What is Knowledge Management?

What is KM?	Tacit Knowledge	Explicit Knowledge	Cultural Knowledge
	Knowledge Creation	Knowledge Sharing	Knowledge Utilization
Values Strategy			
Roles Structures			
Process Practice			
Tools Platforms			

Knowledge Management

is a framework

for designing an organization's

   goals, structures, and processes

so that the organization

   can use what it knows

to learn and to create value

   for its customers and community.

KM Framework (1)

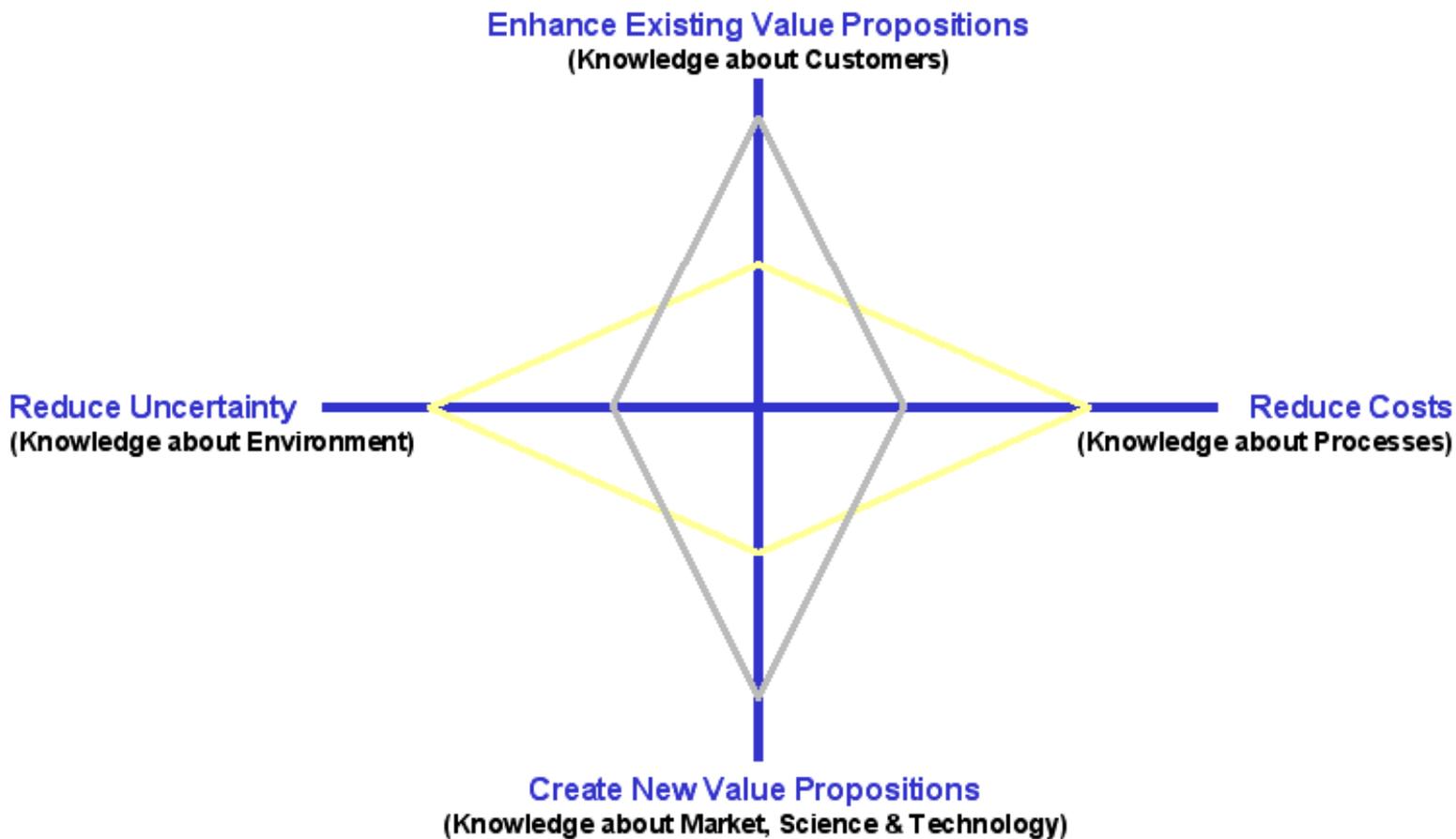| KM Framework	Tacit Knowledge	Explicit Knowledge	Cultural Knowledge
	Knowledge Creation	Knowledge Sharing	Knowledge Use
Values Strategy	· Why is knowledge IMPORTANT to us? · What KNOWLEDGE do we have and need? · What is our CULTURE?		
Roles Structures	· Who will LEAD? · Who will IMPLEMENT? · How do we ORGANIZE?		
Process Practice	· How will we SHARE knowledge? · How will we put knowledge to USE? · How will we CREATE new knowledge?		
Tools Platforms	· How can IT help? · How do we MANAGE INFORMATION? · How do we improve COMMUNICATIONS?		

KM Framework (2)

KM Framework (2)	Tacit Knowledge — Knowledge Creation	Explicit Knowledge — Knowledge Sharing	Cultural Knowledge — Knowledge Use
Values Strategy	· Explain how knowledge creates value for the organization · Link knowledge sharing/use to organizational values		
Roles Structures	· Define roles and responsibilities for leadership, coordination, implementation · Develop group/team structures that promote knowledge sharing and learning		
Process Practice	· Let knowledge sharing and learning occur naturally as part of work practice · Deliberately structure a process to identify, codify, and disseminate knowledge		
Tools Platforms	· Select tools that support tacit, explicit, and cultural knowledge · Build platforms that integrate knowledge creation, sharing, and use		

KM Framework (Tools and Techniques)

KM Framework (3)	Tacit Knowledge	Explicit Knowledge	Cultural Knowledge
	Knowledge Creation	Knowledge Sharing	Knowledge Use
Values Strategy	•Scenario planning •Future search	•Knowledge audit •Action agenda	•Leadership •Commitment •Values Technology
Roles Structures	•Subject experts •Mentors •X-Functional teams	•Knowledge editors •Knowledge analysts •Knowledge architects	•CKO •Champions •Evangelists
Process Practice	•Communities of practice •Peer assists •After action reviews	•Knowledge organization •Intellectual asset mgm •Practice replication	•Motivation •Training & development •Knowledge valuation
Tools Platforms	•Expertise access mgm •Collaborative work tools & platforms	•Data mining •Information architecture •Knowledge repositories	•Enterprise information portals •Community building

KM Framework (Vision and Strategy)

Vision & Strategy: Knowledge to Value

Enhance Existing Value Propositions
(Knowledge about Customers)

Reduce Uncertainty
(Knowledge about Environment)

Reduce Costs
(Knowledge about Processes)

Create New Value Propositions
(Knowledge about Market, Science & Technology)

**4 basic ways to leverage knowledge and information to create organizational value.
Most organizations combine all 4 approaches.**

(Marchand and Rayport 2000)

KM Framework (Vision and Strategy)

	Chevron	HP Consulting	Siemens	World Bank	Xerox	IBM Global Services	Buckman Labs
Cost Reduction	++		++				
Reuse Knowledge, Lessons Learned	++	++		++	++	++	++
Speed		++				++	++
Innovation		++				++	
Reuse of KM Know-how			++	++	++		
Rebranding & Differentiation				++	++		
Improved Quality of Knowledge		++		++			++

APQC (2000)

KM Framework (Structure and Roles)

Roles & Structures

	LEARNING	SHARING	LEADING
Behaviours			
Beliefs	"I am responsible for learning"	"Our knowledge grows when it flows"	"The organization benefits from our knowledge"
Roles Structures	Mentors Coaches	Functional Teams Communities Boundary Spanners	Champions Evangelists Steering Committees
	Individual	Team	Organization

KM Framework (Structure and Roles)

Groups Involved in KM Initiatives

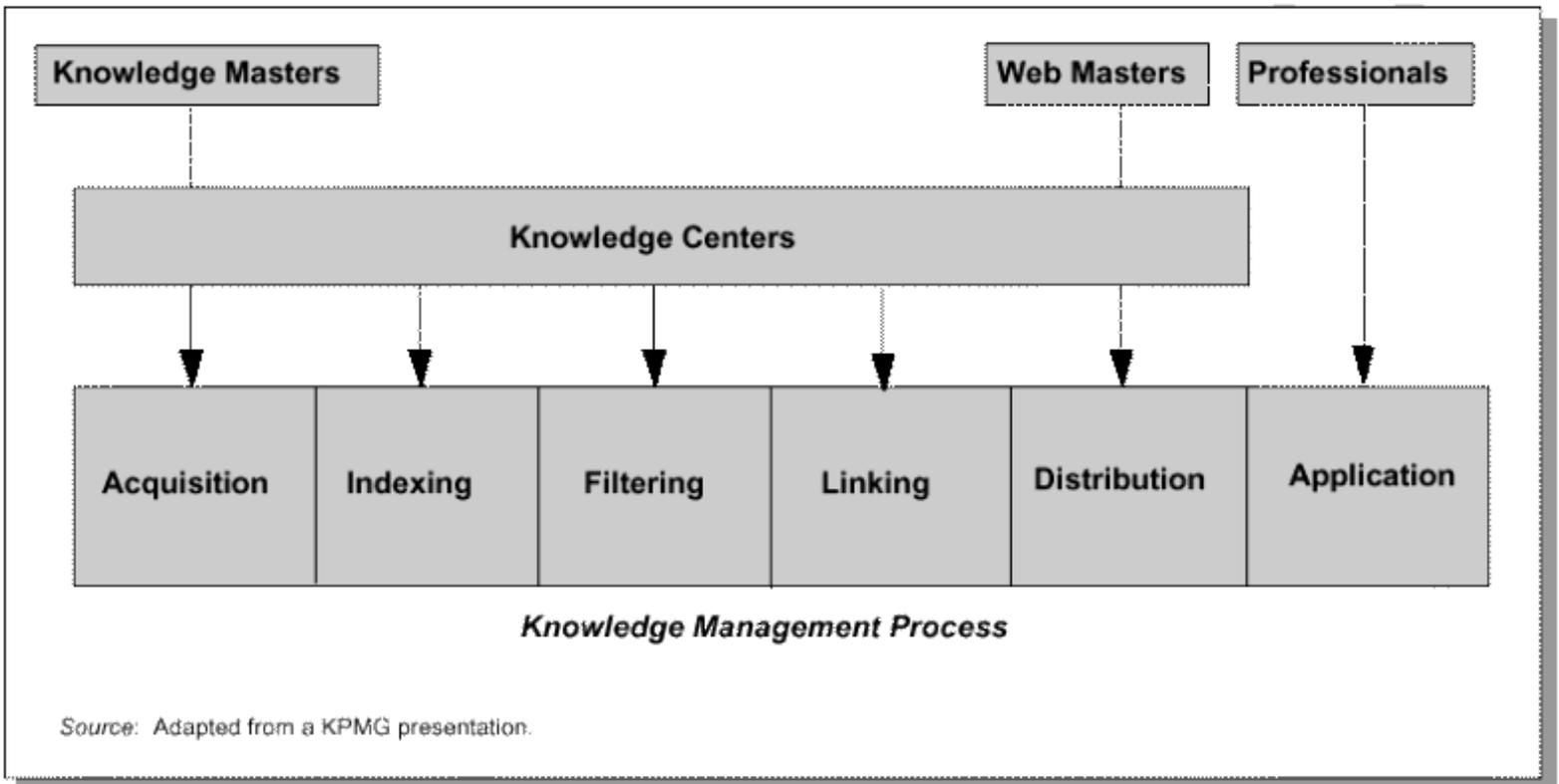| Chevron	HP Consulting	Siemens ICN	Siemens AG	World Bank	Xerox
·Quality ·HR ·IT ·Operating companies ·Marketing & sales ·Technical library	·VP/GM ·HPC Leadership Team ·SAP Practice Leader ·KM Consulting Team ·IT Staff ·HP Consultants	·Executive Team ·Communi-cation Service ·IT ·Information Services/ Library ·Intranet/ Web team ·Marketing & sales ·All levels of mgmt	·CKO & Council ·KM developers, consultants ·CoP ·ICN Share-Net mgrs ·Web team ·Corporate procurement & logistics	·Executive strategy group ·Operations (Sector Boards) ·Information Services/ Library ·IT ·Intranet/ Web team ·KM Leaders	·Corporate ·KM Task Force ·Strategy ·Quality ·Business Intelligence ·HR Eureka: ·Xerox PARC ·Worldwide Customer Service

APQC (2000)

KM Framework (Process and Practice)

Process & Practice: Knowledge Processing Cycle

- **Identify, extract knowledge from primary sources**

  project files, proposals, presentations, email, interviews

- **Edit, refine "raw knowledge" into "processed knowledge"**

  best practices, lessons learned, case studies

- **Organize processed knowledge and making it accessible**

  create a structure for classifying knowledge

- **Packaging, publishing, disseminating knowledge**

  paper, online, Intranet, pathfinders, knowledge portals

- **Manage the whole cycle, design the information architecture**

  architecture for organizing, publishing, navigating information

KM Framework (Process and Practice)

Process & Practice: Structured KM Process

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Knowledge Masters                    Web Masters    Professionals


    Knowledge Centers


  Acquisition   Indexing   Filtering   Linking   Distribution   Application

            Knowledge Management Process

Source: Adapted from a KPMG presentation.
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Case study

Eureka! Xerox Has Found It.

Xerox equipped its service representatives with tools to keep the company's copiers running-a system that allows each technician to carry the knowledge of 24,000 colleagues into every service call.

Source: [Field Force Automation magazine --- April 2000 Edition](#)

By Steve Barth

Machines age

The problems that crop up in a complex new device are different from what ails it later on. That isn't the kind of information that design engineers put in manuals, but it is what service technicians learn about when repairing the products and what they talk about when they get together. Xerox managed to deploy a system that serves every technician's needs, but the solution wasn't technology. It was anthropology. Around the world, DocuColor 40s were getting old before their time. Until the DC40 came along in 1996, the fastest color copier had run only seven pages per minute. Capable of turning out 40 color copies or laser prints per minute, the DC40-the first full duplex color copier-was a breakthrough product for Xerox. By flipping pages through an intricate figure-eight maneuver, the machine can manage 30 double-sided copies a minute. Under its hood, the copier has four inline xerographic modules. Canon had tried and failed to develop a version of its own, so Xerox had a lot of competitive pressure riding on the DC40. This problem of a prematurely aging product would not do for a company that had saved itself from Japanese competition by mastering quality management only a decade before.

"This was completely new technology. To synchronize [xerographic modules] so one copy lays exactly over another was an engineering marvel," says Don Dean, field engineer at the customer and technical support center in Fairport, N.Y. Service technicians call there with the intractable problems even their local hotlines can't handle. In Fairport, experts can open up an identical model in the lab and walk the technician through the repair.

The DC40 was turning into a field service organization's worst nightmare, suffering from the kind of intermittent problem that drives technicians crazy. One minute the machine would work just fine. The next minute, one of the two video selector boards that connect the digital front end-either a computer's printer driver or the copier's digital imaging system-would return a 3396 error code, indicating that it wasn't getting a signal. "Engineers working through the problem had tried changing just about everything," Dean admits. Throwing parts at the problem, an expensive approach, doesn't always work. It

didn't here.

Isolating the problem was no small challenge. Under the tangle of wires, the signal passes through almost a dozen circuit boards, each with hundreds of electronic components and hundreds of leads. The service manuals-three two-inch-thick binders-list more than 16,000 part numbers.

"This was a very expensive problem-not just the machines but the cost of us going out and failing to fix them," Dean says. "We were having to replace these machines because we couldn't fix them."

Unable to identify the source of the problem, Xerox had already replaced half a dozen machines around the world and was faced with replacing one in SaŠ Paulo. After adding the freight and installation time, the repair would cost Xerox approximately $40,000-and a lot of customer goodwill.

A Golden Nugget

Gilles Robert, a service technician with Xerox Canada in Montreal, had solved the DC40 mystery about a month earlier. Behind the panel that covers the machine's left side are the F31 and F32 fuses. Under certain environmental conditions, these two 50-cent fuse holders had a tendency to oxidize, which led to slight fluctuations in the five-volt signal-just enough to throw off the circuit. To repair the problem, the fuse holder didn't even have to be replaced. It simply had to be swabbed with a little alcohol once in a while.

As it happened, at the time the DocuColor was failing in SaŠ Paulo, Tom Ruddy, Xerox's director of knowledge management for worldwide customer services, was in Rio de Janeiro. Ruddy was setting up the Brazilian version of a system designed to help Xerox service techs share their expertise. He was loading software and training the National Technical Specialists, the first line of problem escalation assistance. Downstairs, exasperated technicians had called into the hotline from the customer site in SaŠ Paulo after having worked on the DocuColor machine for three days. Ruddy entered a few keywords into the search engine and the answer appeared on the screen: Clean the fuse contact. The system Ruddy used: Eureka.

One of the big concepts of knowledge management (KM) is knowing what you know. Eureka wasn't the first attempt to get the thousands of Xerox service technicians-the company's largest community of practice-to share their knowledge with colleagues. But as with the DC40, previous efforts had suffered from intermittent failure. One method asked technicians to turn in three pieces of knowledge on their annual employee performance appraisal. Another tried to leverage artificial intelligence for expert systems; it failed miserably because it offered only linear solutions. A third trial forced technicians to create

session trails of diagnostics, but that only produced reams of data without any way to do the analysis.

"This is the fifth or sixth system Xerox deployed to do this. The others didn't work," says Johan de Kleer, manager of the systems and practice laboratory at Xerox's Palo Alto Research Center (PARC) where Eureka was developed. "The technology was not rocket science, but rather the challenge was to come up with the right social insights." Decades ago, PARC was founded by Xerox with the mandate of envisioning the office of the future. Since then, it has literally come up with more innovations than it has known what to do with-the first personal computers, graphical user interfaces, local area networks, page description languages and laser printers, just to name a few. What makes PARC such a unique research lab is the way technologists and social scientists work together in cross-disciplinary engagement. PARC uses anthropologists and sociologists to understand how people do their jobs and work with others.

At PARC, de Kleer manages the research into "knowledge ecologies"-how knowledge is created and shared in organizations. "I view my job as creating a context and getting people to unleash their passions," he says, explaining that Eureka is a good example of this, as the system wouldn't have been created if his researchers weren't given the freedom to follow their passions. "People pursued Eureka before I ever approved it."

Organizational Behavior

Like most service organizations, Xerox repair technicians have their own language and culture. They constantly have to deal with impossible problems because, over time, machines erode in ways that aren't covered in the manual. They are so loyal to their customers that they'd often rather look bad in front of their managers than disappoint a customer. "As a mobile work force, they can avoid their managers but not their customers," Ruddy says.

Above all, they take pride in their work, especially in solving intractable problems that have stymied their peers. Through that friendly competition they determine the hierarchy-the pecking order, in anthropological terms-of their social structure. "Whenever they got together on their two-way radios or, at a parts drop or in workgroup meetings, they used to tell stories of the problems they ran into where the answer wasn't in their documentation," Ruddy explains. "They tried this and that for hours until finally the one thing and Eureka! It solved the problem. That war story would get told around the water cooler, within a community of perhaps 10 or 15 people, but it wouldn't get shared among the 24,000 service technicians we have globally."

What Xerox needed was a way to use technology to share these stories in real time, so that when someone found a solution it would be immediately accessible to the rest of the

technicians. However, one thing that researcher Olivier Raiman found out when he began to study Xerox's corporate culture in France in 1992 was that its techs were unwilling to share their tips because their district's performance was judged against the others. "It was the tragedy of the commons; you couldn't argue philosophy with these people," de Kleer says. "But our social scientists observed a few things, and it was in those insights that the magic happened. Olivier realized the telling of war stories was an illustration that they actually wanted to share, even though they said they didn't." Eureka offered something that Xerox technicians couldn't resist: the chance to brag about their successes on a global scale.

The Struggle to Build KM

PARC pioneered the system in France. To start, Raiman gathered 10 of the best service technicians in Paris for a week and challenged them to remember the best tips that weren't in the manuals. He took those stories and designed a relational database and the processes that would encourage other technicians to both contribute to and consult with the Eureka system.

In 1995, Xerox piloted the system in France, initially on the national Minitel system of dumb terminals, and found it saved an average of five percent of a technician's time if Eureka was used to diagnose a problem. It also saved an average of five percent in parts expenditures. With more than a million service calls per month worldwide, the results seemed promising.

PARC was then ready to deploy Eureka in a larger context. Since Xerox was issuing laptops to its field service technicians, PARC set out to turn Eureka into a portable system that wouldn't tether repairmen to the network. "The concept was to redevelop Eureka for a laptop PC environment. You want to be able to take it [on customer visits] and be able to search on a stand-alone basis," Ruddy says. "We never want to solve the same problem twice. If there's a known solution out there, we want to make it accessible."

Choosing the right connection strategy was important because technicians frequently have trouble accessing phone lines or the Internet at customer sites. On the other hand, wireless connections can be unreliable deep inside office buildings. The answer: a portable database that would update itself when hooked into the network. This was easy enough, since 100 Eureka databases (for different products) require less than 100 megabytes of hard disk space, including the application software. In 1996, Eureka was deployed in North America and has since been deployed worldwide. Today, out of 19,000 Eureka-enabled technicians, about 15,000 are active users, updating on a weekly basis. Ruddy estimates that service technicians know what a problem is right away on 80 percent of their calls, so they probably use Eureka approximately 20 percent of the time. "It saves us on the really long-duration calls, where you are down to trial and error," Ruddy says. He estimates that Xerox

will eliminate approximately 150,000 calls with Eureka per year worldwide-worth $6 million to $8 million. Savings should actually be even higher, as Xerox has implemented the system in its call centers, increasing the expected number of users to 25,000 by year's end.

What Makes Eureka Work?

"When people hear about Eureka, they always want to see the software. But it's really the environment that we are creating," says Ruddy, who has a doctorate in industrial and organizational psychology. "We realized early on that technology wasn't the solution-that if we didn't work on the behavioral side of the equation, it wouldn't be successful. We concentrated on understanding what would make people want to share solutions and take their personal time to enter stuff into the system. A principle of our strategy was recognizing and rewarding people for their creation, use and-more importantly-reuse of existing knowledge, not the reinvention of solutions."

When techs find a solution that isn't in the service manuals, they enter it on their laptop's Eureka system. Templates simplify the entry process, but service technicians can also convey a tremendous amount of information in the shorthand unique to their profession and their community. Tips tend to be short, so they don't take time to input. The next time a submitter connects to the network, their tip is uploaded to the network at the same time other new tips are downloaded to the laptop.

All tips are validated. But rather than deferring to design engineers, technicians' contributions are vetted by their peers-hotline and senior field technicians who are recognized as experts for those particular products.

"Validation isn't just yes or no, it's a conversation with somebody who probably understands the machine better than you, and for many technicians, this is a cool thing," Ruddy explains. "Solutions are in the day-to-day words of the technicians, not the language of the product engineers pushing knowledge down to them."

Tips are validated locally, in case something like altitude is a factor. Validators are supposed to notify authors within 14 days that they are working on the tip; some tips take longer to completely test than others. After being validated, a tip is viewed by everyone who subscribes to products for which the tips are applicable.

Some fixes aren't going to be officially sanctioned-such as part modification. However, such tips can be passed up to "supervalidators" who test innovative suggestions that could each conceivably save millions of dollars. Since politics are inevitable, supervalidator councils are also responsible for hearing appeals from rejected authors and resolving international disputes over tips.

Assimilating Into Corporate Culture

Now that Eureka has been implemented worldwide, it has to cope with the eight languages spoken by Xerox's technicians. Tips can be authored in any language; validators are bilingual; and approved tips are translated into English with the original language retained as an attachment. Since technicians tend to have more trouble with colloquialisms than technical terms, a function built in the software translates difficult phrases.

The name of the author and the validator remains with the tip. Ruddy explains that this simple recognition turned out to be a much more effective incentive than money for the technicians to contribute to Eureka.

"They author tips because they believe it will be reciprocal in the long run," says Ruddy. "They take pride in solving the problem that nobody else can solve." A technician in Minnesota keeps a French technician's thank-you note taped to his dashboard to remind him that every time he finishes a call, he might have learned something that would help others.

Ruddy's favorite tip in the Eureka database was contributed by a Canadian technician. "When techs troubleshoot problems, they try to use all of their senses," he explains. Many tips refer to smells, noises, or feeling a bur on something. This tip has a short sound file attached to it, which the technician recorded directly into his laptop: a cricket-like clicking noise. The tip says that if a particular machine makes this noise at the end of a print cycle, a pulley assembly is likely to go bad within the next thousand copies. "We never planned for Eureka to be used that way," Ruddy says of the sound file, "but that was the most descriptive way to get at the problem."

Although most technicians were initially skeptical of the system, the peer pressure now weighs on the side of using Eureka. Xerox service technicians contribute approximately 600 tips per month, and less than 10 percent are rejected. To date, approximately 36,000 solutions have been validated.

When a technician views a tip, he is asked to vote on whether it helped, so each tip develops a success rate for how many times that solution was applied and how often it fixed the problem. Eureka also tracks hits and captures search words used. There is now a Eureka Hall of Fame for those who contribute tips that prove most useful. The next big projects will be mining the usage data in Eureka as well as analyzing what the tips say about improvements to make to Xerox products.

"One way to look at it is that Eureka is a way of creating a conversation among 25,000 people," de Kleer says. "Now that we see this learning loop succeed, we are starting to

explore other learning loops, such as one back to the field service organization to improve the manuals, although the manual writers realize the technicians can write their own manuals now. Another loop is back to the quality-control people in manufacturing, because they want instant feedback about what is wrong with the early products that come off the line."

Connie Moore, vice president and research analyst at Giga Information Group, says that Eureka is a great case study for other companies. She's impressed by the scale and level from which it is supported. "Eureka stands out as an excellent example of how knowledge management can be applied to a very critical business process. They dramatically changed how the customer service organization supports products in the field and have gotten some impressive ROI. This wasn't some experiment, but a core business process that must be done well," she says. "Xerox has tremendous brand equity that comes from quality, and Eureka really strikes right at the essence of what its branding is all about, which is quality and customer service. It has to maintain that reputation, and this is a way to renew it over and over again."

Steve Barth is editor at large for Knowledge Management magazine.

Company: Xerox
Headquarters: Document Solutions Group, Rochester, NY

Point of Pain: Engineers were wasting time and money searching for solutions that had already been found by their peers.

Solution: The Eureka database enables workers to benefit from the findings of their world-wide peers, making problem diagnosis and repair as efficient as possible.