

**Xerox research labs are also working on technologies designed specifically to support knowledge management. Some are in the early stages of product development and are being piloted in customer sites.**

Two technologies created at the Xerox Research Centre in Grenoble, France, offer different but mutually supportive ways to find and share knowledge in large communities or enterprises.

Knowledge Brokers is a software application that helps users look for information in multiple, often incompatible databases. Acting like agents, these brokers search for information requested and present it in a uniform fashion, regardless of the source.

They even stay alive after the search has been completed, informing users of new information as it enters the databases.

Knowledge Pump is a push methodology of sharing knowledge. With Knowledge Pump, users join communities that share similar interests or vocations; they're connected to each other by a central knowledge repository and electronic mail. Software tracks each user's interests, builds up additional information about the person as he or she uses the system, matches it with the needs, interests and knowledge of other users—and "pumps" relevant information to the appropriate person as it's found in the system.

### The Infrastructure: Networked Digital Machines

Future implementations of knowledge-management systems will undoubtedly feature more than consulting and software. Many capabilities offered today through consulting projects and customized software will eventually be generically available over networks. They'll also be built into standard office machines that are designed to handle both paper and digital information.

While eyeing a paperless future and appreciating its value, we believe that most of us will not see a paperless office in our lifetimes. For this reason, we are building a set of products, software and services that help companies better use and grow the part of their knowledge that lies in both paper and digital documents.

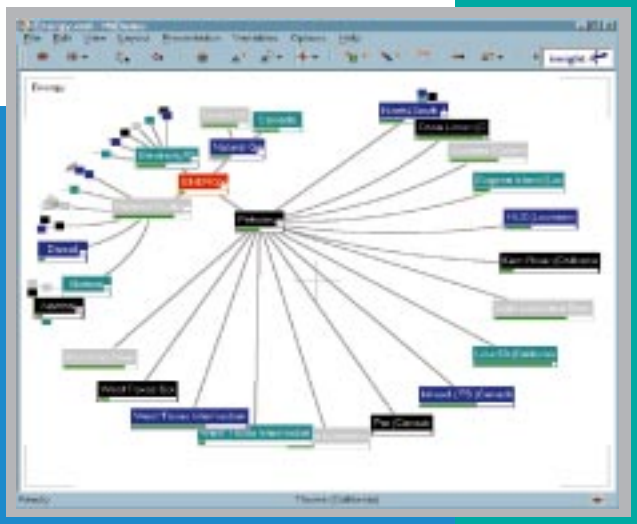
Our Document Centre products, for example, simplify the distributed printing, scanning, copying and sharing of documents and the knowledge that resides in them. They make it easier for companies to capture and codify information they've used or stored in the paper realm, for example, and bring it into the digital domain, where it can be easily shared and combined with other knowledge.

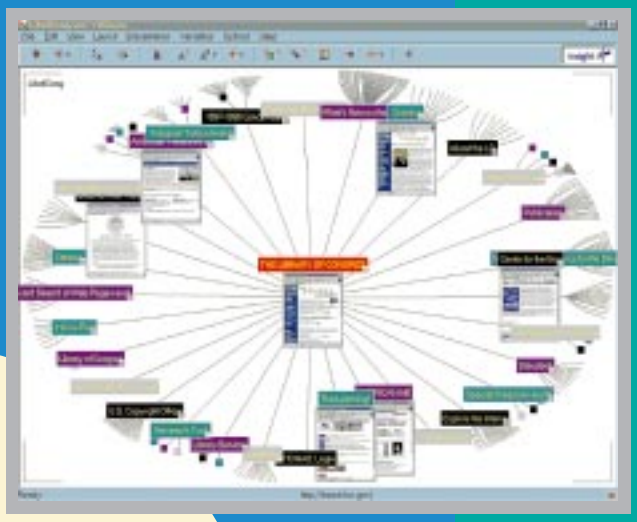
Our digital printing and publishing solutions increasingly work with data-mining software that allows customers to combine knowledge they've collected through experience—in customer transaction records, purchase information, demographics and preferences, for example—with document production. The knowledge drives the creation of smart documents such as direct-mail solicitations, coupons, statements, bills and invoices that, because they are customized, personalized and highly targeted, generate better response rates.

Our evolving knowledge-management software and services, where appropriate, will be laid upon an open infrastructure of document input, storage, distribution, retrieval and output technologies.

# AND Ecologies

The Hyperbolic Tree™ is a user interface component designed for the many applications today that involve accessing, managing, organizing, and exploiting large hierarchies of data such as product catalogs, document collections, and the link structure of World Wide Web sites. The Hyperbolic Tree's unique interface lets users navigate large data sets quickly and easily.





## EUREKA

We are working with a global telecommunications firm to pilot another product code, named Eureka. This software, also used extensively within Xerox, leverages social systems to build knowledge. We found that Xerox service technicians, who make more than a million customer site-visits a month, use "war stories" to teach each other to diagnose and fix machines.

Eureka takes advantage of this social behavior, using community-based software and a knowledge-sharing incentive system to capture these "tips" and to validate and disseminate them. Workers are motivated not by financial rewards but by the recognition of having their names attached to their tips; as a result, they readily share knowledge, contribute ideas and maintain the community knowledge base. In France, where the program was field-tested, technicians contributed 5,000 tips a month—while parts usage and labor costs in their community dropped by about 5%.

### *The* Hyperbolic Tree™

As good as the World Wide Web is, one of its limitations is that users have trouble navigating huge amounts of information — in particular, understanding where they are in relation to the information they're looking for.

The Hyperbolic Tree browser—created at PARC and marketed by Xerox company InXight Inc.—gives users a three-dimensional view of information sources, offering a kind of dynamic fish-eye that lets them zoom in and out while retaining perspective on the entire repository. Using this interface, people can see both the forest and the trees.

### Sharing *and* Searching

DocuShare is a community-owned and maintained Internet-based document repository. It lets people create a virtual work space in which they can easily swap information, collaborate on documents and stay connected with co-workers. It gives people access to repositories of shared documents, calendars and bulletin boards while letting them create both push and pull methods of knowledge sharing.

Another Xerox product, Visual Recall, is a searchable document library that helps users quickly analyze and discern the relevance of the documents they obtain in their inquiries.

# BUILDING BLOCKS *for* Knowledge Sharing


No product, service or technology will seriously improve the use of intellectual assets unless it's installed in a culture that fosters sharing and in a way that sensibly applies it to real information problems and the ways in which people work.

We suggest that organizations address four broad capabilities in managing for knowledge.

The most obvious involves document repositories. Businesses need to create digital libraries that contain their best ideas and most valuable experiences—and they need to improve by orders of magnitude the speed and accuracy with which people can search through them.

The second involves addressing the needs of communities of knowledge workers. Management should support them with an environment—supported by technology—that encourages casual participation, reward sharing, enable peripheral awareness of other community members' activities, and provide easy access to each other's experiences and knowledge.

The third element is navigation. Organizations need new knowledge navigation systems that map, categorize, visualize, summarize and search—in general, make sense of—their knowledge assets.

The fourth element is flow. If knowledge is moving around an organization, it is expanding and growing, creating new knowledge as it is shared. The goal is a system that learns and observes the communication patterns and usage of knowledge seekers and providers alike—and automatically keeps information and knowledge moving freely among them.

With all of these comes the responsibility to change culture, if necessary—to create an environment that encourages knowledge-sharing instead of hoarding.

Additionally, the too-quick application of technology without consideration of the human dimension can contribute to low worker morale, employee turnover and lower-than-expected improvements from investments.

By paying attention to these elements, enterprises can leave behind the status quo—a frustrating, unproductive combination of information overload and knowledge underload.

### Knowledge: The 21st Century Business Imperative

Aristotle said, "Knowledge sets man free and gives him power." Nowhere is this as true as it is in today's business world, where knowledge has become a crucial corporate asset and a competitive weapon.

As the knowledge content of work increases, as the pace of work accelerates and as our horizons expand ever farther, mastering one's knowledge and putting it to use is increasingly determining success and failure. People are becoming more effective, decisions are being made more quickly and are based on more accurate information, and new revenue streams are growing as companies find new economic value in what they know.

The successful approaches to managing for knowledge start with people, involve them in new cultures, organizations and reward structures, and support their collaborative creativity with leading-edge technologies for storing, searching and navigating vast amounts of information, both paper and digital.

Knowledge is becoming the lifeblood of high performance in a fast-moving information age, its management one of the biggest business imperatives of the 21st century.

**For more information on how Xerox can help your organization better share and use its knowledge visit our Web site at www.xerox.com/new/ and click on "Managing for Knowledge."**

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