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Knowledge management is nothing new. For hundreds of years, owners of family businesses have passed their commercial wisdom on to their children, master craftsmen have painstakingly taught their trades to apprentices, and workers have exchanged ideas and know-how on the job. But it wasn't until the 1990s that chief executives started talking about knowledge management. As the foundation of industrialized economies has shifted from natural resources to intellectual assets, executives have been compelled to examine the knowledge underlying their businesses and how that knowledge is used. At the same time, the rise of networked computers has made it possible to codify, store, and share certain kinds of knowledge more easily and cheaply than ever before.

Since knowledge management as a conscious practice is so young, executives have lacked successful models that they could use as guides. To help fill that gap, we have recently studied the knowledge management practices of companies in several industries. We started

by looking at management consulting firms. Because knowledge is the core asset of consultancies, they were among the first businesses to pay attention to—and make heavy investments in—the management of knowledge. They were also among the first to aggressively explore the use of information technology to capture and disseminate knowledge. Their experience, which is relevant to any company that depends on smart people and the flow of ideas, provides a window onto what works and what doesn't.

Consultants, we found, do not take a uniform approach to managing knowledge. The consulting business employs two very different knowledge management strategies. In some companies, the strategy centers on the computer. Knowledge is carefully codified and stored in databases, where it can be accessed and used easily by anyone in the company. We call this the *codification strategy*. In other companies, knowledge is closely tied to the person who developed it and is shared mainly through direct person-to-person contacts. The chief

purpose of computers at such companies is to help people communicate knowledge, not to store it. We call this the *personalization strategy*. A company's choice of strategy is far from arbitrary—it depends on the way the company serves its clients, the economics of its business, and the people it hires. Emphasizing the wrong strategy or trying to pursue both at the same time can, as some consulting firms have found, quickly undermine a business.

The two strategies are not unique to consulting. When we looked beyond that business and analyzed computer companies and health care providers, we found the same two strategies at work. In fact, we believe that the choice between codification and personalization is the central one facing virtually all companies in the area of knowledge management. By better understanding the two strategies and their strengths and weaknesses, chief executives will be able to make more surefooted decisions about knowledge management and their investments in it.

Codification or Personalization?

Some large consulting companies, such as Andersen Consulting and Ernst & Young, have pursued a codification strategy. Over the last five years, they have developed elaborate ways to codify, store, and reuse knowledge. Knowledge is codified using a “people-to-documents” approach: it is extracted from the person who developed it, made independent of that person, and reused for various purposes. Ralph Poole, director of Ernst & Young's Center for Business Knowledge, describes it like this: “After removing client-sensitive information, we develop ‘knowledge objects’ by pulling key pieces of knowledge such as interview guides, work schedules, benchmark data, and market segmentation analyses out of documents and storing them in the electronic repository for people to use.” This approach allows many people to search for and retrieve codified knowledge without having to contact the person who originally developed it. That opens up the possibility of achieving scale in knowledge reuse and thus of growing the business.

Take the example of Randall Love, a partner in the Los Angeles office of Ernst & Young. Love was preparing an important bid for a large industrial manufacturer that needed help installing an enterprise resource planning system. He had already directed projects for im-

plementing information systems for several manufacturers in other industries, but he hadn't yet worked on a manufacturing project in this one. He knew other Ernst & Young teams had, however, so he searched the electronic knowledge management repository for relevant knowledge. For help with the sales process, he found and used several presentations on the industry—documents containing previously developed solutions—as well as value propositions that helped him estimate how much money the client would save by implementing the system.

Because Love reused this material, Ernst & Young won the project and closed the sale in two months instead of the typical four to six. In addition, his team found programming documents, technical specifications, training materials, and change management documentation in the repository. Because these documents were available, Love and his team did not have to spend any time tracking down and talking with the people who had first developed them. The codification of such knowledge saved the team and the client one full year of work.

Ernst & Young executives have invested a lot to make sure that the codification process works efficiently. The 250 people at the Center for Business Knowledge manage the electronic repository and help consultants find and use information. Specialists write reports and analyses that many teams can use. And each of Ernst & Young's more than 40 practice areas has a staff member who helps codify and store documents. The resulting area databases are linked through a network.

Naturally, people-to-documents is not the only way consultants in firms like Ernst & Young and Andersen Consulting share knowledge—they talk with one another, of course. What is striking, however, is the degree of emphasis they place on the codification strategy.

By contrast, strategy consulting firms such as Bain, Boston Consulting Group, and McKinsey emphasize a personalization strategy. They focus on dialogue between individuals, not knowledge objects in a database. Knowledge that has not been codified—and probably couldn't be—is transferred in brainstorming sessions and one-on-one conversations. Consultants collectively arrive at deeper insights by going back and forth on problems they need to solve.

Marcia Blenko, for example, a partner in

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Bain's London office, had to consider a difficult strategy problem for a large British financial institution. The client wanted Bain to help it expand by offering new products and services. The assignment required geographic and product-line expertise, a broad understanding of the industry, and a large dose of creative thinking. Blenko, who had been with Bain for 12 years, knew several partners with expertise relevant to this particular problem. She left voice mail messages with them and checked Bain's "people finder" database for more contacts.

Eventually she connected with nine partners and several managers who had developed growth strategies for financial services institutions. She met with a group of them in Europe, had videoconferences with others from Singapore and Sydney, and made a quick trip to Boston to attend a meeting of the financial services practice. A few of these colleagues became ongoing advisers to the project, and one of the Asian managers was assigned full time to the case team. During the next four months, Blenko and her team consulted with expert

How Consulting Firms Manage Their Knowledge

CODIFICATION		PERSONALIZATION
Provide high-quality, reliable, and fast information-systems implementation by reusing codified knowledge.	Competitive Strategy	Provide creative, analytically rigorous advice on high-level strategic problems by channeling individual expertise.
REUSE ECONOMICS: Invest once in a knowledge asset; reuse it many times. Use large teams with a high ratio of associates to partners. Focus on generating large overall revenues.	Economic Model	EXPERT ECONOMICS: Charge high fees for highly customized solutions to unique problems. Use small teams with a low ratio of associates to partners. Focus on maintaining high profit margins.
PEOPLE-TO-DOCUMENTS: Develop an electronic document system that codifies, stores, disseminates, and allows reuse of knowledge.	Knowledge Management Strategy	PERSON-TO-PERSON: Develop networks for linking people so that tacit knowledge can be shared.
Invest heavily in IT; the goal is to connect people with reusable codified knowledge.	Information Technology	Invest moderately in IT; the goal is to facilitate conversations and the exchange of tacit knowledge.
Hire new college graduates who are well suited to the reuse of knowledge and the implementation of solutions. Train people in groups and through computer-based distance learning. Reward people for using and contributing to document databases.	Human Resources	Hire M.B.A.s who like problem solving and can tolerate ambiguity. Train people through one-on-one mentoring. Reward people for directly sharing knowledge with others.
Andersen Consulting, Ernst & Young	Examples	McKinsey & Company, Bain & Company

The codification strategy opens up the possibility of achieving scale in knowledge reuse and thus of growing the business.

partners regularly in meetings and through phone calls and e-mail. In the process of developing a unique growth strategy, the team tapped into a worldwide network of colleagues' experience.

To make their personalization strategies work, firms like Bain invest heavily in building networks of people. Knowledge is shared not only face-to-face but also over the telephone, by e-mail, and via videoconferences. McKinsey fosters networks in many ways: by transferring people between offices; by supporting a culture in which consultants are expected to return phone calls from colleagues promptly; by creating directories of experts; and by using "consulting directors" within the firm to assist project teams.

These firms have also developed electronic document systems, but the purpose of the systems is not to provide knowledge objects. Instead, consultants scan documents to get up to speed in a particular area and to find out who has done work on a topic. They then approach those people directly.

When we initially looked at how consulting companies manage knowledge, we found that they all used both the codification and the personalization approaches. When we dug deeper, however, we found that effective firms excelled by focusing on one of the strategies and using the other in a supporting role. They did not try to use both approaches to an equal degree.

Different Strategies, Different Drivers

A company's knowledge management strategy should reflect its competitive strategy: how it creates value for customers, how that value supports an economic model, and how the company's people deliver on the value and the economics.

Creating Value for Customers. Randall Love's approach to implementing the information system is typical of consulting companies where the efficient reuse of codified knowledge is essential because they are dealing with similar problems over and over. In such firms, the service offering is very clear: the customer benefits because the consultants can build a reliable, high-quality information system faster and at a better price than others by using work plans, software code, and solutions that have been fine-tuned and proven successful. That's not to say that the process operates

on automatic pilot. It's like building with Lego blocks: consultants reuse existing bricks while applying their skills to construct something new.

Strategy consulting firms offer customers a very different kind of value. Consultants like Marcia Blenko tackle problems that don't have clear solutions at the outset. They seek advice from colleagues to deepen their understanding of the issues, but in the end they must create a highly customized solution to a unique problem. Because their clients' problems are difficult and one of a kind, the consultants can charge high fees for their services.

Turning a Profit. Companies that follow a codification strategy rely on the "economics of reuse." Once a knowledge asset—software code or a manual, for example—is developed and paid for, it can be used many times over at very low cost, provided it does not have to be substantially modified each time it is used. Because the knowledge is contained in electronic repositories, it can be employed in many jobs by many consultants. Many consultants can be assigned to a project; big projects will have a high ratio of consultants to partners. For example, there are more than 30 consultants for each partner at Andersen Consulting.

The reuse of knowledge saves work, reduces communications costs, and allows a company to take on more projects. As a consequence, firms such as Andersen Consulting and Ernst & Young have been able to grow at rates of 20% or more in recent years. Ernst & Young's worldwide consulting revenues, for example, increased from \$1.5 billion in 1995 to \$2.7 billion in 1997.

By contrast, the personalization strategy relies on the logic of "expert economics." Strategy consulting firms offer their clients advice that is rich in tacit knowledge. The process of sharing deep knowledge is time consuming, expensive, and slow. It can't truly be systematized, so it can't be made efficient. That means, first, that the ratio of consultants to partners in these firms is relatively low—there are approximately seven consultants for each partner at McKinsey and Bain. And second, it means that it's difficult to hire many new consultants in a short period because every new person needs so much one-on-one training. For those two reasons, strategy consulting firms find it difficult to grow rapidly without sacrificing the customized approach.

Nevertheless, their highly customized offerings allow them to charge much higher prices than firms offering more standardized services can. In 1997, for example, daily fees for a McKinsey consultant were on average more than \$2,000; at Andersen Consulting, the figure was slightly more than \$600.

Managing People. Not surprisingly, the two kinds of firms hire different kinds of people and train and reward them differently. Ernst & Young and Andersen Consulting hire undergraduates from top universities and train them to develop and implement change programs and information systems. Andersen's recruits are trained at the firm's Center for Professional Education, a 150-acre campus in St. Charles, Illinois. Using the knowledge management repository, the consultants work through scenarios designed to improve business processes. They are implementers, not inventors; the "not invented here" attitude has no place in a reuse firm.

McKinsey, BCG, and Bain hire top-tier M.B.A. graduates to be inventors—that is, to use their analytic and creative skills on unique business problems. These firms also want people who will be able to use the person-to-person knowledge-sharing approach effectively. To be sure of obtaining people with that mix of skills, they recruit with extraordinary care. Partners and senior consultants interview a candidate six to eight times before making a job offer. At Bain, 1 out of 60 applicants gets an offer. Once on board, their most important training comes from working with experienced consultants who act as mentors.

From Health Care to High Tech

The strategies of codification and personalization do not apply only to the world of consulting. We found that providers of health care and manufacturers of computers also need to choose a knowledge management approach that fits their needs and goals.

Access Health, a call-in medical center, exploits a reuse model. When someone calls the center, a registered nurse uses the company's "clinical decision architecture" to assess the caller's symptoms, rule out possible conditions, and recommend a home remedy, doctor's visit, or emergency room trip. The knowledge repository contains algorithms of the symptoms of more than 500 illnesses. CEO Joseph Tallman

describes the company's strategy: "We are not inventing a new way to cure disease. We are taking available knowledge and inventing processes to put it to better use."

Access Health provides a prime example of the benefits that come from reusing codified knowledge—in this instance, software algorithms. The company spent a lot to develop those algorithms, but it has been repaid handsomely for its investment. The first 300 algorithms that Access Health developed have each been used an average of 8,000 times per year. That level of reuse allows it to charge low prices per call. In turn, the company's paying customers—insurance companies and provider groups—save money because many callers would have made expensive trips to the emergency room or doctor's office when they could have been diagnosed over the phone.

Contrast Access Health's reuse strategy with the highly developed personalization model used at Memorial Sloan-Kettering Cancer Center in New York City. The center provides the best, most customized advice and treatment to cancer patients. A variety of experts consults on each patient's case, and managing the experts' collaboration is, in essence, managing the center's knowledge. Dr. James Dougherty, its deputy physician in chief, describes this collaboration as follows: "We coordinate intensive face-to-face communication in order to ensure that knowledge is transferred between researchers and clinicians and between different types of clinicians." Employees work together in 17 disease-specific teams. The breast cancer team, for example, has 40 specialists—medical oncologists, surgeons, radiation therapists, psychologists, and others—as well as a core of basic scientists.

To make person-to-person communication easy, a team's members are all located in the same area of the hospital. Each team has several face-to-face meetings per week that everyone attends. The meetings cover basic science initiatives, clinical findings, patient care, and ongoing research.

The center's human resource policy is aligned with its knowledge management strategy. Top cancer clinicians are attracted by Memorial Sloan-Kettering's state-of-the-art technology and excellent reputation. These clinicians are highly paid—most receive salaries that place them in the ninety-fifth percentile or above relative to their counterparts at

A company's strategy for knowledge management should reflect its competitive strategy.

other academic institutions. The center hires clinicians from two pools of candidates. Junior people are hired from top university residency programs and trained as fellows. The best fellows are moved into an "up or out" pyramid system. The center also hires senior, nationally recognized clinicians who often bring teams of people with them.

It is hard to imagine two business models in the same industry as different as those of Access Health and Memorial Sloan-Kettering. Yet both assess patients' symptoms and make recommendations for their care, and both are highly successful. By providing reliable service at low cost, Access Health has captured 50% of the call-center market and is growing at 40% a year. One insurer using its services saw its emergency-room admissions drop by 15% and its physician office visits by 11%. For its part, Memorial Sloan-Kettering is consistently ranked as the top cancer research and treatment institution in the country.

Medicine, like management consulting and other services, is built on unique knowledge. But the two knowledge management models also apply in the industrial sector. Consider the very different approaches taken by two computer companies, Dell and Hewlett-Packard.

Dell's competitive strategy is to assemble inexpensive PCs that are made to order and sell them directly to customers. A sophisticated knowledge management system lies behind that business model. Dell has invested heavily in an electronic repository that contains a list of available components. The system drives the operation: customers choose configurations from a menu, suppliers provide components based on their orders, and manufacturing retrieves orders from the system and schedules assembly. Dell does not deliver highly customized orders, and it raises its prices considerably for orders with special components.

Dell has to invest a good deal up front to determine and specify configurations, but its investment pays off because of the knowledge's reuse. In 1997, Dell shipped 11 million PCs. Those systems were put together from 40,000 possible configurations (competitors typically offer only about 100 configurations), which means that each configuration was used on average 275 times. That level of reuse allows Dell to lower its costs and charge less than the competition. Propelled in part by its knowledge reuse model, Dell's net income for 1997 was

\$944 million on sales of \$12.3 billion; the company's revenues have grown 83% annually over the last four years.

Hewlett-Packard, by contrast, uses a personalization approach to support its business strategy, which is to develop innovative products. For that strategy to succeed, technical knowledge must get transferred to product development teams in a timely way. The company channels such knowledge through person-to-person exchanges.

For example, engineers routinely use one of the company's planes to visit other divisions and share ideas about possible new products. Rather than limiting travel budgets, executives encourage such travel. Every employee has access to the corporate airplanes, which travel daily between HP offices. Remarkably, the company manages effective person-to-person knowledge sharing despite its size—with 120,000 employees, HP dwarfs the largest consulting company, Andersen Consulting, which has about 60,000 people.

Consider this example. An HP team recently developed a very successful electronic oscilloscope with a Windows operating system and interface. Executives wanted to be sure that other divisions understood and applied the interface. To keep the costs of knowledge transfer low, they considered trying to codify the acquired know-how. They realized, however, that the knowledge they wanted to capture was too rich and subtle to incorporate in a written report. And they understood that writing answers to the many questions that would come from HP's divisions would take an extraordinary amount of time. So they took the person-to-person approach and sent engineers from product development teams to meetings at divisions around the world and to a company-wide conference.

The executives' decision didn't come cheap: by one estimate, the company spent \$1 million on communication costs alone on this process. But the investment paid off as the interface gained widespread acceptance throughout the company.

In all the companies and institutions we examined, managers had chosen a distinct knowledge management strategy. Although their approaches differed slightly, there was a common pattern among them. Those that pursued an assemble-to-order product or service strategy emphasized the codification and reuse

The strategy consulting firms we studied all came to grief with document-driven systems.

of knowledge. Those that pursued highly customized service offerings, or a product innovation strategy, invested mainly in person-to-person knowledge sharing.

Do Not Straddle

As we've said, companies that use knowledge effectively pursue one strategy predominantly and use the second strategy to support the first. We think of this as an 80–20 split: 80% of their knowledge sharing follows one strategy, 20% the other. Executives who try to excel at both strategies risk failing at both. Management consulting firms have run into serious trouble when they failed to stick with one approach.

The strategy consulting firms we studied all came to grief with document-driven systems. Consultants were tempted to use the systems to deliver standardized solutions, but their customers were paying for highly customized services. When the systems were misused, customers became dissatisfied.

As the CEO of a major U.S. company told us, "I have been using a particular consulting company for over a decade now. One of the main reasons I have used them so regularly is because they have intimate knowledge of my company and our industry. The firm's partners who have worked with me also know my style and my strengths and weaknesses. The advice I have gotten from them has been sen-

sitive to our unique needs. Recently, though, I have found that they are trying to push cookie-cutter solutions. It's almost as if they are simply changing the names on the same set of presentations. While some of their advice is useful, I am not sure if that's enough. Frankly I expect more—and they sure as hell have not reduced their rates."

Another consulting firm, Bain, learned a hard lesson about relying on documents. In the 1980s, before electronic document systems became fashionable, managers at Bain developed a large paper-based document center at its Boston headquarters; it stored slide books containing disguised presentations, analyses, and information on various industries. The library's purpose was to help consultants learn from work done in the past without having to contact the teams that did the work. But as one partner commented, "The center offered a picture of a cake without giving out the recipe." The documents could not convey the richness of the knowledge or the logic that had been applied to reach solutions—that understanding had to be communicated from one person to another. Bain's management eventually developed an entirely new system, but the failed approach wasted time and money.

Other strategy consulting companies report different problems with electronic document systems. For example, after subject experts at one firm contributed documents to electronic libraries, they were flooded with callers asking very basic questions. Two companies that we studied have scrapped their investment in electronic knowledge databases; their existing databases are used simply to connect people.

Similarly, firms that rely on codification have run into trouble by overinvesting in person-to-person systems. When they overinvest in this way, they undermine their value proposition—reliable systems at reasonable prices—as well as the economics of reuse. That's because their people may feel encouraged to develop a novel solution to a problem even when a perfectly good solution already exists in the electronic repository. Unnecessary innovations are expensive: programming and then debugging new software, for instance, eats a lot of resources. And person-to-person knowledge sharing involves expensive travel and meeting time; those costs dilute the advantage that is created when codified knowledge is reused.

Companies that straddle the two strategies

Getting the Incentives Right

People need incentives to participate in the knowledge sharing process. The two knowledge management strategies call for different incentive systems. In the codification model, managers need to develop a system that encourages people to write down what they know and to get those documents into the electronic repository. And real incentives—not small enticements—are required to get people to take those steps. In fact, the level and quality of employees' contributions to the document database should be part of their annual performance reviews. Ernst & Young, for example, does just that. At performance reviews, consultants are evaluated along five dimen-

sions, one of which is their "contribution to and utilization of the knowledge asset of the firm."

Incentives to stimulate knowledge sharing should be very different at companies that are following the personalization approach. Managers need to reward people for sharing knowledge directly with other people. At Bain, the partners are evaluated each year on a variety of dimensions, including how much direct help they have given colleagues. The degree of high-quality person-to-person dialogue a partner has had with others can account for as much as one-quarter of his or her annual compensation.

may also find themselves with an unwieldy mix of people. Having both inventors and implementers rubbing elbows can be deadly. The downfall of CSC Index, the consulting company that invented the reengineering concept in the early 1990s, underscores how serious this problem can be.

The founders of what was originally known simply as Index had strong backgrounds in IT systems. Success with reengineering, however, catapulted the company into the general management arena. It then tried to leverage its newfound access to the CEO by aggressively hiring senior consultants from established strategy consulting firms. It also started to recruit M.B.A.s from leading business schools. Soon the firm had two populations: an old guard that focused on IT systems and had strong implementation skills, and a new guard that focused on corporate strategy and had strong conceptual skills.

As reengineering became a commodity business later in the decade, some of the old guard recognized the need to standardize their methods and create more reusable knowledge. But members of the new guard had little interest in

working on commodity-like reengineering projects. They had joined the firm because they wanted to work on cutting-edge strategy problems.

As a result of this clash, CSC Index was unable to keep up with competitors like Andersen Consulting and Ernst & Young, which leveraged a reuse strategy to deliver reengineering projects more reliably and at a lower price. Nor did the firm have enough depth in strategy consulting to compete with the likes of McKinsey, BCG, and Bain. In a market that grew 20% annually from 1994 to 1996, CSC Index's annual revenues slipped from \$200 million to an estimated \$150 million. The firm was subsequently folded into its parent company.

Although it is important to avoid straddling, an exclusive focus on one strategy is also unwise. Companies pursuing the personalization model should have a modest electronic document system that supports people in two ways: by providing background materials on a topic and by pointing them to experts who can provide further advice. As Mark Horwitch, a partner at Bain, explains, "Information in firms pursuing the person-to-person approach is leveraged as an input to the analytical process rather than as an output."

Companies that primarily adhere to the reuse model will want about 20% of their knowledge sharing to be person-to-person. Thus they will have to pay to bring some people within the company together at meetings. They should encourage the heavy use of e-mail and electronic discussion forums. Such person-to-person communication is needed to make sure that documents are not blindly applied to situations for which they are ill suited.

Choosing the Right Strategy

Competitive strategy must drive knowledge management strategy. Executives must be able to articulate why customers buy a company's products or services rather than those of its competitors. What value do customers expect from the company? How does knowledge that resides in the company add value for customers? If a company does not have clear answers to those questions, it should not attempt to choose a knowledge management strategy because it could easily make a bad choice.

Assuming the competitive strategy is clear,

How Much Information Technology Do You Need?

The level of IT support a company needs depends on its choice of knowledge management strategy. For the codification model, heavy IT support is critical; for the personalization model, it is much less important. Managers who are implementing the former should be prepared to spend a lot on large, sophisticated electronic repository systems. Andersen Consulting, for example, has developed proprietary search engines. Ernst & Young has installed a hierarchy of databases. At the top are "elite" databases that are restricted in size and contain the best knowledge on a particular topic. Next come larger databases containing specific "knowledge objects"; finally there are the much larger "holding tanks" for all kinds of other materials.

Over the past few years, Andersen Consulting and Ernst & Young have each spent more than \$500 million on IT and

people to support their knowledge management strategies. On a much smaller scale, Access Health initially invested \$16 million in its knowledge management system when its revenues were a modest \$20 million; later it spent another \$40 million on the system in order to have sufficient scale to generate \$100 million in revenues.

The two knowledge management strategies require different IT infrastructures as well as different levels of support. In the codification model, managers need to implement a system that is much like a traditional library—it must contain a large cache of documents and include search engines that allow people to find and use the documents they need. In the personalization model, it's most important to have a system that allows people to find other people.

Companies that isolate knowledge management in functional departments like HR or IT risk losing its benefits.

managers will want to consider three further questions that can help them choose a primary knowledge management strategy. Although the implications of the answers may seem obvious, it is important for managers to make the explicit connection between their company's competitive strategy and how they use knowledge to support it.

Do you offer standardized or customized products? Companies that follow a standardized product strategy sell products that do not vary much, if at all. Even Dell, whose assemble-to-order computers vary more than mass-marketed products, sells products that can be considered standardized. A knowledge management strategy based on reuse fits companies that are creating standardized products.

A company sells customized products and services if most of its work goes toward meeting particular customers' unique needs. Because those needs will vary dramatically, codified knowledge is of limited value. Companies that follow a customized product approach should consider the personalization model.

Do you have a mature or innovative product? A business strategy based on mature products typically benefits most from a reuse model. The processes for developing and selling such products involve well-understood tasks and knowledge that can be codified. A strategy based on product innovation, on the other hand, is best supported by a personalization strategy. People in companies seeking innovation need to share information that would get lost in document form.

Do your people rely on explicit or tacit knowledge to solve problems? Explicit knowledge is knowledge that can be codified, such as simple software code and market data. When a company's employees rely on explicit knowledge to do their work, the people-to-documents approach makes the most sense. Tacit knowledge, by contrast, is difficult to articulate in writing and is acquired through personal experience. It includes scientific expertise, operational know-how, insights about an industry, business judgment, and technological expertise. When people use tacit knowledge most often to solve problems, the person-to-person approach works best.

Managers sometimes try to turn inherently tacit knowledge into explicit knowledge. That can lead to serious problems. Xerox, for example, once attempted to embed the know-how

of its service and repair technicians into an expert system that was installed in the copiers. They hoped that technicians responding to a call could be guided by the system and complete repairs from a distance. But it turned out that technicians could not solve problems using the system by itself. When the copier designers looked into the matter more closely, they discovered that technicians learned from one another by sharing stories about how they had fixed the machines. The expert system could not replicate the nuance and detail that were exchanged in face-to-face conversations.

Your answers to the three questions above will often suggest which knowledge management strategy to emphasize. But the issue is sometimes complicated by two additional concerns: the existence of multiple business units and the commoditization of knowledge over time.

It is tempting to think that the two knowledge management models can coexist in different business units within one corporation. Indeed, they can coexist—but only in corporations where business units operate like stand-alone companies. In a company like General Motors, where the car divisions have little to do with the credit and finance divisions, different models can in fact work in each business unit. Companies with tightly integrated business units, however, should either focus on only one of the strategies or spin off units that don't fit the mold.

Some knowledge-intensive products and services—like reengineering consulting, for example—mature over time and become commodities. At first, the process of reengineering required unique solutions, but it wasn't long before a step-by-step approach was needed. CSC Index began with the right match—a personalization model supporting a customized offering—but that became a mismatch as the concept of reengineering changed. The firm had a choice: change its knowledge management strategy or get out of the reengineering business. By not choosing either, it fell on difficult times.

In effective companies, the knowledge management model stays the same even as new products and services mature. For consulting companies focused on highly customized solutions, the trick is to get out of areas like reengineering before they become commodities. At firms that reuse knowledge and solutions, the

opposite is true: such firms exploit an approach as it matures. Peter Novins, a partner at Ernst & Young, puts it like this: "We try to commoditize the expertise in one area as fast as possible and move it to scale and reuse, which benefits both the client and the company."

Don't Isolate Knowledge Management

Some CEOs have put knowledge management at the top of their agendas. Others have not given it the same attention as they have given cost cutting, restructuring, or international expansion. In companies where that is the case, knowledge management takes place—if at all—in functional departments such as HR or IT. But companies that isolate knowledge management risk losing its benefits, which are highest when it is coordinated with HR, IT, and competitive strategy.

That coordination requires the leadership of the general manager. When CEOs and general managers actively choose a knowledge man-

agement approach—one that supports a clear competitive strategy—both the company and its customers benefit. When top people fail to make such a choice, both suffer. Customers may end up paying for a customized solution when a standard solution would have worked perfectly well. Or they may get paint-by-the-numbers advice when they really need help with a unique problem. Within the organization, employees will be confused about priorities. The issue will quickly become politicized, and people will battle for resources without seeing the whole picture. Only strong leadership can provide the direction a company needs to choose, implement, and overcome resistance to a new knowledge management strategy. 

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