

Features

Building a Better Knowledge Base--A Primer

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Leonard Shelby, in the film Memento, tries to compensate for an almost complete lack of memory through a crude system of notes, photos and tattoos. That's not a bad proxy for the discoordination, confusion and wasteful repetition suffered by an enterprise without a knowledge base, and as such, without a memory.

Knowledge bases are databases that provide a coherent, comprehensive source of guidance gleaned through an organization's hard experience, study and, sometimes, serendipity. A knowledge base gathers and organizes this knowledge and makes it available where and when necessary to help shape decisions. Knowledge bases can serve a number of different purposes--a repository of best practices, a descriptive directory of experts available for consultation or current and historical information related to products, processes or projects.

Effective knowledge bases also add context--information about internal and external conditions associated with a particular event or relationship. "Was the project successful because you had the right people, the right product, or managed the process or product better?" asks Mark Britton, a senior project engineer at Northrop Grumman, an aerospace company in Los Angeles. To that end, Northrop Grumman tries to capture not only the bare facts about a project's formation and ultimate conclusion, but also who took part, the processes and information the team used and contemporary market conditions.

Above all, a knowledge base aims to reduce duplication of effort. For example, consider Shearman and Sterling, a global law firm based in New York City that practices in a wide variety of disciplines and specializes in major corporate transactions and acquisitions. The firm's knowledge base is used to gather case and legal history for the entire organization. When a lawyer is writing a complex lease, she doesn't want to spend time reinventing the sublet clause, says Eugene Stein, director of information and professional systems. Searching the knowledge base for sublet clauses in similar contracts retrieves several boilerplate alternatives. The net result is freedom to focus on more difficult, and more lucrative, problems.

Although the desire to "know oneself" may be enough to launch an enterprise-wide knowledge base project, most managers will require more convincing. Because of their immortality, and their ability to share the insight of one simultaneously with many, knowledge bases can provide considerable efficiencies.

Brian Jones, an analyst with Yankee Group in Boston, points out that knowledge bases can play a key role in improving customer service. Putting proven problem-solving information at easy reach, either through a self-service website or an interface available to front-line call center agents, can greatly reduce resolution times, which lead both to lowered costs of service and improved customer satisfaction. "Often, service can become the bottleneck--if every one of your 10,000 [e-commerce] customers has to call the call center with a problem, it kills the business."

For companies interested in attacking the knowledge base through self-service, Jones points to RightNow Technologies of Bozeman, MT as a promising provider. RightNow's knowledge base helps companies automate the process of answering known questions, and ensure that the answers to new, more novel inquiries are archived and made available for reference immediately.

Knowledge bases can help companies make the best of bad situations, offering a chance to retain knowledge that would otherwise disappear in times of severe pressure and contraction. Northrop Grumman's knowledge base project started around the B2 Bomber project, which has contracted from a division of 13,000 employees in the early 1990s to less than 1500 today. While the enormous staff was no longer needed to perform post-development manufacturing and service functions, those 11,500-plus people knew a lot about the B2 that would help the company maintain the product line more efficiently. In 1997, aware that it could not feasibly stem the outflow of people from the project, the B2 group implemented a knowledge base to stem the outflow of knowledge instead. "It was a pretty obvious need--it was really one of correcting a bad situation, because we were losing people, losing expertise, and we weren't sure if we could maintain our current capability," says NG's Britton.

Even if a particular point of pain does not lead you to implement a knowledge base, the project must be tailored to address specific, well-articulated business needs. "The content has to be fully grounded in the business process," says Greg Reid, Cambridge, Mass.-based associate partner in the knowledge management service line of Accenture. While a company may consider all knowledge good knowledge, unless at least one person can identify a clear, business goal-oriented purpose for making a piece or class of information available to others, a knowledge base project can quickly lose focus.

Throughout Northrop Grumman's campaign, Britton says that simply asking division and team managers about the knowledge sharing processes they would want to see in a knowledge base has proven very effective. "That's where we started to build requirements, and where we could make generic a method, database, tool or process we would," he says.

At Shearman and Sterling, Stein recalls that in 1998, management hired him to implement a knowledge base to fundamentally improve the levers of production by improving speed, freeing up more time for high-value endeavors, and reducing the cost of operations. Since lawyers are already accustomed to saving copious records, the shift to doing so in a collective fashion using the DOCS family of products from Hummingbird of Toronto, Canada was logical. His staff began by creating proof-of-concept mockups out of whole cloth to provide direction towards the ultimate goal of a self-harvesting, self-categorizing knowledge base, a work still in progress.

When Johnson Controls began its knowledge base project in 1996, the goal was to fit a knowledge base into a larger intranet project in a way that would make the collected wisdom of a 116-year-old Fortune 500 enterprise accessible to a foot soldier. "It became obvious we had so much content that many people found it very difficult to find what they were looking for," says Jim Smith, manager of intranet services in the controls division of Johnson Controls Inc. of Milwaukee. "There was too much content, a lot wasn't relevant to them, and the content they did find was obsolete, dated or duplicated."

Once knowledge needs and goals are coherently expressed, many organizations find it useful to look for seed or model knowledge bases that already exist, since not all knowledge bases are launched to serve the entire company and may in fact be unknown outside a particular working group or business unit. A segment of a database may have grown into a crucial repository of best practices, or a humble online message board become a prime stop for reusable advice, as experts in a field congregate and share knowledge.

At Johnson Controls, for example, the intranet group charged with defining a formal knowledge base investigated the company's prior art and learned of a dial-up bulletin board system built and maintained by the field engineering group to share documents. Northrop Grumman looked for problem tracking and resolution systems that were already proven successes in individual business units, which helped the company build from successful models such as the structural issues database operated by the F/A-18 fighter jet team. "It became a lessons-learned database that helped us understand where problems were, and over time it became part of work," says Jerry Garcia, the company's knowledge management project manager. Ultimately, it became possible for engineers working on very similar issues on very different products (such as the F/A-18 and the B2) to combine their observations and conclusions.

Once such resources are recognized as knowledge bases, or at the beginning of any new knowledge base project, a company must decide what knowledge to share and with whom, how knowledge can be coherently stored and quickly retrieved, and how the knowledge that is relevant today can be augmented or replaced to remain relevant tomorrow.

That may mean a series of informal polls (a crude approximation: "What do you know? What don't you know, and who do you ask that knows it or can lead you to someone else who does?") or a sophisticated knowledge network model which will likely require the cooperation of HR and possibly outside consultants as well.

Northrop Grumman's first step towards this end was to build a map of the expertise areas necessary to keep a particular project or product healthy, then understand where that expertise lies, both in terms of past and present employees. "This is a continuous process, and it has to begin from Day One," says Britton. While tracking problem resolution and best practices can help a tight-knit group avoid duplication of effort, he considers the enterprise-wide expertise map, built using internal resources, to be one of the most profound features of the company's knowledge base project. "We're constantly mapping capabilities, trying to break down those boundaries [between business units] to bring people together."

Some organizations consider such searchable knowledge maps the most valuable permutation of the knowledge base. "We have a fundamental belief that you can't really capture people's knowledge, but you can capture some information about people's knowledge," says John Old, director of information management for petrochemicals producer Texaco Inc. in White Plains, N.Y. "Mostly, what people are looking for when they have a problem to solve is someone to talk to. They may go to a repository, but it's really a pointer to other people." Old speaks fondly of Texaco's in-house Peoplenet system, which stores basic resumes, areas of interest and skills and subject expertise for 4,500 voluntary participants.

Only your business can answer the pressing question of exactly what to place in the knowledge base. Many companies, including JCI, start with high-value, high-frequency documents and the company's sixteen 3-ring binders necessary to contain the entire annotated product catalog was an easy early choice. Approach the question from two directions: "What information do employees spend the most time trying to locate?" and "What information would be of great use to employees if only they knew where to find it quickly?" In situations where duplication of effort is a problem (which can be a consequence of long search times--a lengthy quest for an answer may be abandoned in favor of deriving a new solution), try also to identify those conspicuously unanswered questions.

The question of the user base will be answered more or less simultaneously, as content dictates access and applicability, and vice-versa. Rather than get caught up in this feedback loop, let the clearly defined business goals you define at the outset set the tone for both content and patronage. If your company has started to identify communities of practice, they make excellent affinity groups for knowledge bases, since the community tends to cross the same artificial organizational lines that the knowledge base should seek to straddle.

A knowledge base infused with a knowledge map that understands skill sets and expertise can help identify the best candidates to solve problems and contribute additional knowledge. Northrop Grumman learned this watching the knowledge needs of projects in transition. "On a developing program, you want the expert, but on maintenance, you want the jack-of-all-trades because you can't keep the expert," says Britton.

Once the users have been identified, it is possible to think seriously about how the knowledge base should be organized for maximum efficiency. At this stage, taxonomy creation should begin, or merge if it is being handled as a separate part of a larger KM effort. Shearman and Sterling took an alternate approach, calling upon a beta version of Lotus Discovery Server to automatically build a taxonomy by analyzing the vast storehouse maintained by the company's DOCS system. The result was inefficient, as different practice groups had different taxonomy needs and in any event LDS failed to build a satisfactory structure on its first try. The firm has since regrouped with a newer version of the software and a clean-slate approach, allowing the LDS system to tweak a manually-defined taxonomy.

Don't forget the importance of testing. Even when basing a knowledge base on an existing project, running a pilot with a single community of practice or around a particular category of knowledge will help gauge the overall stability of the design and user-friendliness of the knowledge access and contribution tools, and work out any bugs that could be disastrous at the enterprise level. "Companies that succeed start at a small pilot level and work up," says Accenture's Reid.

Scheduled Feeding

Continuously populating a knowledge base in a meaningful way is a serious issue, one many companies choose to solve in part by automating the process. Northrop Grumman wanted to retain more than just formally submitted project reports, so like Shearman and Sterling, decided on this course and employ technology from Cambridge, England-based Hyperknowledge to capture "decision documents," those working papers and notes and journals that were part

of failed projects or draft proposals rather than finished reports. Texaco is working to integrate KnowledgeMail from Palo Alto, CA-based Tacit to automatically capture and categorize information from corporate e-mail.

Yet this is rarely a complete solution. "There's an extent to which it's inevitably labor-intensive to add and update meaningful content to a knowledge base," says Jones. "There are different tools that try to automate certain aspects, but you always have people involved in making sure content is valid and relevant."

Prepare for knowledge base usage to be treated as a delegated task, particularly in the early stages of a project. "We immediately started training administrative-level people in putting the content [into the knowledge base] because we knew the business-level people probably wouldn't put the effort in," says Smith. That way, knowledge from high-value individuals can be passed along without cutting as deeply into their high-value time.

Expect resistance from the middle of the org chart. "The most difficult is middle management," says Britton, perhaps because they see their roles as likely candidates for elimination as information flows more freely throughout the rungs of the organization. Northrop Grumman enjoyed success attacking the adoption problem from both ends inward. "The worker on the floor is always looking for ways to do his job easier and better," and senior managers are quick to buy into the notion of eschewing the status quo for the "constant improvement" to business processes a knowledge base offers, he says.

Many successful knowledge base team leaders boast that the success of their projects has spoken volumes on its own to encourage further adoption, but sometimes firm encouragement is a helpful complement. At JCI, once the unified knowledge base proved itself viable, its use became a matter of policy. "The corporation made a position statement in 1998: you *will not* have unstructured data hosted on multiple services," says Smith.

...Every 3000 Miles

Whether a company opts to use a gatekeeper or editor to monitor, approve and categorizes content or takes a self-policing approach to contributing knowledge, the procedures for adding material to or deleting it from the knowledge base need to be clearly delineated. After launching Shearman and Sterling's knowledge base, Stein saw a need for a new job role to bridge the gap between lawyers and librarians. Stein then pushed for the firm to create the new position of knowledge coordinator. The gatekeepers of the group's content, they research its lawyers' knowledge needs, organize knowledge sharing meetings, and collaborate with the firm's existing staff of certified librarians on particularly sticky knowledge inquiries that the LDS Web client cannot answer quickly. Not all firms can justify so many workers solely dedicated to the storage and access of internal documents, but Stein says both roles are invaluable to extracting the most value from the knowledge base. "If you want to find the best source of information on X, go here--that's what the librarians are particularly good at."

Contributions will be easier to come by if the knowledge store-and-retrieve system performs well. The company developed its content management tools in-house, but adopted the Dublin Core XML metadata standards (available at dublincore.org) to make content easier to find and retrieve from the company's HP/UX file management server.

JCI's Smith stresses that without a powerful front end and top-notch organization, the content in a knowledge base may as well be nonexistent. The company employs the namesake search engine of Verity Inc. of Sunnyvale, CA, and strongly recommends that the interface receive as much attention and investment as the rest of the project. "People who have tried not to invest money in the search engine have skill ability issues, speed issues, and no advanced search ability," he says, likening a knowledge base with an underpowered front end to a desktop computer without any applications.

Aging content poses a challenge for any knowledge base and can be blessing or curse. While Johnson Controls wants new hires to benefit from knowledge that might be a decade or more old, Smith also believes in aggressively culling old content. Documents are removed from search results 13 months after they are posted, then pulled outright 60 days later. A document's designated caretaker is notified of the impending removal 90 days before purging the document. In case a document has been deleted in error, the company keeps a tape backup for a year after deletion.

Other organizations find value in old content and develop ways to maximize its use. Stein plans to include a change description process that tracks why a knowledge element has been changed. He believes that the earliest instance of a document is often the most illuminating for future research since it may contain the broadest scope of ideas, before editing narrows it down in subsequent versions.

You may have noticed that the term "IT department" has yet to appear in this article, and for good reason. While they will play a critical role laying and maintaining the systems that house and power the knowledge base, they should not take a direct hand in managing content. "Clearly, this is the last thing an IT department wants to be involved in," says Jones. He agrees with Smith that buying or building a contribution and administration tool that non-technical employees can use is a vital component of the knowledge base project. "The people who can best add and maintain the content are the business experts." According to his research, a knowledge base sufficiently complex to warrant attention from one or two full-time editors should, if run well, free up enough bottom-line resources to justify the staffing expense.

Enabling every employee to know all that is worth knowing in an instant is not an easy task. Yet the alternative--running your business the way the unfortunate Leonard Shelby has to run his life--is hardly more attractive.

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