

KNOWLEDGE MANAGEMENT



Beyond the intranet

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The future is knowledge. Experts predict that soon we all will live in a knowledge society. We will work for knowledge organizations, managed by knowledge managers and staffed by knowledge workers, together producing knowledge products.

Getting to that utopian world will take a lot of hard work and a bit of wisdom. First, we'll consider how change affects societies and how well we can predict such sweeping changes. Then, we'll examine this thing called the knowledge economy. Next, we'll look at how some innovative managers are going beyond intranets to transform their organizations to highly productive knowledge engines. Finally, we'll look at some simple things that can turn a company intranet into a knowledge management system.

HORSELESS-CARRIAGE THINKING

How do we react to change? To new technologies? Do we use them to solve old problems and develop new markets? Sometimes, but not always.

In the early part of this century, in the U.S. and Canada, what we now call automobiles were called "horseless carriages." Why? That's an odd name!

Well, that's what they were. For the first 15 years, automobiles were just horse-drawn carriages with the horse taken off the front and an engine bolted on underneath. For the first six or seven years, every automobile came with a buggy whip holder as standard equipment.

In 1900 the Benz Company predicted a world market of no more than 1 million automobiles because only 1 million families could afford a chauffeur. By 1920, Henry Ford had sold 8 million Model Ts. How? By making the automobile so simple, reliable, and inexpensive that every family could own and drive one. Ford **invented** what people wanted and needed rather than just manufacturing what they already had.

I refer to this form of shortsightedness as *horseless-carriage thinking*. It refers to the tendency of designers to use new technologies, especially communications media, in exactly the same ways they used earlier technologies and media.

Airplane

The airplane fared no better than automobiles in the minds of experts. In 1895, Lord Kelvin, president of the British Royal Society, the premier scientific body in the United Kingdom, confidently stated that heavier-than-air flying machines were impossible. Eight years later two bicycle makers, with no formal scientific education, flew their 337-kg invention over the white sands of Kitty Hawk, North Carolina. Even then, experts saw no practical use for the device. Marechal Ferdinand Foch, Professor of Strategy at the Ecole Superieure de Guerre, declared that airplanes were interesting toys but of no value to the military.

Sometimes it does take a rocket scientist to see the future. And clearly the New York Times editorial writer was no rocket scientist when he said of the father of rocketry, "Professor Goddard does not know the relation between action and reaction and the need to have something better than a vacuum against which to react. He seems to lack the basic knowledge ladled out daily in high schools."

Telephone

New communications media have not been without their naysayers, neo-ludites, and nincompoops.

And what of the telephone? Was its potential immediately recognized? In 1876, an internal memo of the Western Union Telegraph Company summarized its assessment thus, "This 'telephone' has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us." In fact, Western Union turned down the offer of the patent on the telephone because they felt it was not worth the \$100,000 offering price. In a letter to shareholders in 1877, the Board of Directors of Western Union opined, "No sensible man would transact his affairs by a means of communication such as Bell's telephone."

In England, it was predicted that the telephone would not achieve wide use because England had "an adequate supply of messenger boys."

Even the telephone's inventor, Alexander Graham Bell, for years resisted the notion of using the telephone for person-to-person communications and instead insisted it be used to broadcast news and music.

Knowledge and learning have not always been recognized as valuable. In AD 640, Caliph Omar burned the manuscripts of the Great Library of Alexandria, many of them unique throughout the world, to heat the public baths.

The world's first rotary press was smashed by an angry mob.

In 1830 the British government levied a 4-cent "knowledge tax" on each 1-cent newspaper sold.

Old media have jealously guarded their markets. Until 1938 the American Newspaper Publisher's Association successfully limited news broadcasts to no more than ten minutes per day. No news item could exceed thirty words. The same organization lobbied for a ban, until 1989, on a national online phone directory.

Movies and television

For the first fifteen years after the invention of the movie camera, virtually all movies were made by setting a camera down in the fourth row center and filming a stage play. It took film directors 15 years to realize that they could move the camera and could splice together separate bits of film.

Have you ever seen films of early TV news broadcasts? What did you see? For the first 5 or 10 years all you saw was a person sitting at a desk or table, reading from a piece of paper, while drinking a cup of coffee and smoking a cigarette. It was not until 5 years into television news broadcasting that any news broadcaster made eye contact with the viewer. Why? They were all radio broadcasters.

Computers

The electronic digital computer has been underestimated, misinterpreted, and misrepresented more than any invention in history.

Probably the most famous underestimation was the belief by Thomas J. Watson, president of IBM in 1943, that there just might be a world market for five computers.

Nor was the business press any more prescient: The Prentice Hall editor in charge of business books had this to say in 1957, "I have traveled the length and breadth of this country and talked with the best people, and I can assure you that data processing is a fad that won't last the year."

The microchip puzzled the world's largest computer manufacturer in 1968 when an engineer at the Advanced Computing Systems Division of IBM quipped, "But what is it good for?" Indeed, the established companies seemed clueless about the personal computer. Steve Jobs and Steve Wozniak founded Apple Computer only after they could not give their invention away to Atari or Hewlett-Packard.

Not even magazines featuring futuristic technologies believed that computers would move into everyday life. A 1949 article in *Popular Mechanics* boldly ventured that in the distant future computers might weigh less than 1.5 tons. Brave stuff.

Probably the most successful person in the computer field has at times seemed the least able to predict its twists and turns. Said Bill Gates, founder of Microsoft and the world's richest man, in 1981, "640K ought to be enough for anybody." By the way, Windows 2000 requires 128,000K.

The Internet

Before a live audience in 1997, Ethernet inventor Bob Metcalf had to eat a copy of his InfoWorld column that predicted that the Internet would collapse in 1996.

The future

Horseless-carriage thinking is alive today on the Web and corporate intranets. Designers have produced several billion Web pages that are little more than TV pictures of paper pages. “Oh, but they contain hypertext links,” you say. Yes, and when you click on one of the links, what do you get? Right, another TV picture of a paper page. Hardly the best use of advanced technology for building a knowledge economy.

I hope that Charles Duell, the Commissioner of the United States Office of Patents, was being facetious when he stated at the end of the 19th Century that everything that can be invented has been invented. Clearly, when it comes to knowledge, the future is waiting to be invented.

THE KNOWLEDGE ECONOMY

The knowledge economy is real. It is the biggest force in business and international relations today. It seems to dominate the popular and business press.

The knowledge economy is changing many of the fundamental rules we learned in school and in a lifetime of business practice. It has made instant millionaires and billionaires. It has sent seemingly invulnerable businesses into bankruptcy. Yet few know what it is. And fewer still seem to have a plan for surfing the waves of change sweeping over us.

What is the knowledge economy

What do we mean by a *knowledge economy*?

The idea of a knowledge economy has its roots in the term *knowledge worker*, which was coined by Peter Drucker in his 1959 book, *Landmarks of Tomorrow*.

There are as many definitions as there are economists. Let me give you a simple one of my own. I define a knowledge economy as one where success depends more on knowledge than on labor and capital.

We will look at the characteristics of such an economy later, but I want to make a couple of points about my definition first.

1. I do not mean to imply that labor and capital are not important in a knowledge economy, only that they are not the most critical factors. Even dot-com startups require someone to empty the trashcans and restock the soda machines.
2. And without generous venture capital, none of them would have gotten off the ground.

But it is the unique knowledge of the company that is most important in determining its success. Without the good idea there would be no company to attract venture capital or to hire janitors. And without better knowledge about their customers, their business, and their employees, these companies would fall behind similar companies with better knowledge.

The knowledge economy is real. Among developed countries over half the gross domestic product comes from production and distribution of knowledge. Knowledge is the new gold standard.

What are the characteristics of a knowledge economy?

Let's look deeper at the characteristics of a knowledge economy. Around the world, certain countries and companies are cited as examples of the new knowledge economy? What do they have in common? And how do these same characteristics apply to other kinds of organizations and to the individuals within them?

Communications infrastructure

Knowledge economies, countries, and organizations rely heavily on a pervasive telecommunications infrastructure. Ideas can travel the breadth of the organization in seconds.

The Roman Empire dominated by a sophisticated road system enabling travel and commerce among all its provinces. The British Empire was based on a superior ability to navigate the oceans. Today dominant companies and countries in the knowledge economy rely on intranets linking the whole organization.

Businesses also make use of the Internet to communicate with customers and suppliers. Government bureaus use the Internet to communicate with citizens, publish regulations, and collect taxes.

Wires and routers are not sufficient. Successful organizations also have workers capable of using such communications technologies. Their workers have almost continual access to computers and telephones connected to these networks. They have mobile phones. They have a computer on their desktop, in their briefcase, or in their pocket. They can connect to the intranet when they travel or visit clients and customers.

And they have been trained in how to use these technologies. The first attempt at deploying information technology throughout the offices of the United States failed miserably when workers and schoolteachers were given computer but no training or encouragement in using them productively.

Finally, workers have permission to use the technology to innovate. No appreciable knowledge economy has sprung up in Iran, Iraq, or China, where the technology is available, because the technology is used mainly to broadcast commands downward from executive management.

Before I go on to another point, let me say one more thing. When it comes to technology, availability is more important than speed. It is better to give every

employee a slow computer with a modem than to give powerful computers and fast connections to just a few employees. Metcalfe's law points out that the value of a network rises exponentially with the number of people on it.

Knowledge economies are investing heavily in communications and computer technology. Since 1991 industries in the United States have spent more on information technology than on manufacturing equipment. And more than half of the cost of the manufacturing equipment has been for its "intelligence." Such investments are paying off, finally. U.S. Steel produces as much steel today with 20,000 workers as it did twenty years ago with 160,000.

Knowledge product or service

Knowledge economies produce knowledge products. What are knowledge products? They are products whose primary appeal and whose cost of production depend on the knowledge they embody.

Commonly cited examples include high-technology products such as computer hardware, computer software, mobile phones, and other telecommunications products.

Other examples include products that are almost entirely knowledge. These include intellectual products, such as fiction and non-fiction books, music, photographs, and other works of art. In an era of word processors and digital cameras, all such works can be reduced to bits. Such bits can be transmitted and sold over the Internet.

In the same category fall the purest examples of knowledge as a product: selling advice. Many consultants have no tangible product. Their product is the advice they offer their clients.

Traditional industrial products are transforming themselves into knowledge products, too. Today the most powerful computer system owned by most families is the one parked in their driveway. Even moderate-cost automobiles include complex networks of computers controlling the low-emissions engine, the anti-lock brakes, the automatic transmission, and even the heater. Up scale models include satellite navigation displays and built-in wireless communications systems. More than half the cost for modern airplanes is for electronics, not the airframe.

Even agriculture is becoming a knowledge business. Farmers in Sweden and the United States plow and harvest their fields with tractors that construct real-time maps showing soil moisture and crop yield, all overlaid on a satellite photograph of the farmer's property. Dramatic increases in crop production are as much a product of the research and development of fertilizer manufacturers and of bio-engineered crops as of hard work and luck.

All products and services today have a knowledge component. The size of this component is growing and may soon dominate in even the most traditional products and services.

Knowledgeable workers

In a knowledge economy, workers are paid more for their brains than for their muscles. They may still lift and tote, but more and more they work with their brains.

When you think of steel workers, you probably imagine a guy with bulging sweat-covered muscles in a scene out of Dante's *Inferno*. Sparks fly from open cauldrons of molten metal.

Today, you are more likely to find a steel worker in an air-conditioned room, standing before a control panel or computer display. Or, sitting around a table discussing what statistical function to use to properly evaluate quality control variations.

Such knowledgeable workers are the primary assets of most knowledge companies. The owner of one consulting firm put it this way, "Every night 95% of my company assets go home. And I never know if they will come back in the morning."

In the 1950s in the United States, industrial workers made up 40% of the workforce. By the 1990s, that percentage had dropped below 20%, the same as it was in 1900. By 2010 in developed free-market countries, that figure will drop to between 10% to 15%.

Drops in industrial workers do not mean a drop in industrial production. In the 1980s and 1990s in the United States, the industrial workforce shrunk more than in any other developed country. Yet, industrial production grew faster than in any developed country other than Japan.

Global—not geographically defined

Knowledge economies are global. The countries of such economies rely heavily on international trade. Most companies sell their products outside their home country. From 1970 to 1995 world trade grew from \$1.3 trillion to \$4.3 trillion. McKinsey & Company, an economic consulting firm, reported that the amount of the global economy that is "contestible" rose from \$4 trillion (17% of the world economy in 1995 to \$21 trillion (50% of the world economy) in 2000.

Even small businesses have a global perspective. Wheat farmers in Canada now find that they have more in common with wheat farmers in the United States, in Britain, and in the Ukraine than they do with politicians in Ottawa or stockbrokers in Toronto. The prices of many commodities and other products are determined by world markets, not local ones.

My own two-person company is an example. When I started my consulting practice in 1988 I set a goal of doing 10% of my business outside North America. I thought a bit of travel would be nice. By 1996, over half my business came from outside North America. In 1988, the idea that a two-person company could do most of its business outside its home country seemed absurd. Today, it seems quite normal.

With fast telecommunications, anywhere is the center of the world. E-Trade and other online brokerages are as available in Beijing and New Delhi as they are in Los Angeles or New York.

Innovative and risk-taking

The most successful knowledge economies and organizations are filled with risk-taking innovators. Those who played it safe, failed.

In the 1970s the engineering management of most US automobile manufactures seemed to think, "If it ain't broke, don't fix it." As a result, they were overtaken by Toyota, Nissan, and Honda whose motto was, "If it is not perfect, improve it."

That was good enough back then, but today's knowledge economy requires even higher levels of improvement. Innovators of the 1990s seemed to be saying, "If it is not perfect, **REINVENT** it." Mere incremental improvements were not enough. Internet and information technologies encouraged such innovators to rethink even the most basic business processes.

These technologies have reduced bureaucracy and flattened organizations. For examples, e-mail, from its beginning, has been an informal medium, in contrast to the business letter or memorandum. Jack Welsh, head of GE, has credited e-mail with eliminating one entire level of management while improving internal communications.

Knowledge organizations tend to tolerate new thoughts and unorthodox behavior. No one was ever fired from Microsoft for sending Bill Gates a message disagreeing with a decision he made. Even honest failures seem no barrier to promotion.

How do you build the knowledge workforce?

At the core of the knowledge economy are knowledge workers. Where do they come from? What do they require?

Who do you hire?

What kinds of knowledge workers do we need? Let's consider the decision made by a hiring manager for a knowledge organization.

Imagine a steel plant. The plant currently uses Brand X smelter. Now imagine you are interviewing three workers for a job operating the Brand X smelter.

- Worker A knows how to operate Brand X smelters, but is not good at picking up new skills.
- Worker B knows steel manufacturing processes, but not how to operate a specific kind of smelter.
- Worker C knows how to learn independently, but is not familiar with the steel business.

Which worker would you hire?

Now, let me tell you that within a year, the plant will switch from Brand X smelters to Brand Y. Now which employee would you hire?

Okay, suppose you know that within three years the company will stop making steel and start manufacturing electronics. Now whom would you hire?

The greater the rate of change, the more valuable becomes the ability to learn. At Yahoo, the Internet search service, the philosophy is “Hire for attitude, train for skill.” Skills are easier to acquire than attitude.

What do knowledge workers require?

What do knowledge workers require and what should employers require of them? Probably the best answer comes from management guru Peter Drucker’s 1994 article in the *Atlantic Monthly* titled “Age of Transformation” where he said:

“They [knowledge workers] require a great deal of formal education and the ability to acquire and to apply theoretical and analytical knowledge. They require a different approach to work and a different mind-set. Above all, they require a habit of continuous learning.”

WHAT IS KNOWLEDGE MANAGEMENT?

We have looked at what makes a knowledge economy. Now it’s time to ask, “What exactly is knowledge management? What is its nature? Does it even exist? Or, is it just another vaporous management fad?” Let’s take a look.

We have no shortage of definitions for the term *knowledge management*. Unfortunately most definitions are quite abstract, relying on lots of other undefined terms and a stratospheric level of vagueness.

Let me give you my definition. It may not be better, but it is shorter.

I define knowledge management as the ways a group of people makes itself smarter. The group of people may be the employees of Royal Widgit Limited. Or it may be the faculty of Lightspeed University. Or the customers and potential customers of BlottoBlaster Software, Inc. Knowledge management includes all the techniques and technologies used to help the group make better decisions—individually and as a group. In other words, to make them smarter.

An early knowledge management system

Knowledge management systems are so shrouded in management mythology and technobabble that it is easy to lose sight of how simple they can be.

The simplest example is quite simple indeed. It is the beehive. Every spring day, hundreds of bees sortie forth in quest of nectar. Once one of the emissaries locates a promising patch of pansies or petunias, he flies back to the hive where he does a unique figure-eight dance. The angle of the figure eight informs other bees of the angle of the patch of flowers relative to the angle of the sun. And the frenzy of the dance specifies how far to fly in that direction.

By this simple process, bees perform the basic functions of all effective knowledge management systems: Bees gather, share, and apply knowledge. All without management consultants or intranets.

The many parts of knowledge management

Knowledge management has many parts. Sometimes practitioners or vendors for one part may portray it as the entire field of knowledge management. But we need a broader perspective.

Knowledge management includes activities such as publications management, information repositories, data mining, collaboration systems, process reengineering, best practices, competency measurement, resource catalogs—and, indisputably, training.

Training is legitimately an essential part of any knowledge management effort. But training does not cover the whole of knowledge management.

So, how do organizations perform these knowledge management activities, and how does training contribute to these other activities?

WHAT IS KNOWLEDGE?

Philosophers have debated the concept of knowledge for millennia. And just when you thought you knew what it meant, along comes knowledge management to throw in a couple of new ideas of what we mean by knowledge.

What is different about knowledge?

To make a point I want to invite you to steal this presentation from my Website at horton.com. Please do. Make as many copies as you want to. And give them away to others.

I am not being generous. I am just practicing one of the principles of the knowledge economy: The more you give away the more you get.

I learned this principle, not from a management expert, but from the rock band The Grateful Dead. While most bands refused to allow taping of their concerts,

the Dead actually encouraged it. And they built a loyal following that made them one of the leading concert draws during the 70s, 80s, and 90s.

My hope is that someone who reads one of the copies from my Web site will hire me to give a speech at their meeting or even hire me as a consultant. The more copies I give away, the greater the odds one will land on the desk of the person who can hire me.

My point is that knowledge is not subject to the basic law underlying capitalism, Marxism, and most other economic-isms. Knowledge defies the law of scarcity, which holds that things acquire value by being scarce relative to their demand. The law of supply and demand does not apply to knowledge. Consider a loaf of bread, which is subject to the law of scarcity. If I have it, you do not. If I give it to you, I no longer have it and I cannot then give it to someone else. If I give half to you, we both have bread, but not as much as I had originally.

With knowledge I can give it away and still have it. I can give it to you and to many other people too—and still have full use of it. Some kinds of information actually grow in value as they are given away. Microsoft, for instance, has enormous incentive to keep users informed on how to use Microsoft Word because that knowledge discourages users from switching to another word processor that they would have to learn from scratch.

Explicit and tacit knowledge

Knowledge consists of two distinct types. And it is important to consider **both** types in designing knowledge management initiatives.

Consider the trajectory of a thrown basketball. A high-school physics student can write a formula relating the velocity and angle of launch to subsequent positions of the ball in space.

That knowledge about that path is **explicit**. That means it is exact and easily recorded.

But a professional basketball player's knowledge of how to propel the ball over the heads of defenders and into the hoop is what we call **tacit** knowledge. The basketball player does not use (or need) a formula to calculate the angle and velocity with which to release the ball. The player relies on experience, skill, and muscle memory.

Effective knowledge management systems must deal with both explicit and tacit knowledge.

IS KNOWLEDGE MANAGEMENT REAL?

Is knowledge management real? And does it matter? The answer to both questions is yes.

The number of leading companies using knowledge management is too long to even list here. Knowledge management systems are in place or being developed in all kinds of organizations, profit and not-for-profit, private and public sector, high-tech and low-tech, and around the globe.

Knowledge management saves money

But does it work? A few case studies provide some encouraging answers.

Dow chemical increased the value of its portfolio of patents four-fold while cutting its taxes on that portfolio by \$40 million.

Bristol-Myers Squibb cut the distribution time for training from days down to minutes.

Chevron saved \$20 million.

Sun Microsystems cut the costs of sales training by \$3.5 million, reduced the time off job for training by 80%, and trimmed costs of distributing documents by \$25 million.

Haworth cut the time for completing a sale from 2 weeks down to 12 minutes.

US West cut the time for ordering new phone service from 10 to 2 minutes and increased readership of technical documents four-fold.

Texas Instruments reported saving a half a billion—that's a B—dollars through its knowledge management efforts.

Buckman Laboratories cut training costs in half.

Who is leading the initiatives?

Which groups within organizations are currently leading knowledge management efforts? A study by the consulting firm Ernst & Young found that almost half of all knowledge management initiatives originate in the information technology department. Senior management trigger another 22% of the projects. Nowhere on this radar screen is training. Why not? Training departments would seem well-positioned to lead the initiative.

WHAT IS OUR ROLE?

What can early efforts in knowledge management teach us? What new techniques can we learn? How must we revise our current ways of doing business and even our current principles?

Publishing model

One fundamental change we must make is to go beyond the publishing model. The publishing model—or broadcast model as it is sometimes known—underlies the operations of most training and publications departments worldwide.

At the center of the publishing model is the producer. The producer may be a developer of training, a teacher in the classroom, or author of books and manuals.

The producer works by consulting the enlightened few. These are the people who have the knowledge needed by others.

The producer gathers this knowledge, organizes it, and expresses it.

The producer then distributes or publishes the information to the “ignorant masses.”

Catalyst model

The knowledge management model is more sophisticated—and considerably messier.

We still have a knowledge producer. And we have those who need the knowledge. But now, the exchange with knowledge consumers is a two-way exchange. Consumers can ask questions and may even contribute ideas themselves.

Some knowledge consumers also become knowledge producers themselves. I call them local-area experts. Local-area experts exchange information with a subset of the knowledge consumers. This subset may be those interested in an esoteric issue of the overall subject. Or, they may be experts in how one particular department or company is applying the knowledge.

Knowledge consumers are no longer isolated. They discuss, they chat, and they exchange e-mail furiously. These circumferential exchanges complement the radial exchanges centered upon the producer.

What does this new model imply for us, the producers?

1. We must conduct dialogs with our consumers, not merely broadcast information.
2. We must develop materials to foster and support local-area experts.

3. We must put in place communications mechanisms that allow consumers to communicate with one another, with local-area experts, and with us.

PROCESSES OF MANAGING KNOWLEDGE

What are the basic processes of managing knowledge?

Knowledge management is just a metaphor. We cannot “manage” information any more than we can herd cats. What we can do is to improve the processes whereby organizations come to make better and better decisions.

The processes are simple. Organizations get smarter by several complementary processes. I like to group the processes into five main ones.

Effective organizations increase knowledge, capture knowledge, refine knowledge, share knowledge, and apply knowledge. Let’s look at each in turn.

Increase

First we must **increase** knowledge by acquiring new knowledge. When we increase knowledge, we add to the knowledge of individuals. Think of increasing knowledge as sticking a funnel in the mind and pouring in new knowledge.

Sometimes we **discover** new knowledge or gain it through **research**. Other times we gain new knowledge through **reading** or through **study**.

Capture

Second we **capture** knowledge, converting vague, ephemeral knowledge into a precisely expressed and permanently recorded form. We take knowledge locked in a single human brain and make it publicly available.

Capturing knowledge used to mean **writing** it down on paper. Today capturing can involve **recording** it in any form. Increasingly we record the data into a computer file or database.

Refine

We often must **refine** knowledge. Refining knowledge smoothes out the rough edges and removes imperfections.

When we refine knowledge, we make it more useful by **verifying** facts, **correcting** mistakes, **updating** ideas, **augmenting** them, **clarifying** expressions, and **generalizing** conclusions.

We refine knowledge when we make it more complete, more concise, more precise, more accurate, more up to date, and more understandable.

Share

Knowledge is multiplied when it is **shared** among the members of the group. We share knowledge when we **present** it to others, when we **publish** and **distribute** it, and when we **discuss** it with others.

What was in one brain is now in many. It is more secure against loss. Discussions among those possessing the knowledge can lead to new and better knowledge. A community of the knowledgeable can support one another.

Apply

Finally, unless knowledge is **applied**, it is of no use. Applying knowledge involves **planning**, **implementing** the plan, and **solving problems** along the way.

Applying knowledge is the payoff of knowledge management. By applying knowledge, we put it into action to make a profit, improve someone's life, or to save the world. Without application, the preceding steps are just a silly academic exercise.

SIMPLE THINGS WORK

Web technologies can be used to build complex solutions. But they can also be used in simple ways. And often these simple solutions are the most effective. Let's look at a few effective things you can do on your existing intranet to make your organization smarter.

Best practices

Some of the most effective efforts at sharing knowledge have come from having employees post their best practices—or just good ideas—to an easily accessible location on the network.

The key to success in such efforts, we have found, is to make sharing the best practice as quick and simple as possible. One solution is to provide an online form to fill in. The contents of the form are automatically posted to a discussion forum or entered into a database.

As an alternative, you can provide a word-processing template for people to enter and format their ideas before manually submitting them.

Directories of resources

Most organizations already have 99% of the knowledge they need. But 99% of their employees cannot find it when they need it. One solution is to set up the electronic equivalent of the corporate library. Organize and index the resources so that learners can search for them or select them from logically organized menus.

Resources can include books, manuals, reports, specifications, policies, procedures, and other documents—on paper or online. One important type of resource is the hundreds of PowerPoint presentations given each year by company executives, managers, and technical experts.

Discussion groups

One of the most popular features of many knowledge management and e-learning projects is the discussion forum. Here employees and customers can post messages that others can read and respond to at their leisure. Such discussion forums enable extended conversations among people scattered over 24 time zones.

In one example, customers who are unable to find answers in the Help file for a program are encouraged to post questions to the support forum. They can do so simply by filling in a form on the screen. Later, they can check their message to see if they have received a reply. Such forums are highly effective in marshalling support from a whole community of users in addition to official technical support representatives.

Tele-mentors and e-advisors

The term *mentor* for a sage advisor goes back to the ancient Greeks. In Homer's *Odyssey*, when Odysseus goes off to sack Troy, he leaves his son's education in the hands of a teacher called Mentor. And, whenever the goddess Athena swoops down to give the boy advice, she does so in the form of Mentor. Hence, the concept of a *mentor* has come to mean a wiser person who provides guidance and advice to an individual.

With advances in communications technologies, mentoring is possible on a much wider scale than ever before. Mentor and protégé need not work in the same building—or even on the same continent.

Some organizations are setting up formal telementoring or e-advisor programs. They use Web technologies to help match up mentors and protégés and to provide channels for communication. Channels involve infrastructure, such as networks and simple user-interfaces for conferencing, chat, and e-mail. Channels may also include an e-commerce component to compensate mentors—even if only to ensure that their efforts are made visible during their next performance appraisal.

Such programs support long-term advisory relationships among professionals who may change jobs and locations frequently and whose job schedules make regular face-to-face meetings impossible.

Online job aids

Another feature of a knowledge management system is the online job aid. Such aids take several forms.

You might provide a glossary that lets people lookup the meaning of technical terms they encounter in their work.

Or, you may provide a virtual consultant to guide them through a complex business decision, such as how to discipline an employee who has violated security regulations.

Or, you could include a calculator that lets learners compute numbers directly rather than having to first memorize formulas.

Job aids provide just-in-time knowledge. They provide immediate answers to specific questions. They can be quite sophisticated—or just simple checklists to prompt and remind.

Question-answering machine

If you observe how most people go about acquiring the knowledge they need to do their jobs, you notice that one method is more common than all others. Imagine that you need to do something new in your word processor, something you know it can do but that you have never done before and cannot figure out on your own. What do you do?

If you are like 85% of the people in the workplace, your first choice is to ask someone: a friend, a co-worker, a supervisor. You seldom look first in a book or take a course.

But if they cannot ask a person, the next best thing is to have the computer serve as a question-answering machine.

A lot of our efforts over the next few decades will go to creating such a question-answering machine.

SUCCESS STORIES

Let's close with some success stories.

Tales of national revival

In the 1980s, the end was in sight for the US economy. It was predicted that by the end of the century the United States would lose 34 million jobs. The predictions were wrong. During that period the US lost 44 million jobs. But at the same time it created 73 million new jobs, for a net gain of 29 million jobs. Over 55 percent of Americans work in a job that did not exist in 1980. In 1960 there were 5000 programmers; today there are 1.3 million with hundreds of thousands of job openings going unfilled. International trade grew from 11% of gross domestic product in 1970 to 25% in 1997. The value of each ton of exports has doubled during that period (in real terms). The US economy, the largest in the world, was almost completely reinvented.

In 1990 Singapore was a tiny island nation with only 200 square kilometers of land and no natural resources. Its manufacturing jobs were slipping away to countries with lower costs of living. Singapore decided to become a knowledge economy. Now, over 98% of homes in Singapore have access to Singapore ONE the national broadband network. By 2001 all government services will be online and it is planned that 50% of businesses will be conducting electronic commerce by 2003. According to projections by International Data Corporation, by 2002, Singapore should become the world's second largest knowledge economy.

In the late 1980s, Ireland was nearly bankrupt with no significant high-tech industry. Government and business leaders, with help from the European Union, took dramatic steps to join the knowledge economy. The results are impressive. Between 1990 and 1997 Ireland's economy grew at 7% per year, three and a half times the rate of the rest of the European Union. Today software and electronics account for 40% of Irish exports.

Nokia and Finland

I want to tell you a story of how one man's vision transformed a company, reinvigorated his country's economy, and set an example for the whole world.

Until the late 1980s, the Finnish company Nokia was primarily a paper and pulp company, which also manufactured automobile tires and some electronics. Today they are one of the world's largest electronics and telecommunications companies, single handedly accounting for 15% of Finland's exports.

How did they transform themselves to a knowledge company in less than 15 years? Though many thousands of people participated, the man most responsible was Jorma Ollila, president of Nokia. Ollila articulated a clear vision, encouraged a culture that welcomed innovation and tolerated risk, and invested massively in training and in research and development. During the 1990s, Nokia spent more on R&D than the whole country of New Zealand. While leading international companies were spending 4.4 percent of sales on R&D, Nokia spent 10.4%

Largely as a result of Nokia's efforts, Finland transformed itself from a commodity-based to knowledge-based economy, all during a period in which it lost its largest trading partner, the Soviet Union. Technology based products, as a percentage of Finland's gross national product, have increased 5 times.

IN CLOSING

This is not the end, but just the beginning. Most organizations are just starting to manage their knowledge. Many will stumble and fail. But they will try again and again. They will learn and so will we all. I dare not predict what will follow.

We are not at the dawn of the knowledge age. We are just past midnight. We are in the dark with flashlights, a bit afraid of the dark, and too excited to go back to sleep.