

A pair of glasses with a dark frame is positioned over a document. The document features a line graph with a bell-shaped curve, labeled 'Fig. 2: economy model'. The graph's x-axis is labeled 'Time' and has markers for 'I-1', 'I-2', 'I-3', and 'I-4'. The y-axis is labeled 'Number of new buyers'. The curve is divided into four segments: 'Innovators' (I-1 to I-2), 'Early adopters' (I-2 to I-3), 'Majority' (I-3 to I-4), and 'Laggards'. Below the graph, there are arrows pointing to the right, labeled 'I-1', 'I-2', and 'I-3'. To the right of the graph, there is a block of text, partially obscured by the glasses. The overall background is a warm, orange-toned image of the document and glasses.

Research Report

Better Practices for Retaining Organizational Knowledge: Lessons From the Leading Edge

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This report describes a set of "better practices" that organizations are using to address the threat of lost knowledge caused by changing workforce demographics. The challenges of knowledge retention now confront many industries faced with an aging work force, faster turnover among mid-career employees and more competitive recruiting. The early success of the initiatives described here provides useful lessons for executives who recognize that knowledge retention and workforce planning are critical for sustaining future organizational performance.

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Better Practices for Retaining Organizational Knowledge:

Lessons From the Leading Edge

In 1998, after significantly downsizing for 10 years, the Tennessee Valley Authority (TVA) realized that the median age of its 13,000 remaining employees was 48. Because most of its workers retired well before age 60, this meant that over the next 10 years TVA, the largest electrical utility in the United States, was bound to lose many of those it depended on to run its nuclear, coal-fired and hydroelectric power plants efficiently and safely. Those employees, and the knowledge they embodied, would be hard to replace.

Changing workforce demographics, marked by an aging labor force, more competitive recruiting and faster turnover among younger employees, are creating unprecedented knowledge retention problems in many industries, threatening to reduce the capacity for innovation, growth and operational efficiency. A recent study of 26 firms conducted by the Accenture Institute for Strategic Change documented the danger lost knowledge poses for organizational performance in the global chemical industry.¹ But, of course, operational and institutional amnesia imperil more than just the chemical industry.

This report outlines a set of "better practices" that organizations currently are implementing to address these concerns. The practices shared here are not claimed to be "best in class," because the challenges of knowledge retention are so new that a rigorous comparison cannot be established. At this moment, no one is ready to claim that they know what "best practices" are when confronting the threat of losing knowledge critical to organizational performance. Nevertheless, the early success of the initiatives described in this emerging area provides useful lessons about the options global chemical companies and other organizations have to address knowledge retention concerns.

One of the early lessons from organizations addressing knowledge retention issues is the need for a comprehensive approach. Simply creating a database of "knowledge objects," introducing a mentoring program or employing retirees as contractors will be inadequate for dealing with a systemic problem that is effected simultaneously by challenges related to retirements, recruiting and the retention of younger employees. In our research, Accenture has identified several critical success factors that comprise the

framework for action necessary to capture, share and reapply knowledge before it is lost (see Exhibit 1).

Exhibit 1



Identifying Knowledge at Risk

The first step in retaining critical knowledge is identifying what essential knowledge is at risk. TVA, Siemens AG and Delta Airlines demonstrate how this can be done in a variety of different situations.

To identify the specific knowledge and skills at risk, TVA began surveying all of its employees annually in 1999 to find out who

was planning to retire and when. Response to the survey was strictly voluntary, and after some initial resistance, 84 percent of employees provided a non-binding planned retirement date.

Projected retirement dates are multiplied against a "position risk factor," an estimate of the indispensability of an employee provided by their supervisor or manager, to produce an attrition factor that represents the level of effort and urgency needed to manage the retirement and replacement of an employee.

$$\text{Retirement Factor} \times \text{Position Risk Factor} = \text{Total Attrition Factor}$$

TVA then creates a report for each of its work sites listing the site's employees and their attrition factors, and detailed succession plans are created for replacing those employees whose pending retirement date and hard-to-replace knowledge makes them particularly important to the company. Part of the succession process involves capturing as much knowledge as possible before these veteran employees leave the company.

Siemens AG, Europe's largest electronics and electrical engineering company, has an elaborate knowledge management infrastructure. As part of that effort, it has developed a knowledge-retention process and a broad array of practices for retaining knowledge depending on the situation. For example, if a manager determines that a departing employee possesses knowledge that is both crucial and unique, that manager is expected to make extensive efforts to retain the employee's knowledge.² The approach used depends on the answers to several questions:

- Is the expert who is leaving both willing and capable of sharing his or her knowledge?
- Is the employee leaving the company entirely or just moving to another part of the organization?
- When is the employee leaving?
- Is a successor already in place?

Answers to these questions can help any Siemens manager determine the level of effort that should be put into retaining an individual's knowledge and also in selecting the types of knowledge-retention methods that would best fit the situation.

In the wake of September 11 and a sluggish worldwide economy, which together made severe layoffs inevitable, Delta Airlines faced a knowledge retention crisis in the fall of 2001. After a reduction-in-force in 1994, Delta had lost significant dispatch reliability, incurring cancellations and costing it customer

goodwill. In 2001, management was intent on cutting its staff as necessary without reducing its knowledge and performance. Eleven thousand employees accepted Delta's attractive severance package by late October 2001—1,200 aviation maintenance technicians and related support staff, many with 20-30 years of experience were included in that count. Mike Dolen, a manager in Delta's learning services organization and the head of the new knowledge-capture process, was confronted with a real knowledge-transfer challenge.

To address the problem Dolen had supervisors identify who among the departing employees represented a "critical job loss," and interviewed only those who met four additional criteria: they (1) were outstanding performers; (2) occupied positions in which there were no other incumbents or no one was trained as a back up; (3) were considered a go-to person during crises; and (4) had great contacts inside and outside of Delta.

The technical operations division, which includes Delta's maintenance technicians and engineers, had 120 people nominated for interviews, primarily because employees in this division had the most unique skill sets, took the longest time to train for a job and were among the longest tenured at Delta. (There were 66 people who had been with the airlines more than 40 years.) Jim Smith, director of performance and learning for technical operations, knew his group needed to interview these people in less than a month, so he established priorities by matching departure dates against the criticality and uniqueness of the individual technician's knowledge. In the end, his team was able to interview 85 of the 120 people targeted before they left Delta in December, including all of the most critical nominees.

Knowledge-transfer Practices

The heart of any knowledge-retention strategy is its knowledge-sharing practices. There are many sorts of methods that contribute to knowledge capture, sharing and re-application: after-action reviews, communities of practice, face-to-face meetings, mentoring programs, expert referral services, training, video conferencing, interviews, written reports, etc. While many of these practices are helpful for creating a general knowledge-sharing environment, the question remains which ones are most useful for addressing knowledge-retention problems?

Siemens directs its managers to ask these five questions when determining the best method for transferring valuable, imperiled knowledge:³

- **What is the life cycle of this knowledge?** Will it be obsolete in a few months or still valuable 15 years from now?
- **What types of knowledge are involved?** For example, is it explicit rule-based knowledge that is easily documented, purely tacit experiential knowledge or implicit knowledge (explicit knowledge not yet articulated)?
- **How much time is there before the expert leaves the organization?** Is it a matter of days or years?
- **What is the expert's level of motivation and capability for sharing the knowledge?** What is the successor's motivation and capability for acquiring that knowledge?
- **What are the costs of applying the specific methods of knowledge retention being considered?**

The criteria for choosing between transfer practices fall into three categories: (1) considerations concerning the impact of the knowledge in question; (2) considerations regarding the timing of its loss; and (3) considerations about the kind of knowledge represented.

As for impact, it is important to remember that all knowledge is not created equal. Experiential knowledge about keeping a nuclear power plant operating safely is virtually priceless. In contrast, knowledge gained from years of experience calling on customers to sell specialty chemicals is valuable, but there is a limit on what should be spent to retain these detailed insights about customers.

As for timing, Accenture found that companies usually are in one of two situations, which dictate the use of different knowledge-transfer practices:

- They have recognized that the demographic make up of their workforce suggests they will face major knowledge-retention issues in the next two to 10 years (for example, TVA).
- They have been surprised by an unanticipated loss of knowledge due to a sudden increase in attrition in the short term (for example, Delta Airlines).

The other factor determining the type of methods used will be the types of knowledge involved. Where possible, tacit or cultural knowledge needs to be transferred with practices involving more face-to-face interaction, such as mentoring or after-action reviews. But the more practical, explicit and rule-based the knowledge is, the less face-to-face interaction required, making it more feasible to use training or technology-based systems to transfer the knowledge. There are a variety of transfer methods available to support knowledge retention, but each one has different purposes, strengths and limitations. Five of the most widely used ones are described here:

Interviews/Videotaping

When 1,200 aviation mechanics and support staff "took the package" late in 2001 at Delta Airlines, the company interviewed 85 of those considered to have the most critical specialized knowledge on different aspects of aircraft maintenance. TVA has also begun interviewing those employees, such as senior engineers and technicians, who are close to retirement and deemed to have critical operational knowledge about the utility's plants. TVA is evolving an interviewing process to surface and capture knowledge about task performance (for example, questions like what reports do you use?), general facts (for example, which vendors do you use?) and lessons learned (for example, what are you most worried about the company not knowing when you leave?). This knowledge is then dealt with directly, either by building it into training materials, codifying it in procedures or checklists, engineering it out of work processes through process improvements or technology upgrades, or by using other resources.

In general, interviews, especially when videotaped, are one of the most expensive methods of capturing knowledge. Often, however, this is the only option left when key employees are about to leave the organization. An issue that remains unresolved for most organizations that have used interviews is how successful they will be reapplying knowledge gained through these face-to-face sessions. Interview transcripts require careful editing, condensing and cataloging to identify "knowledge nuggets" and to make them accessible to employees who will need them in the future. Organizations using interviews to transfer knowledge need to think through the process that will be used to integrate the knowledge captured into the organization.

Mentoring

One-on-one coaching or apprenticeships would seem to be a logical approach for transferring important tacit and implicit knowledge from veteran employees. But, in practice, most companies are finding this method very difficult to sustain, except in short-term situations. Most organizations are so resource-constrained these days that it is hard to get experts to take the time needed to adequately train their successors. Realistically, how could a veteran employee pass on 20 or 30 years of experience in a year or two, anyway?

Quest International, whose innovative specialty flavors and fragrances business depends on highly skilled flavorists and perfumers, has tried to transcend these issues by building mentoring into its culture. To transfer knowledge to younger employees, senior experts are given responsibility for two or three junior application specialists. Quest uses this "buddy approach" to

make sure veteran specialists guide younger colleagues and help them gain experience. "It's an honor to be a buddy," said Bernard Arnold, senior vice president of human resources. "The more experienced people need to ensure that the younger people become successful, and the senior people love it. It gives them status." Although a companywide mentoring program may require deep, perhaps expensive changes in company culture, companies also may be able to make a more limited use of the practice in specific situations where particular individuals hold knowledge truly critical to the organization's continued strategic success.

Storytelling

NASA has made extensive use of storytelling. In the late 1990s, it found that many of its most experienced employees were retiring just as the number of complex space projects was increasing, and, thus, it began to look for ways to transfer the experience of veteran managers to its less-experienced workforce. One way it does this is through an online magazine designed to capture project managers' stories. "Generating, sharing and discussing stories is an excellent way of converting tacit knowledge to explicit knowledge, and an effective method for quickly assimilating new learning," said Alexander Laufer, editor-in-chief of NASA's online journal.⁴

NASA's Jet Propulsion Laboratory (JPL) in Pasadena, California, is using storytelling for a different type of knowledge retention. Since early 1999, monthly storytelling sessions have been held in JPL's library. These sessions, which usually are videotaped, often bring NASA veterans back to recount what it was like being part of old missions. This effort is intended to help socialize newer employees into the JPL culture and to connect them with the lab's history and mission of "doing what no one has done before."

Storytelling, of course, also has its limits. Charlotte Linde, an expert on uses of narrative who works for NASA, has found that storytelling is good for conveying events that require interpretation, such as how a program manager dealt with conflicting organizational priorities. But she has not found stories a useful way to transfer knowledge about how to accomplish a technical task that involves facts and technical issues but little interpretation.

As knowledge retention becomes a more compelling problem, storytelling will gain credibility and popularity. Organizations such as the World Bank, IBM and Corning already are making productive use of storytelling, and there is a growing body of research on the valuable role stories can play in transferring knowledge.

Communities of Practice

When knowledge retention becomes a management issue, communities of practice usually become an important part of any long-term strategy to diffuse knowledge before it is lost. Shell Oil Company has benefited significantly from the use of communities of practice, or as it calls them, networks. Networks serve multiple purposes in Shell, but in some cases these communities have come to play a role as "knowledge stewards" for a particular area of expertise in the company. For example, to connect professionals who were distributed across project teams, Shell created networks of employees who shared a common discipline. One such network consisted of geologists, reservoir engineers, petrophysicists and other geoscientists who were all concerned with a particular geological formation known as turbidite structures. This group of about 15 top experts in the field soon took on the name "Turbodudes." They have continued to meet weekly for several years, talking informally about the technical problems individual members were confronting in their work and considering alternative solutions. These ongoing interactions have spawned many rich one-on-one relationships that are an important source of daily knowledge transfer.⁵

Buckman Laboratories is another company that has had long-term success with communities of practice. Buckman identified three critical areas where it needed to promote networks to share and capture knowledge around the sales organizations for each of the company's three lines of business—pulp and paper, leather, and industrial water treatment. Although not primarily set up to retain organizational knowledge, the industry-focused networks serve that purpose as a byproduct of their members' efforts to help each other solve customers' problems.

Both Buckman and Shell have extensive experience trying to build distributed global communities to facilitate knowledge transfer, and they have both learned that it is much more difficult to build social networks across different organizations that are also geographically distributed. Language barriers, lack of common terminology and lack of trust all inhibit knowledge sharing. Thus, expecting communities of practice to be an important vehicle for facilitating knowledge retention in global organizations requires patience and a long-term commitment.

One of the most interesting networks that we found was a cross-company community founded by Siemens and BMW to address the challenges of losing expertise through retirement and attrition. The "Leaving Experts Community of Practice" currently has six companies as members, including Intel, Infineon Technologies and Winterthur Insurance Switzerland.⁶ All the companies participating in the community are confronted with high retirement and turnover levels due to mergers, layoffs

and employee dissatisfaction. One of the primary goals of the community is for members to collect and exchange information about the knowledge-transfer methods they are using.

Other organizations frequently ask to join the Leaving Experts group, but community moderator, Tom Falter, program manager in the corporate information and operations organization at Siemens, said there are two main criteria used to evaluate possible new members. First, they must be experienced in dealing with the problem of losing expertise and be able to contribute lessons of value to other companies. Second, they must not be a direct competitor of any of the existing members of the community.

Training and Education

Even when knowledge is "captured" in interviews, case studies, videotapes, etc., it does not add value until it is distributed to those employees who can reapply it in the context of their jobs. As a knowledge-transfer practice, training is thus likely to be part of a "blended solution" that might include some combination of formal classroom training, eLearning, video- or computer-based training, on-the-job training, coaching, shadowing, etc.

Accenture found the materials used to develop training content most likely come from face-to-face interviews conducted before an employee leaves the organization. So far, only a small percentage of these interviews are being videotaped, depending on the type of knowledge being captured, the interviewee's comfort level with the camera and the budget available. In addition to interviews, NASA has commissioned some senior-level retirees to write case studies covering specific projects they worked on and the lessons learned. This material will be incorporated into the agency's Academy of Program and Project Leadership, which is designed to improve program management competence throughout the organization.

Training is useful only as part of a knowledge-retention strategy in certain jobs and for specific types of knowledge. Delta Airlines, for example, incorporates lessons from veteran mechanics into its training materials and standard operating procedure manuals because this knowledge deals with repetitive tasks in which actions can be standardized. Because its engineers, however, tend to deal with "one-off" problems, both more abstract and specialized than those of mechanics (for example, how to do a stress analysis rather than how to replace a part), Delta does not regard their knowledge as appropriate for transfer by training.

Accenture spoke with several companies that believed that because one kind of organizational knowledge concerns who to go to get something done, it is important that training also be

about who employees should contact when they need to know more about a specific topic. One European chemical company told us that its managers are taught to think that having only one source of expertise in a critical area is just one unlucky event away from having no expertise at all in that subject ... that is "one is none." Siemens makes sure that it has at least two trainers who are competent in every topic or process covered in its product development training program.

Many companies may gravitate to training as a logical knowledge-transfer practice when addressing knowledge retention. The danger, however, is that this approach allows managers to overlook more important tacit knowledge, which, although difficult to transfer, may be the more costly resource to lose.

Using Information Technology to Enable Knowledge Capture, Sharing and Reuse

Pioneers in organizational knowledge retention recognize that their primary challenges involve behavior or process changes. There are two reasons information technology plays only a secondary role in addressing threats of knowledge loss. First, most useful knowledge either cannot be captured in a computer system or it will not be accessible in a digital format by those who might benefit. Second, applying information technology to knowledge-transfer problems will have almost no impact without first recognizing the culture and context of knowledge use. Except in unusual cases, leading with the technology is a recipe for failure.

Nevertheless, Accenture thinks information technology has an important role to play in many knowledge-retention initiatives, even though all of the applications we heard about in interviews were still in the pilot stage or had just recently been rolled out. Instead of trying to provide a full run down of the applications we found, below are two promising illustrations of how information technology is being applied to reduce knowledge loss in organizations.

Quaker Chemical

In 1999, Quaker Chemical recognized that an aging sales force and technical staff posed a major risk for the company. Quaker's sales reps and lab technicians, who possessed most of the firm's knowledge of its customers, were retiring at unprecedented rates. As the US-based specialty chemicals company began pursuing an aggressive globalization strategy, management needed an infrastructure that would improve its knowledge capture and sharing capabilities across the worldwide organization.

To address these multiple objectives, Quaker began piloting a software system from Intraspect in its research & development labs worldwide. The enterprisewide Quaker Business Intelligence project is designed to facilitate collaboration in solving customer problems, and at the same time build a fully searchable knowledge base of e-mail discussions and documents for use in the future.

As might be expected, the process of implementing the new collaborative software was full of unexpected challenges—and benefits. The lack of computer skills among the aging workforce was one of the first surprises. Project managers had to invest considerable time in helping Quaker Chemical's lab technicians and sales force develop personal computer and Web-based skills in the first couple of years. Not surprisingly, there was resistance among sales reps who tended to be reluctant to share their knowledge about customers through the system. This resistance began to subside, however, when senior management took a strong stand tying most employee bonuses to their level of contribution in the Quaker Business Intelligence system.

The greatest benefit of implementing the Quaker system has been the unanticipated visibility gained into how knowledge is distributed and how work actually gets done in different parts of the company. "For example," said Tom Baker, manager of the Quaker Business Intelligence project roll-out, "if I call our lab in Holland to ask for information about the steel cold rolling process, I now know to call the development chemists in the lab. But in Australia, I'd call the lab director because he wears multiple hats. We now have visibility into where the knowledge is in our company." Quaker Chemical set out to develop a knowledge base, but it ended up with something equally valuable—visibility and a global understanding of who has what knowledge. This allows the company to better optimize the allocation of its human resources.

Quaker Business Intelligence started out as a small pilot in Quaker's technical labs, but by the end of 2001 demand for the collaboration software was so widespread that the company hired a full-time administrator to support the system. Among the administrator's tasks is helping different groups define a logical knowledge structure for storing content on the system. The global sales organization, for example, was undecided whether it should structure and store content by global key accounts, product application or region. These decisions are part of the system's evolution.

After capturing and indexing several years of problem-solving discussions, Quaker began to develop a searchable knowledge base that it expects will add value in developing future customer solutions. Thus, a key step has become educating users in how to

search the system effectively so they are not overwhelmed with hits that are irrelevant to their current problem or question.

One clear benefit of the Quaker system is that it makes key experts in the company more visible through their contributions to the knowledge base in response to queries posted by others. Experience with the collaboration technology has taught Quaker management that following a natural process of knowledge capture will not transfer enough knowledge before people retire. To address this problem the company hired a director of knowledge management who is responsible for debriefing individual experts directly to accelerate knowledge retention in particularly critical areas.

While there are still technical hurdles in connecting some of Quaker's foreign sites, and there is reluctance in some quarters to use the system, collaborating through Quaker Business Intelligence is rapidly becoming part of the company's culture. The global operating committee now uses the system before and after meetings to make its sessions more efficient and to document discussions, and financial results are posted regularly on the system. One important lesson from Quaker's experience is the shift that has occurred away from its initial focus on retaining knowledge from specific groups, such as the sales force. Today, Quaker's knowledge-capture efforts are driven by its business strategy. In the meantime, Quaker Business Intelligence has helped make the company's real experts visible and the process of implementation has shown how knowledge actually is distributed in different sites. Understanding where expertise is located is a critical step before more proactive knowledge retention tactics can be used with employees whose knowledge may be at risk.

Metals Refinery

The new general manager of refining operations for a large global metals producer realized he had a major knowledge retention problem on his hands soon after he took the job in September 1998. One of the company's refineries used a metals production process that relied on highly lethal chemicals, and its senior operating superintendent, who had begun working at the refinery when it was being built 27 years ago, was due to retire. In addition, several other operators who had spent their entire careers working in the refinery were also eligible for retirement. The risk of losing critical operations knowledge in a production process using lethal chemicals posed a huge safety concern for plant management. Even if an accident resulted in no injuries, there were significant environmental and community concerns.

Initially, the general manager planned to hire a journalism student to engage the retiring superintendent in discussions around

problems with specific pieces of equipment and processes where he had unique experiential knowledge. But in conversations with several consultants, the general manager realized that, even if the veteran superintendent remembered how he had solved a specific problem years ago, the chances of all the necessary variables lining up again in such a complex production process were very slim. Thus, the general manager became convinced that he needed some other way to capture the tacit problem-solving processes used by his veteran employees.

In early 2000, the refinery experienced major quality problems when a recently rebuilt processing tank came back on stream. As a result, the company lost millions of dollars in revenues when it was unable to fill orders for longstanding customers and temporarily had to sell some of its product at a lower cost. Management was very concerned because the refinery's other tank had to be rebuilt in 2001. A similar quality upset had occurred 15 years previously, the last time the tanks had been rebuilt. Management needed to determine the root cause of the problem quickly and retain that knowledge for future overhauls.

To find a solution, the plant manager brought together everyone involved with maintaining and operating the equipment. The group used a new type of question-based reasoning software from PHRED Solutions, a Breckenridge, Colorado software company. The intranet-based application is designed to help make explicit the reasoning of team members when solving production problems. In the process, the system also helps share and retain the tacit knowledge developed during these problem-solving sessions.

By working through PHRED's guided problem-solving model, the refinery staff was able to analyze what they had done and what had happened when the first tank was rebuilt. They discovered the root cause of the tank malfunction was that the glue used in certain seams in the tank liner was creating quality problems that could not be identified during sampling tests. "You don't want to trust people's memory on a huge problem like this, and you need to be confident you got to the base cause," said the refinery general manager when explaining his decision to use the software. The resulting solution proved itself when the plant's other tank was rebuilt in 2001 and returned to service without incident.

More recently the plant has used the PHRED application to make explicit the tacit reasoning skills of its most experienced operators in solving routine problems on the plant floor. Some 60 percent of the refinery's staff has 25 to 30 years of experience, while many of the remaining employees have worked at the plant only about two years. Thus, there is an urgent need to transfer the knowledge of veterans to less experienced employees.

Working with the question-based reasoning software, shift teams met and began thinking through the types of operating problems they run into regularly. Problems included: "A pump won't transfer the slurry. We're getting a high level in the tank and can't control it. Why is reactor filter life reduced?" The software guided the shift teams through these problems, asking them to state the problem, analyze its impact, design a temporary fix or determine the root cause, and define a more permanent solution.

Most significant was the new dynamics that became evident in the way team members interacted when responding to the questions while one team member typed answers into the system. One of the group leaders in the plant noted, "It turned out the experienced people were very willing to share and the younger employees were amazed at what they didn't know. So information was being passed on through a dialogue process that doesn't occur on a daily basis. But we also wanted to document it so people who are not around can benefit from the knowledge."

The refinery's general manager was even more surprised by the impact of the technology-supported sessions. He said:

"I had always assumed people were withholding knowledge, but in reality they just didn't have a forum to share it. The senior operators never had a way of sitting down with the younger guys and transferring what they know. But the software gives them a reason to sit down as a group, and it's not a finger-pointing exercise. It's a pure learning experience. They can say, 'Here's what came up, and here's why we dealt with it like that.' We're just starting on this, but I'm hugely encouraged. I think we've found the mother lode in terms of how to transfer knowledge."

Using information technology to support knowledge-retention efforts presents the usual set of technical difficulties, as the software is gradually refined to meet the demands of users. Questions about connectivity, speed and search capabilities must all be kept in mind. The systems at both Quaker Chemical and the metals refinery were creating digital "knowledge bases" by virtue of the users' inputs. But sponsors at both companies concede that questions remain about how frequently and effectively these knowledge bases will be accessed by others in the future. Nevertheless, early applications show there can be some significant potential benefits from using information technology to help with knowledge retention efforts.

Developing and Retaining Experienced Employees

Career Development and Succession Planning

As we have shown above, a growing number of organizations are using methods to identify critical areas for knowledge retention in the short term. But, ultimately, both short- and long-term approaches are required for retaining knowledge. Companies need processes for identifying long-term human-capital needs, given their business strategy, as well as programs for developing the knowledge and skills required. Shell's chemical companies are taking this longer-term approach to addressing the problem with their Global Technical Skills Resource Management Process, which is designed to ensure an adequate level of technical resources to support current business and growth objectives (for example, will they have enough manufacturing control engineers to meet the current needs of the business as well as bring new plants online?).

To support the process, global skill resource managers were named, each one responsible for ensuring the overall health of one of seven skill families, such as process engineering, project engineering and manufacturing control engineering. Skill resource managers identify critical jobs in their skill family for which there should be global interest in sustaining performance and which also represent important positions for developmental reasons. The global managers' job coverage planning role means making sure the chemical companies in Shell have people ready to fill any vacancy that may occur in their skill family. If there is an opening now, does the company have sufficient qualified technical staff to draw on? And will they have enough experienced people to fill future needs several years out?

While the global managers are focused on one skill family, local skill resource managers have been designated for each of Shell's 10 chemical manufacturing sites worldwide. These local managers focus more on the short-term needs of their site across all seven skill families.

Part of the local skill manager's role is to meet regularly with each technical employee at their site to assess the individual's current and future career interests. They act as coaches about skill development and the types of jobs an employee might pursue next, given their career goals. Shell has begun developing a database of this individual level information so the organization can identify who could be candidates for particular openings in both the short and long terms.

"Our ideal position is to have three people ready for each of our critical positions," said Cary Wilkins, manager of global human resource processes for Shell Chemical Company. "So if we have critical process engineering positions open in three sites, ideally we would want nine people in the pipeline." Implementing the global process initially has revealed where the company's skill resources were most thin, but Wilkins concludes that the real payoff will be in eliminating the skill gaps in key technical areas and ensuring adequate job coverage ratio for all critical technical positions by drawing on Shell's global resources.

Phased Retirements

Although early retirements have been standard practice in the chemicals industry for years, companies will need to find ways to extend the tenure of their most valuable older employees as knowledge-retention and recruiting problems become more acute. One way is through "flexible phased retirement," or allowing employees who have become eligible for retirement to create more varied and shorter work schedules.

Studies have shown that relatively few private-sector companies are providing phased retirement programs for older workers. To date, the practice has been more common in the public sector and in university settings. This is, in part, because of a variety of legal obstacles involving federal tax and age discrimination laws, as well as restrictions created by pension plans, which have often been designed to encourage early retirement. But pressures are building to reduce legal restrictions, and undeniable demographic forces will require new approaches to retain older employees. Two researchers recently wrote:

*Sometime soon, probably between 2005 and 2010, managers will come to realize there are not enough skilled younger workers entering the labor force to replace the older ones leaving through retirement. When that happens, they will likely do a rapid about face—from encouraging early retirement to discouraging it. They will soon begin asking the question: what can we do to retain, reengage and retool older workers?*⁷

Although phased retirement initiatives are still rare, TVA recently introduced a "Conditional Part-time Employment Program" to help in retaining employees where there is a potential for critical knowledge loss. An employee who qualifies for the program can work part-time, typically 20 hours a week or less, drawing part-time pay, but retaining full benefits and continuing to accrue pro-rated annual leave. Although this program was implemented largely to address TVA's concerns about transferring knowledge from its aging workforce, all of the utility's employees are eligible, for example, new parents or those taking care of aging relatives.

Employees interested in the program must get permission from their manager before participating. Management evaluates the impact of the individual's request on the business and other employees on a case-by-case basis. "The benefits to the company are an important part of this," said Edward Boyles, TVA's manager of workforce planning. "We clearly state that our goal is retaining employees and knowledge, and creating a more productive workforce."

Boyles described an engineering manager who had retired after 30 years with the utility. He was very knowledgeable and a good mentor, but he was also financially ready to retire. "If we had had a program like this already in place, perhaps we could have retained that manager for another year to mentor and train people," said Boyles.

In tandem with the risk-assessment process described earlier that identifies the employees whose knowledge it can least afford to lose, TVA can use the new conditional part-time program to approach specific employees about creating more flexible work arrangements as part of a process to transfer their knowledge before they leave the organization. But Boyles concludes:

"This type of effort can't be done with a cookie-cutter approach. It depends on what the knowledge is that we need to retain. You might cover it over six weeks of brown bag lunches with a group of engineers. Or if it's a turbine specialist who has gained that knowledge over 15 years, you might need a junior person to shadow them for a year. But if we can negotiate this conditional part-time employment with a potential retiree, then at least we know how much time we have. As part of this program, they are still a TVA employee, and we know what we have to accomplish in that year. But, if they retire, we may or may not get them back as a contractor."

Programs for Effectively Utilizing Retirees

One of the most surprising findings from a previous Accenture study of changing workforce demographics in the chemicals industry was how dependent many companies have become on bringing back retirees as contractors or consultants for the sake of the knowledge they alone possess.

Organizations tend to take four different approaches to utilizing retirees: (1) some have strict policies against rehiring retirees; (2) some bring retirees back as contractors or consultants only by informal arrangement with individual managers; (3) some have implemented policies that dictate in what situations retirees can be rehired to limit the practice; and (4) a few, such as Monsanto and Cigna Insurance, have created formal programs to actually encourage the reemployment of retirees. Given the looming shortage of experienced professional and managerial talent in

certain areas, it is only a matter of time until more organizations will have to shift to the latter, rarer approach. Monsanto's Retirement Resource Corps offers an excellent model.

After downsizing extensively in the 1980s, Monsanto's management recognized that too much good talent was leaving the company prematurely. Thus, the company launched its Retirement Resource Corps (RRC), a worker reentry program designed to keep Monsanto lean while also retaining the intellectual resources of many of its veteran employees. Since the early 1990s, the company has used the program to systematically reemploy recent retirees on a per diem basis either to train the next generation of employees or to work on projects especially suited to their talents. "Just because someone is retiring doesn't mean their manager can't keep drawing on their knowledge," said Liz Thien-Reich, the sourcing manager who oversees the program. "The Retirement Resources Corps is a way to have retirees keep coming back in the door."

The RRC is now run out of the company's procurement department. Three months after a Monsanto employee retires they automatically receive a letter asking if they are interested in returning to work at the company part-time. Six months after formally retiring, former employees can begin working up to 1,000 hours per year. The company currently has a database of 1,000 retirees who have expressed interest in returning part-time. At any given time, 300 of these retirees are back in the company as per diem employees, working on a project basis in research & development, information technology, engineering or administrative roles. Salaries typically are negotiated between the hiring manager and the retiree.

Some retirees return every year, such as one international tax expert who, in her late 70s, still works several months a year. Another former research lab director, who had taken a retirement package at 58 but soon after returned, said, "I knew I was coming back part-time. I wasn't ready to retire."

Monsanto benefits financially because these former employees are no longer in the company bonus program, nor do they qualify for company health insurance benefits. But more importantly, the company retains knowledge. "When retirees come back in the door, there's no training needed. They know the way Monsanto works," said the former lab director. "But when a college grad or a Ph.D. walks into a new job here, you're looking at six months before they become productive."

The experience retirees bring to their new roles can add value in a variety of ways. They know where knowledge is located in the organization. For example, what databases already capture the

information needed for a new project? They have a good idea of what pitfalls to avoid when designing a new safety program for Environment, Safety & Health. "Business moves so fast these days that experts returning part-time can tell people what **not** to do, which is really important," said Thien-Reich.

Monsanto's management does not try to measure the business value provided by its reemployed retirees, recognizing any number would be too subjective. Instead, Thien-Reich and her colleagues ensure the Retirement Resource Corps is a "cost neutral" program by calculating a running cost avoidance figure that reflects the difference between the program's administrative and per diem salary costs and fees that would otherwise have to be paid to outside employment agencies. Currently, the RRC is saving the company more than \$600,000 annually, and that is without taking into account the business value of the retirees' knowledge being retained in the process. Programs to reengage employees after they retire may be challenging to set up and create new administrative costs, but in an increasingly tight labor market the opportunity to leverage years of experience and expertise, even on a limited basis, is crucial.

Taking Action Now

Retaining organizational knowledge in the face of changing workforce demographics is a complex challenge that requires simultaneously confronting the problems created by an aging workforce, a shrinking talent pool and increasingly restless employees. The threats posed by changing demographics were not created in a year and will not be solved overnight. The most effective knowledge retention strategies will require a multifaceted approach and a long-term commitment.

Knowledge retention solutions should, of course, be driven by the company's business strategy—that is always the place to start. However, some of the knowledge most at risk today in companies is likely to be in core operations, and there may be a tendency to overlook these areas, which could be a serious mistake. Clearly, there is no one-size-fits all solution when it comes to retaining organizational knowledge. Every company's situation is somewhat different. Indeed, there is significant variation within businesses. For some units this will be a much greater challenge than in others. One Shell manager noted, "The average age in some parts of the company is rising a lot and in others it's dropping. It depends on where you are in the cycle. It also depends on when plants came up and when you laid people off. We've got one plant where the average age is quite young and in others it's the opposite."

Customization is a key characteristic of any knowledge-retention solution. Where an organization starts depends on how pressing is the nature of the problem. For some firms, like Delta Airlines, the challenge of knowledge retention looked like a fire drill when they had to capture know-how from veteran employees leaving in a month. Other organizations, like TVA and NASA, recognize they have a little more time, but they must act now or face serious problems of lost knowledge in the next few years. Still other companies, like Shell, see the problems of knowledge retention and sustaining human capital resources as long-term issues that the business must address immediately because the organizational changes required will take years to implement.

Of course, where and how you focus your efforts depends on where the sponsors are in the organization. After identifying the knowledge most at risk, a plant manager is more likely to concentrate resources on improving knowledge-transfer practices and using retirees, while a corporate executive might focus on succession planning and career development programs, building an information technology infrastructure that supports knowledge sharing and creating a more retention-oriented culture.

No matter where a company starts, it needs to beware of attacking knowledge retention with solutions that are too narrow. The most common mistake inevitably will be implementing technology applications alone, thinking that they will solve the problem. Effecting long-term knowledge retention in a serious way will require much more holistic approaches.

The need to retain knowledge in organizations is going to become even more critical. This problem is not just about aging baby boomers. Every executive knows the technologies that underlie his or her company's operations are becoming increasingly complex and interdependent. These complexities require increasingly deep and specialized expertise, which is going to be needed to sustain and grow the business. The whole problem is further complicated by globalization, which means more distributed work teams.

Retaining organizational knowledge is not just a short-term management problem. Like the quality movement, it represents a philosophical approach to business that will become a prerequisite for remaining competitive in the years ahead. Retaining knowledge to sustain performance in the face of changing workforce demographics is a management challenge that is here to stay. The practices described in this report should give managers some ideas of how to get started addressing these issues.

Building a Business Case for Knowledge Retention

One of the most consistent themes in the interviews Accenture conducted with global chemical companies was the difficulty in identifying the costs of lost knowledge. We found that most "early adopters" proceeded without a detailed ROI evaluation, relying instead on strong executive sponsorship. Here are some key principles for gaining strong executive support:

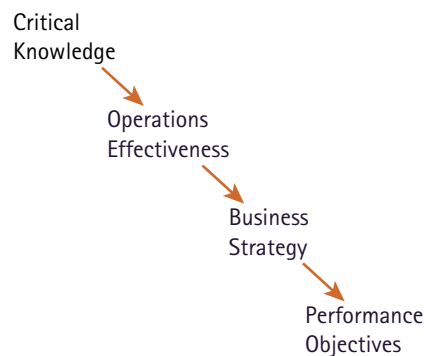
1. Be sure to identify the executive who is the real decision maker, as well as those people who will be influencing him or her.

Knowledge retention initiatives are likely to be cross-functional efforts involving line management as well as information technology, human resources and knowledge management functions. Jack Keen, president of The Deciding Factor, a Basking Ridge, New Jersey-based company that specializes in methodologies for building business cases, said, "When pinpointing the decision maker, always confirm it with multiple sources. The rule is, if you can't triangulate on the answer, assume the actual decision maker is one level higher than people tell you."

2. Identify the goals that really matter to potential sponsors.

Linking a knowledge-retention initiative to the organization's strategic objectives requires a careful assessment of what executives say publicly—in speeches, for example—and what they say privately. A chemical company executive may publicly espouse a strategic focus on growth and innovation to please Wall Street, while private meetings reveal more interest in cutting costs and improving employee productivity. When probing for what the potential sponsor really cares about, be sure the answer is expressed in terms of the ultimate business results. If the initial response is "We need to know how to run our chemical plants more efficiently," keep asking "So what?" until you identify the clear business implication of that

goal. The ultimate answer might be, "We need to run plants more efficiently to reduce costs so we can increase our market share in Eastern Europe." Developing a knowledge-retention business case requires an excellent understanding of the company's business model to identify links connecting:



3. Interview knowledge holders themselves to learn how the loss of particular types of knowledge specifically could affect operations and organizational performance.

Having an accurate, first-hand understanding of the dynamics of knowledge use is essential not only to build a realistic business case, but also to begin generating support among knowledge users for a company's efforts. Unlike some other organizational change initiatives, no knowledge retention effort can be successful without the cooperation of knowledge holders themselves.

4. There are at least five areas to look to identify where the loss of knowledge can affect group and organizational performance:

- **Will the loss of particular technical or scientific experts affect the organization's rate of innovation or, specifically, new product development?**
The departure of a single technical product specialist, for example, can delay the introduction of a new product for months or even longer. The potential lost revenues should be estimated and taken into account when evaluating programs that could reduce the delays by transferring or replacing the specialist's knowledge or by convincing the individual to stay.
- **Are projected retirement rates or the attrition rate of mid-career employees threatening the organization's ability to adequately resource its growth strategy?**
Expansion into developing markets actually requires more experienced engineering and technical staff. But if these veterans are leaving the company rapidly, will the organization have the human capital needed to meet its growth objectives? What will be the business impact of missing expected growth targets?

- **Are there other time-sensitive business processes where knowledge lost through retirement or turnover will increase costs or reduce revenues?**

For example, one chemicals company was concerned about lost revenues as members of its aging sales force began to retire. Estimating those lost sales would help justify investments in capturing sales representatives' knowledge and bringing replacements up to speed faster.

- **What would be the cost of a plant explosion or major quality upset in production?**

The loss of experienced production engineers and senior operators can significantly increase the vulnerability of plant operations to costly disruptions. One refinery manager began investing in knowledge retention initiatives just before several senior operators retired. He recognized that a safety violation in his unit would affect the company far beyond the short-term profit and loss statements of his plant.

- **What is the cost of "reinventing" capabilities and processes that the organization once had but has lost or forgotten because of inadequate documentation and turnover?**

Identifying the costs of reinvesting in capabilities the company once had can be a powerful way of justifying knowledge-transfer initiatives. One high-technology company recognized the cost of lost knowledge when they figured the fully loaded charges of a research scientist who spent nine months recreating work another scientist in the company had done several years ago.

Building a business case for knowledge retention initiatives may not be necessary in every organization, but many companies face so many demands on their existing resources that senior management needs to see a strong economic justification for these investments.

About the Author

David W. De Long is a research fellow at the Accenture Institute for Strategic Change. He is currently writing a book on knowledge retention solutions. His other work focuses on managing the organizational changes needed to create real business value from IT investments. David is also an adjunct professor at Babson College. He may be reached at ddelong@babson.edu, or by phone at 1+978 369 5083.

About the Institute for Strategic Change

The Accenture Institute for Strategic Change was founded in 1996 and conducts original research focused on business innovation. Based in Cambridge, Massachusetts, the Institute consists of management researchers working collaboratively with executives and other researchers to bring innovative and actionable ideas to decision-makers.

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For the fiscal year ended August 31, 2002, Accenture generated net revenues of \$11.57 billion. Its home page is www.accenture.com.

Notes:

1. David W. De Long, "Confronting the Chemical Industry Brain Drain: A Strategic Framework for Organizational Knowledge Retention," Accenture Institute for Strategic Change Research Report, April 2002: www.accenture.com/isc. Also see David W. De Long, "Uncovering the Hidden Costs of 'Lost Knowledge' in Global Chemical Companies," Accenture Institute for Strategic Change Research Note, January 2002: www.accenture.com/isc.
2. See "Retaining Valuable Knowledge: Proactive Strategies to Deal with a Shifting Work Force," American Productivity & Quality Center Report, April 2002.
3. American Productivity & Quality Center Report.
4. Simon Lelic, "Fuel Your Imagination: *Knowledge Management* and the Art of Story Telling," *Knowledge Management*, December 2001: 9.
5. For more on Shell's use of networks see Etienne Wenger, Richard McDermott and William Snyder, *Cultivating Communities of Practice* (Harvard Business School Press, 2002).
6. American Productivity & Quality Center Report.
7. Glenn McEvoy and Mary Jo Blahna, "Engagement or Disengagement? Older Workers and the Looming Labor Shortage," *Business Horizons*, September 2001: 46.

A pair of glasses is placed over a document. The document features a graph titled "Fig. 2: economy model" with a y-axis labeled "Number of new buyers" and an x-axis labeled "Time". The graph is divided into segments for "Innovators", "Early adopters", "Majority", and "Laggards". Below the graph, there are arrows pointing to the right, labeled "Innovators", "Early adopters", "Majority", and "Laggards". To the right of the graph, there is a paragraph of text. The overall image has a warm, orange-toned background.

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