The High Cost of Not Finding Information

An IDC White Paper

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Information: The Lifeblood of the Enterprise

Timely access to critical information separates the winners from the losers in today's information economy. Yet all too often knowledge workers fail in their quest to obtain the information they need. There are many reasons for this failure — some technical, some cultural, and some personal. No matter the cause, the amount of time wasted in futile searching for vital information is enormous, leading to staggering costs to the enterprise.

Company executives overwhelmingly agree that good access to information is the basis for improved decision making, saves time and frustration, and leads to less duplication of effort within the enterprise. A 1998 survey found that 76% of company executives considered information to be "mission critical" and their company's most important asset. Yet, 60% felt that time constraints and lack of understanding of how to find information were preventing their employees from finding the information they needed.

How did we end up in this unacceptable situation? IDC estimates that enterprises spent more than $884.3 billion on information technology during 2000. Why hasn't this vast sum led to more effective tools for knowledge workers?

The short answer is that it has. Intranet technology, content and knowledge management systems, corporate portals, and workflow solutions have all generally improved the lot of the knowledge worker. These technologies have improved access to information, but they have also created an information deluge that makes any one piece of information more difficult to find. Knowledge workers need unified, universal access to all information, but they only need that portion of the information that actually solves the information problem at hand. Such a system must be capable of overcoming the structural limitations deeply woven into current and legacy information systems.

To fully understand the enormity of the problem, we need to look at the historical antecedents that led to the information quagmire with which all modern enterprises find themselves struggling today.

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The Information Cold War

When Peter Drucker coined the phrase "knowledge worker" in his 1964 book *Managing for Results*, he introduced the then radical notion that workers should be directed by the authority of knowledge rather than by the authority of the corporate hierarchy. At the time, this was a truly visionary idea. Knowledge in an enterprise was a scarce commodity, carefully guarded by those who possessed it and shared only under duress. Those who had knowledge used it as a basis for power within the enterprise. At that time, internal information was contained in paper files throughout the enterprise and was restricted to those who knew the filing systems and had a key to the file drawers. Access to external information was restricted because the online systems up until the advent of the Web required extensive knowledge of commands and content in order to search. Because they were expensive, and cost was based on time spent online, enterprises restricted access to trained search specialists who acted as intermediaries between the knowledge worker and the information.

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As society gradually shifted to an "information economy," the need for access to information increased. Gradually, gatekeepers have had to give way to newer, more collaborative work models as knowledge workers have become increasingly important to the enterprise. However, until recently, they continued to labor under the handicap of restricted access to the very systems they needed to do their jobs.

Shattering the Information Barrier

The disruptive technology of the Web turned the old model upside down. Suddenly, information was abundant and apparently readily available for the taking. Easy-to-use search engine technologies and the cornucopia of results they provided convinced users that they were expert searchers.

This initial euphoria, of course, gave way to a more sober reality within corporate intranets. There's still a huge gap between what most information systems can do and what users expect. Some of the problems are technical — systems simply weren't designed to match a certain level of user expectation. But other problems aren't technical — they're rooted in the more human realm of business processes, corporate culture, and individual knowledge and skill.

For example, sometimes the information users seek simply isn't available on the particular system they're using. Information within an enterprise may reside in one of several central repositories, on a user's laptop, hidden behind a firewall, or forbidden because of security access rules.

Functional divisions within an enterprise often lead to silos of information that aren't universally available.

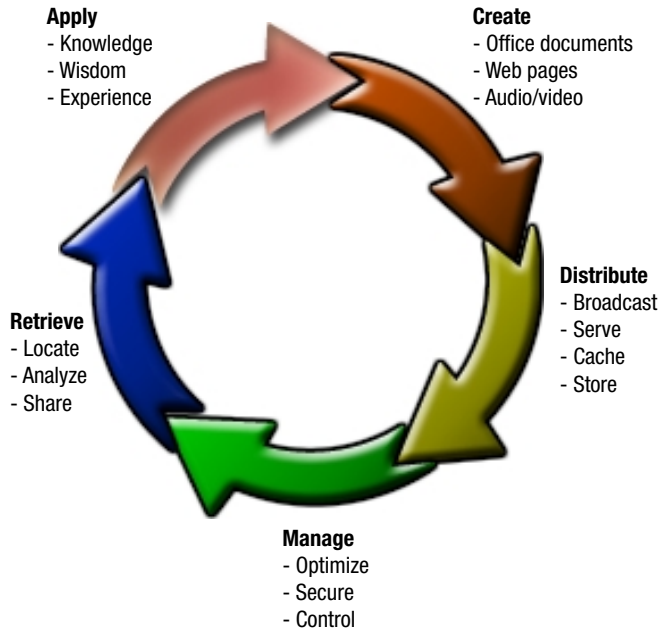
Ensuring that knowledge workers have full and unfettered access to these information assets should be a top priority for managers at all levels of the enterprise.

In today's information economy, knowledge and intellectual property residing in an enterprise network are truly "information assets" that must be managed and leveraged just like physical and human assets. Ensuring that knowledge workers have full and unfettered access to these information assets should be a top priority for managers at all levels of the enterprise.

The Information Life Cycle

To fully understand the value of information assets, we need to examine the information life cycle within an enterprise (see Figure 1).

Figure 1
Information Life Cycle



Source: Inktomi, 2001

The information life cycle begins with the creation of knowledge from the raw material of information. Knowledge is then distributed within and outside the enterprise. Distribution channels include network-connected desktops or databases, the company intranet, or external repositories such as a public Web site or some other online medium.

The diversity of distribution mechanisms creates a need for sophisticated systems to track and manage information. Search and retrieval, knowledge management, and content management systems are all partial solutions to the information management problem.

Continuing within the information life cycle, knowledge is retrieved and applied to satisfy an information need. Applied knowledge often leads to the creation of new information, and the cycle begins anew.

For knowledge workers to truly fulfill their potential as catalysts in transforming information to knowledge assets, timely access to relevant information is crucial.

The information life cycle shows that knowledge can be transformed into a significant competitive advantage for the organization. But within the cycle, the ability to find and retrieve information is paramount. It's impossible to create knowledge from information that cannot be found or retrieved. For knowledge workers to truly fulfill their potential as catalysts in transforming information to knowledge assets, timely access to relevant information is crucial.

The Problem: Inability to Locate and Retrieve Mission-Critical Enterprise Information

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For the enterprise to gain the greatest leverage from its "information assets," knowledge workers must be able to share and reuse information regardless of format or location. Yet, due to the multitudes of resources available within a typical enterprise, most people are not aware of all the useful information sources, nor do they have access to them all.

This lack of awareness and access leads to a serious squandering of time. Many ideas have to be reinvented because an original work cannot be located and retrieved or people are unaware of its existence. Worse, decisions may be based on incomplete or erroneous information, with severe consequences for the company.

Information Is Useless If It Can't Be Found and Retrieved

IDC's *Global IT* surveys show that in 1999, 24% of enterprises worldwide had implemented intranets, while over 70% of North American enterprises with more than 500 employees had intranets by this time. Although intranet technology is ubiquitous among Fortune 1000 companies, its widespread adoption was something of a historical accident. Intranets use the same browser and server software that sparked the explosion in the use of the Web. The software proved so useful in unifying enterprise networks that sales of intranet systems dwarfed those of systems designed to operate and maintain public Web sites.

As useful as an intranet may be, it's not a silver bullet that can fully satisfy the wide array of information needs within an enterprise.

The Invisible Intranet

Intranets rely on search technology that utilizes "crawlers" (i.e., automated software) to find, fetch, and index material residing on the intranet. When users search, they are searching this centralized index, not the actual intranet.

Any information that isn't centrally indexed will not appear in search results, creating a phenomenon known as the "invisible intranet." The information is there, but it simply cannot be found by the intranet's search function.

What exactly is the invisible intranet? A major component is the information in databases and other content repositories within the organization. Information in databases generally isn't stored as static HTML pages favored by crawlers. Typically, the only way to extract information is to query the database with specific parameters, and the result is generated dynamically.

Proprietary file formats used in legacy content management systems are also often not indexed. Even commonplace productivity files in Microsoft Word, Excel, or PowerPoint formats are often overlooked or ignored by crawlers. In general, file system–based storage devices are the least effectively indexed resources in any enterprise network.

Rich media files — those containing streaming content such as audio and video — are becoming much more prevalent within the enterprise. But since these files are not text, they are difficult to index. Besides the indexing issue, it's difficult to search through and deliver rich media files due to problems of bandwidth, compression, and sheer size. Apart from the delivery dilemmas, video files need to be divided into logical chunks to answer a query but not overwhelm the searcher with an hour's worth of tape.

Another part of the invisible intranet consists of information that could be, but isn't, indexed. For example, the files stored locally on most desktop systems are not indexed.

Devices that are only intermittently connected to the intranet also pose challenges. Laptops and other mobile devices are rarely included in the crawling process. The information they contain, as potentially valuable as it might be, will be relegated to the realm of the invisible intranet.

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Laptops pose additional concerns for the enterprise that are not necessarily related to the invisibility of their contents. The foremost issue is that of security. Laptops travel outside the confines of the enterprise, and therefore they are outside the firewall. Remote access to corporate repositories on unsecured phone or wireless connections may put corporate information at risk. Laptops are also more accident prone than desktop machines, and without reliable backup they may threaten the enterprise with the loss of valuable knowledge work.

The High Cost of Not Finding Information

This invisible information comes at a high cost to the enterprise. Lack of information results in:

- Poor decisions based on faulty or poor information
- Duplicated efforts because more than one business unit works on the same project without knowing it has already been done

- Lost sales because customers can't find the information they need on products or services and give up in frustration
- Lost productivity because employees can't find the information they need on the intranet and have to resort to asking for help from colleagues (Studies by AIIM and Ford Motor Company estimate that knowledge workers spend 15–25% of their time on nonproductive information–related activities.)

The problem of the invisible intranet is particularly acute for Fortune 1000 companies. The sheer size of intranets poses one challenge — an IT manager for one Fortune 1000 company estimates that almost 25% of available documents on the corporate intranet are not centrally indexed, but they should be.

Multiple content or knowledge management systems exacerbate the problem. Providing enterprisewide access to all of these systems is not an option. Beyond the obvious security concerns of having universally open access, the massive investments in hardware, network connectivity, and software required to provide such access are prohibitively expensive.

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Quantifying the cost of knowledge workers not finding information they need is difficult. Factors ranging from a lack of user training to incompatible enterprisewide systems to information simply not being available all play a role, so any calculation of cost must necessarily be imprecise.

IDC has developed three scenarios that can help companies estimate the cost of not finding information and the productivity gains that can be achieved when knowledge workers have effective information-finding tools.

All of these scenarios use assumptions that must be adjusted to the circumstances of each particular organization because the definition of "knowledge worker" varies widely depending on the nature of the enterprise. Even within an organization, knowledge workers can run the gamut from manufacturing line to executive suite, given the highly computerized nature of many businesses.

In these scenarios, IDC uses a salary plus benefits number of $80,000 for a typical knowledge worker. We use a general estimate that the typical knowledge worker spends about 2.5 hours per day, or roughly 30% of the workday, searching for information. This number also needs to be adjusted to reflect the circumstances of each specific enterprise. IDC believes the number represents a general average of time spent searching based on the ubiquity of intranets within organizations. Employees are encouraged to use the search function to find what they need on the

intranet — indeed, in large organizations it's unlikely that knowledge workers can find what they need without resorting to the search form. Increasingly, search has become one of the most frequent, vital tasks a knowledge worker performs. Much of this time is wasted, and each scenario addresses one potential reason for search failure.

It's important to bear in mind that these scenarios do not work together to provide cumulative estimates, due to the often overlapping nature of the search challenges. The point with each is to develop an ad hoc process that can be used to at least gain a preliminary understanding of the problem.

Scenario 1: Time Wasted Searching

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Assumptions

- Knowledge worker salary = $80,000 annual salary plus benefits
- 1,000 knowledge workers x 2.5 hours/day searching on average
- Calculation of cost: $80,000 (52 weeks (40 hours/week x 2.5 hours/week searching x 1,000 knowledge workers x 50% unindexed information

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In the aggregate, the Fortune 1000 stands to waste at least $2.5 billion per year due to an inability to locate and retrieve information.

Scenario 2: Cost of Reworking Information

A 1999 IDC study found that Fortune 500 companies would lose $12 billion as a result of intellectual rework, substandard performance, and inability to find knowledge resources. IDC calls this the "knowledge deficit" (see *European Knowledge Management Fact Book*, IDC #21511, January 2000):

> The knowledge deficit is a metric that captures the costs and inefficiencies that result primarily from intellectual rework, substandard performance, and inability to find knowledge resources (both information and experts). IDC's extensive study of European firms and end-user return on investment (ROI) analysis has enabled us to estimate the average cost of ineffective knowledge management (KM) within organizations. The knowledge deficit translated into an average cost of US$5,000 per worker per year in 1999, growing to US$5,850 in 2003.

A study by Kit Sims Taylor found that knowledge workers spend more time unwittingly recreating existing knowledge than in creating new knowledge. (This study was presented at the *International Conference on the Social Impact of Information Technologies* in St. Louis, Missouri, October 12–14, 1998. For more information, visit **http://online.bcc.ctc.edu/econ/kst/BriefReign/BRwebversion.htm**). According to Professor Sims, roughly one-third of productive time is spent in knowledge reworking. The other nearly two-thirds is spent in knowledge finding and communication, with only about 10% of time spent in actual creation of new knowledge. For instance, Whirlpool expects to increase the productivity of its engineers by 30% by giving them access to existing designs for products. The following scenario uses an extremely conservative estimate of time spent in knowledge reworking.

Assumptions

- Knowledge worker salary = $80,000 annual salary plus benefits
- 1,000 knowledge workers x $5,000 per year (knowledge deficit)
- Calculation of cost: 1,000 knowledge workers x $5,000 per year
- Conclusion: An enterprise employing 1,000 knowledge workers wastes $5 million per year because employees spend too much time duplicating information that already exists within the enterprise. If we apply this finding to the Fortune 1000, we see that in aggregate, enterprises are wasting $5 billion annually. And this is a conservative estimate, since many corporations employ more than 1,000 knowledge workers. The productivity cost is staggering.

Scenario 3: Opportunity Costs to the Enterprise

The first two scenarios focus on relatively quantifiable costs to the enterprise of time wasted searching for information and recreating information that already existed but couldn't be found. Another very tangible but harder-to-quantify cost is the opportunity cost to the organization.

Assumptions

- Revenue per employee: $500,000 per year, or $240 per hour
- Calculation of opportunity cost: 1,000 employees x 50% failed searches x $240/hour x 2.5 hours searching
- Conclusion: The opportunity cost to an enterprise employing 1,000 knowledge workers is about $300,000 per week, or more than $15 million per year.

  Other unpredictable costs to the organization include the cost of poor decisions, the cost in frustration and job satisfaction of knowledge workers, and the cost in sales due to inability to provide information to customers. While the cost of poor decision making seems hard to quantify, anecdotes abound about engineering design

decisions, for instance, that were based on using components that were no longer manufactured and that resulted in complete product redesigns. Time is also a factor. If information is not located online, employees resort to interrupting their colleagues to ask for help or information. All of these factors are hard to quantify, but they all add to the cost burden incurred through poor information finding.

Conclusion

Using the scenarios outlined above, IDC estimates that an enterprise employing 1,000 knowledge workers wastes at least $2.5 to $3.5 million per year searching for nonexistent information, failing to find existing information, or recreating information that can't be found. The opportunity cost to the enterprise is even greater, with potential additional revenue exceeding $15 million annually.

Measuring return on investment (ROI) for improved search and retrieval or, indeed, for a complete enterprise information system is not a precise science. While costs such as software, additional hardware, or staff training can be estimated fairly precisely, benefits can be both tangible and intangible.

Among the more easily quantified benefits are increased sales, decreased time in answering inquiries and requests for help, the need for fewer help desk employees, the larger number of personnel problems that are answered with access to online information, and so forth. It is harder to quantify the effects of finding better information for decision making, saving search time for analysts so that they can spend more of their hours analyzing the information they have located, or the fact that there are fewer poor decisions made within the enterprise.

Similarly, a decrease in duplicated efforts can only be quantified if there is already a baseline number of times that two business units have spent time developing exactly the same information or product. The degree to which improved search yields a significant ROI is also affected by the corporate culture: Are employees willing to use new functionality? Are they willing to give others access to their own work?

Nevertheless, several studies in the past five years point to significant ROI for improved access to information. ROI figures range from 38% to over 600%, depending on whether the new information or content management system is an incremental improvement over an existing one or is an entirely new system replacing previously manual processes.

While the costs of not finding information are enormous, they are hidden within the enterprise, and therefore they are rarely perceived as having an impact on the bottom line. Decisions are usually information problems. If they are made with poor or erroneous information, then they put the life of the enterprise at stake. Therefore, it behooves the enterprise to provide the best information-finding tools available and to ensure that all of its intellectual assets have access to them, no matter where they reside.

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