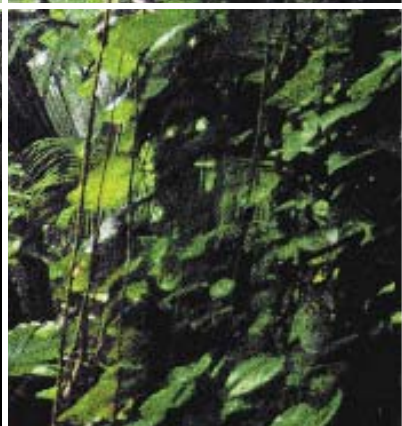
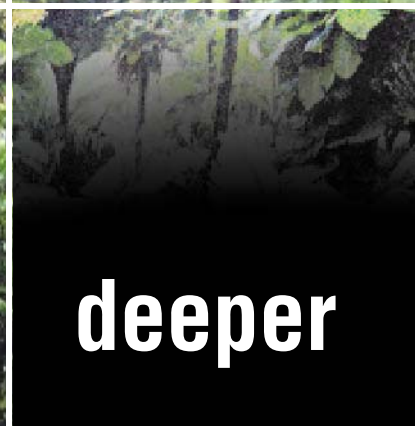
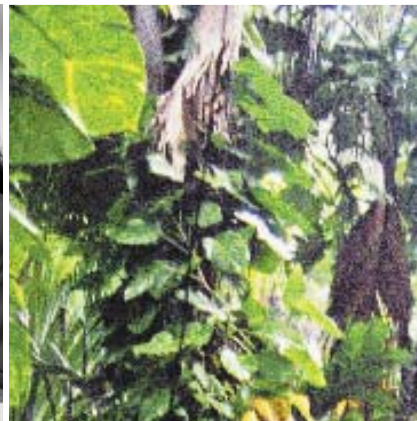


Tackling “messy knowledge”: Combining the best of Knowledge Management with Learning and Development



An IBM Institute for Business Value executive brief

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Tackling “messy knowledge”: Combining the best of Knowledge Management with Learning and Development

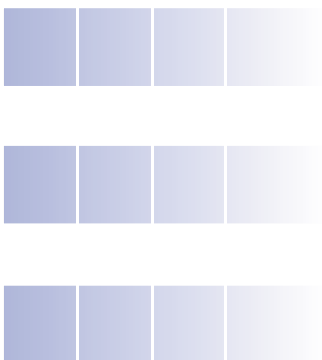
As work requires ever-faster judgment and decision-making, workers need to find and apply the relevant knowledge from a barrage of content that is larger and more complex than before – especially difficult because much potentially critical knowledge is “messy.” Knowledge is often *out-of-date* (expired or not encompassing today’s circumstances), *out-of-reach* (in someone’s head, an obscure database or a co-worker’s hard drive) or *out-of-touch* (not relevant for the individual worker or the task at hand). Meanwhile, managers struggle to improve corporate *responsiveness* by matching skills and knowledge to activities, even as the required knowledge is fleeting and competition forces compressed cycle times.

The solution to the *messy knowledge* problem may come from combining the best of two disciplines: Knowledge Management (KM) and Learning & Development (L&D). Historically, KM has focused on addressing out-of-date and out-of-reach knowledge via various capture-organize-store-use/innovate tools supporting the knowledge cycle. Meanwhile, until the recent expansion of “e-Learning” technologies, L&D has focused on preventing out-of-touch knowledge by concentrating on context and form.

Today, these two disciplines are linking creatively as KM practitioners increasingly consider context and form, while L&D practitioners increasingly access and distribute knowledge through electronic means. Only by combining the strengths of each can managers move toward *knowledge on demand* capabilities that can solve the messy knowledge problem. IBM Corporation has designed a framework that leverages the best of the KM and L&D worlds. Known as “solutions for messy knowledge,” these approaches address the “triple threat” – knowledge that is out-of-date, out-of-reach and out-of-touch.

The problem: Messy knowledge

More and more, work requires innovative techniques for managing messy knowledge, mainly due to two well-documented characteristics of today’s business environment. First, much knowledge work is also service work because services comprise a greater proportion of the information economy. Second, as customers become better informed, the complexity of knowledge work has grown. Thus, there are more instances of messy knowledge in a variety of industries.



As a result of higher demand and knowledge complexity, customer-serving personnel must answer increasingly difficult questions more quickly. The questions that now come to a human being such as a "product expert" generally require more sophisticated logic and even judgment. In addition, the questions are not only from consumers – service customers may also include a co-worker or a collaborator at another company.

Retail, financial services, high-tech, pharmaceuticals and many other industries face this knowledge work challenge. Using the most up-to-date knowledge separates industry leaders from their competition. Increasingly, a firm's success depends on the ability to respond rapidly to virtually any type of opportunity or threat. Having knowledge on demand – precisely what's needed, when it's needed – is critical for firms to function optimally in a demanding business environment. *The overall economic objective is to get work done faster and more accurately, with individuals and groups making decisions more quickly and with better insight.*

Messy knowledge is perishable, inaccessible and not usable by the person performing work. Organizations seeking to overcome these problems have often met with mixed results:

- *Out-of-date*: Some companies have replaced live classroom training with static online instruction. Yet, by the time it's delivered to the appropriate employees, the content may be out-of-date.
- *Out-of-reach*: Others have cataloged and linked information and/or experts in elaborate repositories. Unfortunately, much interactive content is insufficiently mapped to the workers' context or existing knowledge – using the wrong sequence, focus or examples. Multipurpose or non-intuitive taxonomies may stump workers seeking answers. As a result, many repositories are confusing, difficult to search and ultimately under-used.
- *Out-of-touch*: Some organizations focus on getting the information to the knowledge workers at the right time, without considering format or context. For example, at a consumer electronics company, well-intended engineering managers sought to teach new product teams about the corporate research process by handing their historical project logs to new design teams. Because the logs contained cryptic test results and journal entries and were not designed for educational purposes, the knowledge was not reusable by any other team.

Figure 1 provides real-world examples of messy knowledge problems.

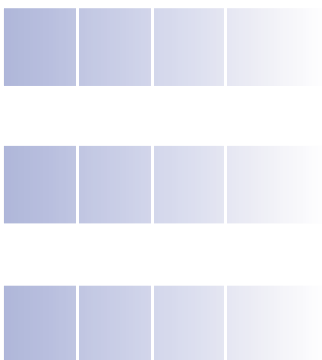


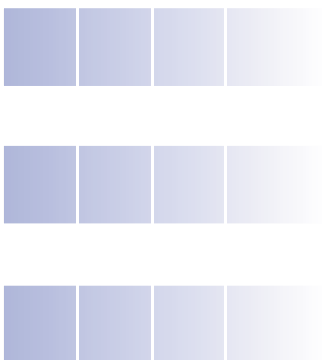
Figure 1: Examples of messy knowledge problems.

Example	Out-of-date	Out-of-reach	Out-of-touch
Government official asks an aide for one fact, but is given a 30-page report	If the fact changes often, a long paper may not have the most up-to-date information	If abbreviated highlights are not available, the user will become frustrated	It is too time-consuming to look through a 30-page report
An expert locator database never catches on because it has too few search terms and the entries are not up-to-date	People will discount the database as a way to find someone's most recent contact information	If you can only search by last name but not by topic, location or tenure, the system is less useful	Users will lose patience with a locator that doesn't provide robust searching capabilities
Best practice business case samples are stored in intranet repositories for which there are multiple sign-ons, non-intuitive taxonomies or search engines	Not a best technology practice	Wrong location – too hard to access information	Once access is granted, the obscure taxonomy system makes it difficult to find what the searcher needs

The out-of-touch shortcoming is particularly sticky: *How do we not only move knowledge to the worker, but also feel confident that knowledge is both relevant and digestible?* Some managers have tried to do this through interactive access to static knowledge: delivering instructor-led or self-paced training, setting up content repositories or providing self-serve learning modules. The drawbacks of these types of solutions include:

- Instructor-led training can be costly, in terms of non-productive worker time, travel and other classroom expenses
- People forget much of their conventional training and are not accustomed to subsequently consulting training materials, whether online or in hard copy
- Online training content is often too long, irrelevant, too general or incomplete.

On the other hand, there are promising possibilities. Some firms are taking a more on demand approach to knowledge sharing by trying to connect workers immediately with knowledge sources by having “roaming” instructors or subject matter experts (SMEs) available at deskside or via instant messaging. However, this particular solution may be cost-effective only when there are considerable numbers of knowledge workers and SMEs available.



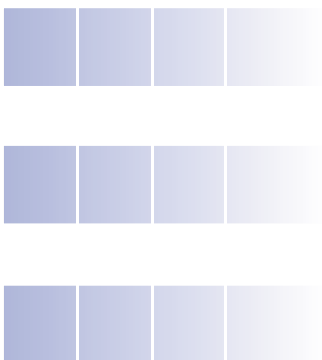
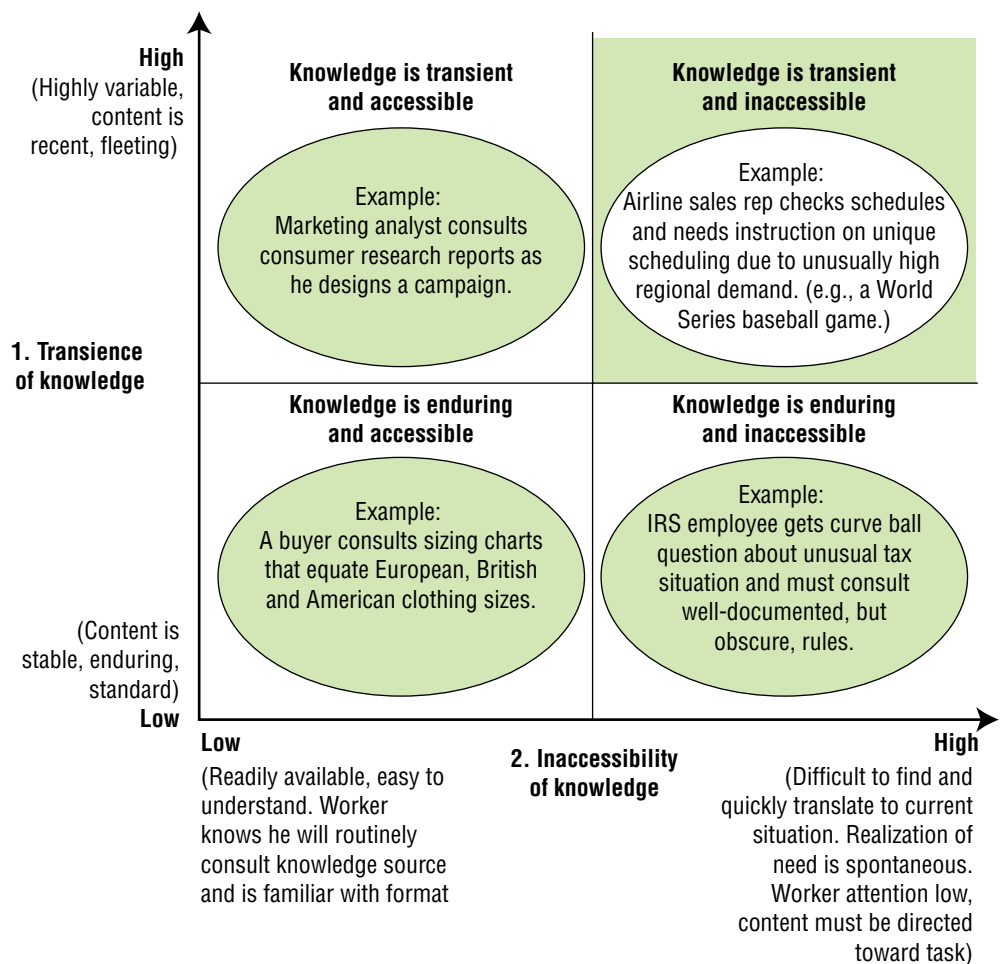
A model for identifying messy knowledge

To help understand and address messy knowledge, we developed a simple diagnostic model. The framework's two dimensions address all three characteristics of messy knowledge.

1. *Transience* encompasses the first characteristic: out-of-date
2. *Inaccessibility* combines the second and third characteristics: out-of-reach and out-of-touch.

These dimensions are represented in a 2 x 2 matrix (see Figure 2).

Figure 2: Messy knowledge model.



Dimension 1: Transience of knowledge

On the y-axis is *transience* of knowledge. Transience measures the speed at which knowledge becomes obsolete. In some processes, knowledge does not change quickly; it is relatively stable. For example, basic property and casualty insurance claims rules may not change for several years, so online or paper repositories of those rules are easy to maintain.

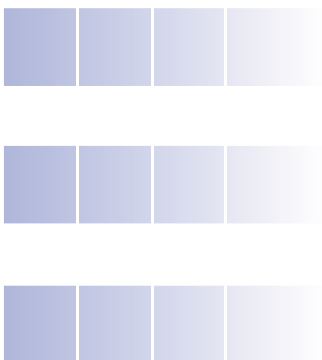
On the other hand, knowledge that becomes obsolete quickly needs to be replaced or removed to promote timeliness and accuracy of decision-making. Consider a physician. As medical knowledge changes rapidly – for example, reference research – its useful effects on competitive advantage and patient safety are also fleeting. The knowledge and learning platform that is deployed must support the particular knowledge worker and keep pace with the transience of knowledge. To become *responsive* and *adaptive*, the learning platform requires customization to better serve its identified knowledge seekers, as well as a self-monitoring capability designed to eliminate outdated information.

Dimension 2: Inaccessibility of knowledge

On the x-axis is *inaccessibility* of knowledge. Inaccessibility is more complex than transience, as it embodies two characteristics:

- a. The first characteristic is *availability*, which addresses the out-of-reach element. It answers the questions, “Is the information physically accessible? Does the knowledge seeker know that the knowledge exists and is the knowledge accessible when he or she needs it?” Today’s info-glut and rapid changes often result in workers’ being vaguely aware of where knowledge exists, yet being unable to obtain it due to cumbersome search requirements.
- b. The second aspect of measuring inaccessibility is *ease of assimilation* for the knowledge worker. Having found available knowledge, the worker next needs to interpret, put into context and integrate it into his background or experience. In other words, does it address the out-of-touch characteristic? Highly inaccessible knowledge must be transformed from its raw form (for example, work papers, statistical tables, presentations, interview notes) to a form that can be quickly absorbed by an adult learner to accomplish a given task or process, such as rapidly making a well-informed, customer-focused decision.

Resiliency is a pivotal aspect of knowledge on demand – the organization must use processes and technology that are consistent and reliable, prepared to handle change and always “on.” Such increased resiliency can eliminate points of vulnerability or potential failure due to inaccessibility of critical knowledge.



To reduce inaccessibility, an organization committed to knowledge on demand should focus on two goals: integrating data and systems across the organization to alleviate knowledge deficits that can arise from isolation and using technology to aid in information transformation, thereby boosting assimilation.

Convergence of KM and L&D: Solutions for messy knowledge

The messy knowledge problem sits in the upper right-hand quadrant of Figure 2. Here, knowledge workers tackle tasks that are high-risk, complex and judgment-oriented. The required knowledge is perishable, unique to the situation and time-bound. The solution requires the following content and delivery attributes:

- *Content:* Content must be up-to-date, put into context, streamlined and easy to grasp – that is, appropriate given the cognitive and psychological readiness of the user or worker
- *Delivery:* Delivery must be interactive, flexible and configurable, just-in-time and relevant to the problem at hand. L&D professionals often refer to this transformation of content as generating “reusable learning objects.”

These content and delivery dimensions of messy knowledge correspond to the complementary strengths of KM and L&D. The KM community has focused on the capture and push or pull, via the correct delivery vehicle, so that knowledge is available on demand – just as a decision is being made. Meanwhile, the L&D community has focused on verifying that content is formatted to be responsive to cognitive needs.

On demand solutions for messy knowledge bring together the strengths of both KM and L&D and can be characterized by three main knowledge activities:

- Frequent harvesting to combat the out-of-date problem
- Delivery to workers in the work context to prevent the out-of-reach problem
- Aggregation into a useful format to manage the out-of-touch problem.

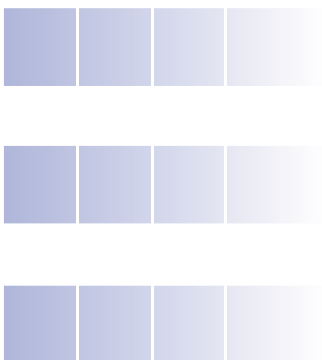


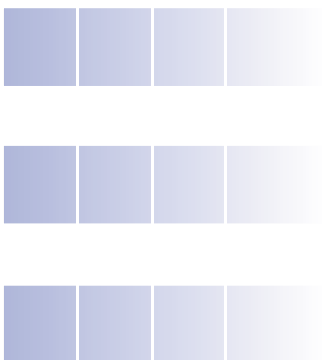
Figure 3 illustrates how on demand knowledge inherits different strengths from the KM and L&D disciplines.

Figure 3: Solutions for messy knowledge: Applying the best of both worlds.

	Knowledge management (KM)	Learning & development (L&D)	On demand solutions for messy knowledge
Asset	Process and discipline to tackle out-of-date and out-of-reach conditions	Process and discipline to tackle out-of-touch and out-of-reach conditions	The most up-to-date knowledge or information in the right format, delivered to the worker at the right time in the course of work, via realtime data gathering and analysis
Heritage of this discipline	Work process management and info management	Individual and group cognition	KM and L&D
Tacit (person-to-person) or explicit (written/electronic)?	Tacit or explicit	Mostly explicit	Both tacit and explicit
Form	Artifacts, generally organized and synthesized	Learning objects targeted at adult learners	Artifacts, delivered with the clarity and appropriateness of learning objects to promote fact-based decision-making
Measure of effectiveness	Reduced process cycle time	Individual and group skill	Quality of complex decisions possible to measure through availability of continuous feedback. Bottom-line increase in effectiveness, efficiency and innovation.
Risk (Assumes KM and L&D both strive to not be out of reach)	Not the right format, not easy to understand (out-of-touch)	Not timely (out-of-date)	Costs: Must invest in making content in right form and up-to-date and provided at the right time

Addressing messy knowledge at Partners HealthCare

For medical knowledge workers, the consequence of making a poor decision may literally become a matter of life and death. The medical field has many examples of information glut overpowering those who need to make informed judgments with little time. In fact, a typical doctor at the top of his profession needs to know “something about 10 000 different diseases and syndromes, 3 000 medications, 1 100 alternative laboratory tests, and many of the 400 000 articles added each year to the biomedical literature.”¹



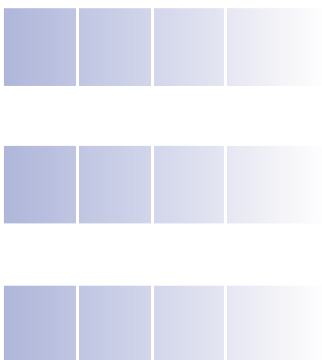
In 1999, the Institute of Medicine reported that in the U.S., as many as 98 000 lives are lost each year due to preventable medical errors. A newer study, which discovered errors through prospective reviews initiated by computerized clinical information systems, uncovered twice the number of adverse drug events and five times the number of surgical events than were found by manual chart review.²

Partners HealthCare, an integrated healthcare delivery organization, wanted to help its doctors make better decisions in light of fast-changing, inaccessible, messy knowledge. Their solution centers on a hand-held personal digital assistant (PDA) that calls up an interactive repository of clinical and pharmaceutical data. This combination of repository, delivery and form specifically addresses the triple threat:

1. *Out-of-date and perishable knowledge.* No individual doctor can manually stay on top of the proliferation of pertinent medical information that is produced on a daily basis. Yet, a copious amount of current information – such as drug interactions, formularies or patient records – is essential to make the best decisions.
2. *Out-of-reach knowledge.* Doctors can now get information when they most need it – even at a patient’s bedside or an examining table. Without relevant knowledge at their fingertips, doctors must spend valuable time combing through libraries and databases before they can make decisions that “needed to be made yesterday.”
3. *Out-of-touch knowledge.* PDA information suppliers use handheld device technology and the Internet to push the knowledge at an appropriate level of detail, using drill-down menus.

At Partners HealthCare, a physician uses a computerized, integrated system with “trusted knowledge” built in. He will know if a test he plans to order is no longer necessary or if a medication he wants to prescribe is one the patient cannot tolerate. Information in an appropriate form is at his fingertips exactly when he needs to make a treatment decision. While a long, involved response may be more technically accurate and comprehensive, a short answer may not only prove sufficient, but also life-saving in a particular situation.

Other system functions will notify the doctor if a patient’s condition has taken an unexpected turn or other events occur that should trigger a treatment decision. Furthermore, the tool provides access to many other in-depth sources of trusted medical knowledge that the physician can consult when (and if) time permits. Facts may change quickly, but the accessibility, delivery and form are highly tuned.



Addressing messy knowledge at a major airline

A global airline recently developed and implemented an innovative customer call center application. The previous process and systems were not intuitive to the worker. So, over the years, workers had created personal job aids or memorized code lines to take them directly to answers during customer calls. In effect, they were using individual “rules of thumb” and “workarounds” – personalized taxonomies which further reduced opportunities for knowledge sharing.

Management reasoned that structuring, indexing and filtering data in a manner intuitive to workers would increase productivity, reduce errors and enhance customer service. To improve responsiveness to customers, reservation agents required realtime access to a wide range of reference documents and perishable customer data, including:

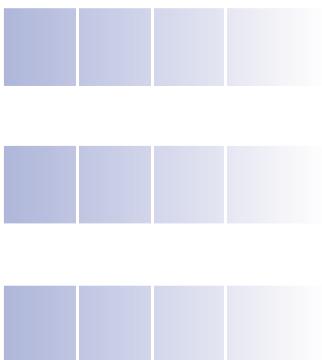
- Reference data – Basic policies and procedures such as the airline’s policy on bringing pets overseas, guidelines on awards certificates or even how to handle a customer with a peanut allergy
- Customer data – Reservation details, travel preferences, payment and an index of customer attractiveness (profitability).

To solve the airline’s problems, the consulting team specifically addressed its messy knowledge:

1. Out-of-date and perishable information wasn’t always consistent among airline divisions
2. Out-of-reach information left workers frustrated and at a loss for data
3. Out-of-touch information needed to be refreshed – some data had a long shelf life, while other data were dynamic.

Initially, a variety of experienced reservations agents helped define the new content taxonomy, highlighting common themes and trends for sorting data. Additionally, “if/then” logic was built into the methodology and new technology to facilitate retrieval of needed knowledge through better search capabilities. It was imperative to design an intuitive taxonomy within the context of their daily activities.

Analysis resulted in a high-level architecture for the new data platform, called the Reference Documentation system, which features: extensibility and synchronization with data used by other divisions; flexibility, accessibility and availability (at all times); security/control; graphics; standard formatting; cross-referencing; and intuitive search capabilities. By converging KM and L&D constructs, reservation agents now receive just-in-time, current knowledge presented in a useful format within an appropriate taxonomy.



Building on demand solutions for messy knowledge

As companies move toward having knowledge on demand, there are technology, knowledge-capture and knowledge-aggregation challenges. By integrating the best of both KM and L&D, we believe that the sum will be greater than the parts. Solution design requires fully understanding the organizational vision, audience needs, economic constraints and availability of technology.

First, managers must generate a collective view of the content delivered in a form that is usable, when the individual needs it. This requires in-depth comprehension of related work processes, knowledge gaps, time-critical process steps and worker comfort with reading, graphics and technology.

Next, managers need to focus on and prioritize content:

- What knowledge is needed – such as lessons learned, databases, transaction systems, insights or rules of thumb – to support specific processes?
- Which of this knowledge is fleeting and how can it be cost-effectively updated on a regular basis?
- Where does this knowledge exist today: in workers' heads; in manuals or research reports; or in other functions outside the workers' expertise?

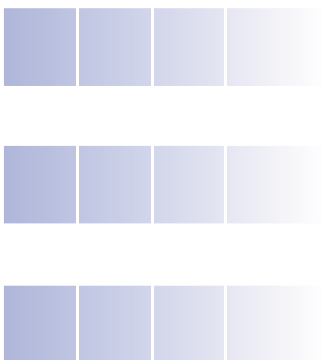
Harvesting knowledge

KM practitioners have made significant strides in harvesting knowledge. Locating and capturing knowledge – whether tacit or explicit – necessitates considerable attention to the degree of knowledge sharing in a given work culture, as well as the need to reward those who have or leverage knowledge. During harvesting, L&D professionals should help specify the choice of knowledge and its form – unless that knowledge is put into a useful form and made available when needed, the value of collecting it is lost. Both disciplines can contribute formal methods for synthesizing, organizing and storing knowledge using a shared taxonomy.

Designing to handle the out-of-date condition

Preventing this condition requires providing the most up-to-date and accurate information to the decision-maker. Decisions made with obsolete data are risky at best. Knowledge management addresses the timeliness problem in several ways:

- Connection to realtime data feeds continuously updated information directly to the user
- Push technology delivers predetermined types of content whenever there is a notable change



- Participation in communities of practice or other formal groups helps extend people's networks, thus facilitating knowledge transfer
- Expertise locators help workers quickly and efficiently to find the person who will know "the answer".

A KM system can either make the information available directly to the user or make a connection to needed knowledge readily available. Regardless of the delivery method, both technological and people-focused strategies can be implemented to provide the most current knowledge on demand to the person who needs it.

Designing to handle the out-of-reach condition

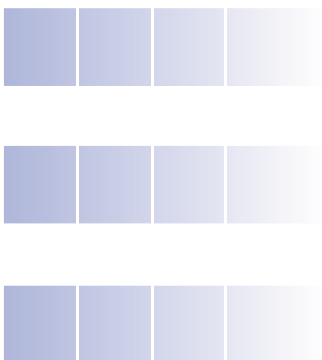
This step is about storing and physically moving content to the worker or to an easily searchable repository. Embedding knowledge requires the following work:

- Selecting the content delivery method (high-tech or high-touch)
- Linking or streamlining search or push processes
- Delivering content to specific work stages for specific individuals (for example, within a portal's work flow)
- Refreshing perishable content on a timely basis, along with archiving old knowledge
- Setting up and monitoring performance measures (for example, process cycle time, content use and qualitative opinions of content from workers).

Addressing out-of-reach knowledge combines the technical disciplines of both KM's portals and collaboration tools, and L&D's reusable knowledge object storage and delivery technology. Both KM and L&D focus on designing and delivering strategies and solutions both *on the Web* and *complementing the Web*. Each specific organization must solve its messy knowledge problems by operationalizing a path that is appropriate to its workers.

Designing to handle the out-of-touch condition

Managing the out-of-touch condition is about envisioning the delivery of content just-in-time in a form that is appropriate for the worker, by leveraging the best of L&D. L&D practitioners have made significant strides in using technology – high-touch and high-tech – to achieve worker cognition, assist decision-making, organize content and contextualize knowledge. Many organizations are achieving a balance of cost-effectiveness and work performance by implementing a blended solution that includes both high-touch and high-tech components.



High-tech (tool-to-person) solutions range from low- to high-investment and include reference manuals and self-study workbooks, linear video, interactive computer-based training (usually CD-ROMs), employee portals and handheld devices with mobile connectivity.

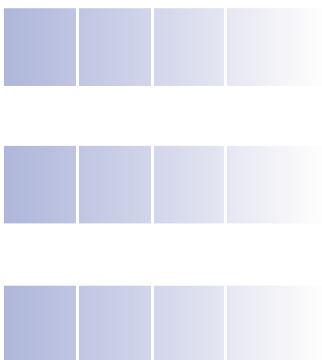
High-touch (person-to-person) solutions include expertise finders for accessing remote instructors or SMEs, instant messaging to a pool of experts or problem-solvers and in-person “roamers” or “process coaches” who respond directly to questions, in terms appropriate for an individual worker.

Teaming up against the triple threat

Moving ahead, we encourage the KM and L&D fields to jointly address several questions that are critical to companies seeking to take advantage of knowledge on demand:

- What are the economics of messy knowledge? What is the messy knowledge problem costing individual companies today? The global economy?
- When are the high-tech versus high-touch options preferable for solving messy knowledge? What are organizations doing today?
- How can you design the best combinations of typical KM activities (harvesting, organizing, storing, accessing/delivering and using/innovating) and L&D activities (assessing, planning, synthesizing, modularizing and distributing learning objects) to allow your organizations to become more responsive to customers and better able to adapt to market shifts?
- How can KM and L&D practitioners help their respective clients and peers to embrace core offerings of both disciplines instead of “reinventing the wheel”?

Using knowledge effectively in work to inform complex decision-making is a key driver of competitive advantage in today’s economy. Because service activity has outpaced manufacturing activity as the major engine of the industrialized economy, the knowledge that service-providing personnel need has become increasingly important. The success of product manufacturing firms – and the services surrounding the design, development, sales and use of their products – similarly depends on responsive, adaptable and resilient knowledge processes and systems. In short, to thrive in increasingly complex business environments, service providers and manufacturers must be able to tap into knowledge on demand.



Individually, KM and L&D do not address this challenge completely, but combining the best of both fields can help solve messy knowledge problems. Equipping an organization to operate in the on demand environment will require planning that integrates knowledge into workflows, a harvesting process that accelerates accessibility and a continuous knowledge segmentation and reaggregation approach that is designed to streamline delivery of the right content, to the right workgroup, to the right work-step, at the right time.

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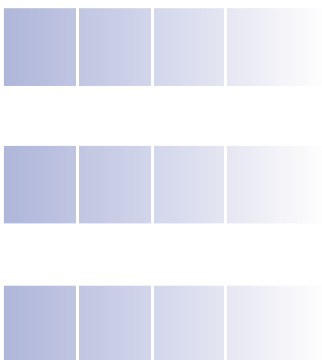
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