Knowledge Management

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Abstract
Knowledge management (KM) is defined as a deliberate and systematic coordination of an organization’s people, technology, processes, and organizational structure in order to add value through reuse and innovation. There is a lack of consensus on clearly defining KM partly due to the multidisciplinary origins of the concept, ranging from organizational science, to cognitive science, to library, and information science. Core management concepts include the notion of difficult-to-articulate tacit knowledge, documented tangible or explicit knowledge, organizational learning as encapsulated in the form of best practices (successes) and lessons learned (failures), and preservation of this content in an organizational memory system. The knowledge processing life cycle then consists of creating new knowledge, capturing existing knowledge, contributing knowledge for reuse by others, documenting knowledge, reconstructing, refining, and sharing knowledge as well as continually evaluating the value of each knowledge resource in order to decide whether to keep it in circulation or to retire it from “active duty.” The Nonaka and Takeuchi knowledge spiral model is used to illustrate how knowledge is transformed from one form to the other. A brief historical overview of KM is presented to show the evolution from a management fad to a scholarly discipline of study and research. Finally, the emerging roles for information professionals in this field are briefly described, outlining some of the key roles such as Chief Knowledge Officer, Knowledge Manager, Content Editor, and Knowledge Journalist.

INTRODUCTION
This entry provides an overview of knowledge management (KM), both as a scholarly discipline and a professional field of practice. Key terms such as “knowledge” and “knowledge management” are defined. Core concepts such as intellectual capital, lessons learned, best practices, and value-added knowledge reuse are introduced and defined. Key stages in the knowledge processing cycle are defined and described. A brief historical chronology of KM is outlined to show the multidisciplinary roots and the evolution that has taken place to date. The emerging roles for information professionals in KM are presented and the links to information studies are emphasized. The primary goal of this entry is to illustrate how KM that rests on a solid foundation of information management emerges as a stronger and more rigorous field of study and practice.

DEFINITION OF KNOWLEDGE MANAGEMENT
There is no universally accepted definition of KM. Part of this stems from the fact that there is a lack of consensus in defining knowledge. A sample dictionary definition of knowledge is:

The fact or condition of knowing something with familiarity gained through experience or association; acquaintance with or understanding of a science, art, or technique; the fact or condition of being aware of something; the range of one’s information or understanding (e.g. answered to the best of my knowledge); the circumstance or condition of apprehending truth or fact through reasoning; the sum of what is known: the body of truth, information, and principles acquired by humankind; cognizance, awareness, learning.[1]

Knowledge obtained from investigation, study, or instruction; intelligence, news data or facts; the attribute inherent in and communicated by one of two or more alternative sequences or arrangements of something (as nucleotides in DNA or binary digits in a computer program) that produce specific effects e (1); a signal or character (as in a communication system or computer) representing data (2); something (as a message, experimental data, or a picture) which justifies change in a construct (as a plan or theory) that represents physical or mental experience or another construct.[1]
Other definitions from the KM literature include

Knowledge is a subset of information: it is subjective; it is linked to meaningful behavior; and it has tacit elements born of experience (p. 113).[2]

Knowledge is always recreated in the present moment. Most of us cannot articulate what we know. It is largely invisible, and often comes to mind when we need it to answer a question or solve a problem.[3]

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of those who know. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices and norms (p. 5).[4]

A typical example of information would be to read the listings of movies being shown on a given week, reading the reviews, and consulting the times and places the film will be showing at. An example of knowledge would be calling on a friend who has, in the past, demonstrated an uncanny inverse relationship with respect to likes and dislikes: if this person liked a movie, experience has shown that one would hate it and vice versa. Knowledge is also brought into play in making a decision to drive or take public transport, given the time of the year, possibility of inclement weather, and the rapid trend analysis that concludes that it has never been possible to find parking in time to see a movie being shown downtown.

A key point is that not all information is of value to a given individual, group, or organization. A knowledge asset is defined as knowledge that is of value, which is more context dependent and more subjective in nature, as illustrated in Fig. 1.

The Multidisciplinary Nature of KM

There is a great diversity to be found in KM definitions. This is due to the multidisciplinary nature of the field. In fact, most definitions appear to provide only one piece of the KM definition puzzle, as they are heavily influenced by their particular discipline. Table 1 lists some of the different disciplines and specialties that have contributed to and that make use of KM.

Here are a few sample definitions from the business perspective:

Knowledge management is a business activity with two primary aspects: treating the knowledge component of business activities as an explicit concern of business reflected in strategy, policy, and practice at all levels of the organization; and, making a direct connection between an organization’s intellectual assets—both explicit (recorded) and tacit (personal know-how)—and positive business results.[5]

Knowledge management is a collaborative and integrated approach to the creation, capture, organization, access and use of an enterprise’s intellectual assets.[6]

There is much more to knowledge management than technology alone. Management is a business process (p. 95).[7]

Some definitions from the cognitive science or knowledge science perspective:

Knowledge—the insights, understandings, and practical know-how that we all possess—is the fundamental resource that allows us to function intelligently.

Over time, considerable knowledge is also transformed to other manifestations—such as books, technology, practices, and traditions—within organizations of all kinds and in society in general. These transformations result in

![Fig. 1 Key attributes of knowledge assets.](image-url)
cumulated expertise and, when used appropriately, increased effectiveness. Knowledge is one, if not THE, principal factor that makes personal, organizational, and societal intelligent behavior possible.\cite{8}

Some sample definitions from the process/technology perspective:

Knowledge Management (KM) was initially defined as the process of applying a systematic approach to the capture, structuring, management and dissemination of knowledge throughout an organization to work faster, reuse best practices, and reduce costly rework from project to project.\cite{9,10,11,12}

American Productivity and Quality Center (APQC)\cite{13} defines knowledge management as:

KM is the managing of knowledge through systematic sharing. Even in highly sophisticated modern knowledge organizations, the most valuable knowledge—the know-how in terms of what really gets results and what mistakes to avoid—often resides mainly in people’s minds. Knowledge Management works towards migrating that knowledge from one person to a wide-range of individuals within an organization.

Some “people-oriented” definitions:

Knowledge management is not seen as a matter of building up a large electronic library, but by connecting people so they can think together (p. 104).\cite{14}

Most executives seem to understand that knowledge is highly people-based, but they are stuck with an investment model that is geared primarily toward technology implementations (p. 86).\cite{12}

Knowledge management and its varied definitions need to achieve a balance: there cannot be an overemphasis on any one of the key dimensions, such as technology.\cite{14} Effective KM (and comprehensive KM definitions) should include people, process, technology, culture, and measurable organizational objectives.\cite{15,16}

Wiig\cite{8} also emphasizes that given the importance of knowledge in virtually all areas of daily and commercial life, two knowledge-related aspects are vital for viability and success at any level. These are knowledge assets that must be applied, nurtured, preserved, and used to the largest extent possible by both individuals and organizations; and knowledge-related processes to create, build, compile, organize, transform, transfer, pool, apply, and safeguard knowledge. They must be carefully and explicitly managed in all affected areas.

Historically, knowledge has always been managed, at least implicitly. However, effective and active knowledge management requires new perspectives and techniques and touches on almost all facets of an organization. We need to develop a new discipline and prepare a cadre of knowledge professionals with a blend of expertise that we have not previously seen. This is our challenge! (Wiig, in Grey).\cite{16}

The Intellectual Capital Perspective

The focus of intellectual capital management (ICM), on the other hand, is on those pieces of knowledge that are of business value to the organization—referred to as intellectual capital or assets.\cite{17} While some of these are more visible (e.g., patents, intellectual property), the majority consists of know-how, know-why, experience, and expertise that tend to reside within the head of one or a few employees.\cite{18,19}

Knowledge management is often characterized by a “pack rat” approach to content: “save it, it may prove useful sometime in the future.” Many documents tend to be warehoused, sophisticated search engines are then used to try to retrieve some of this content, and fairly large-scale and costly KM systems are built. Knowledge management solutions have proven to be most successful in the capture, storage, and subsequent dissemination of knowledge that has been rendered explicit—particularly lessons learned and best practices.

Intellectual capital management is characterized by less content—because content is filtered, judged, and only the best is inventoried (the “top ten”). Intellectual capital management content tends to be more representative of peoples’ real thinking (contextual information, opinions, stories) due to its focus on actionable knowledge and know-how, with the result that less costly endeavors and a focus on learning (at the individual, community, and organizational level) results, rather than on the building of systems.

It is essential to identify that knowledge which is of value and is also at risk of being lost to the organization, through retirement, turnover, and competition. The best way to retain valuable knowledge is to identify intellectual assets and then ensure legacy materials are produced, and subsequently stored in such a way as to make their future retrieval and reuse as easy as possible.\cite{20} These tangible by-products need to flow from individual to individual, between community of practice (CoP) members and, of course, back to the organization itself, in the form of lessons learned, best practices, and corporate memory.

The knowledge capture and transfer approaches described here help to:

- Facilitate a smooth transition from those retiring to their successors who are recruited to fill their positions.
• Minimize loss of corporate memory due to attrition and retirement.
• Identify critical resources and critical areas of knowledge so that the corporation “knows what it knows and does well—and why.”
• Build up a toolkit of methods that can be used with individuals, with groups, and with the organization to stem the potential loss of intellectual capital.

Knowledge management is often mistakenly perceived as a process of documenting knowledge held in people’s minds, then storing or archiving this knowledge.\[21\] In fact, it is better to view KM in a broader context, one that encompasses all the processes used to generate value from knowledge-based assets. Knowledge management is facilitated by technology and by the culture of an organization. A good way of defining KM is:

...the deliberate and systematic coordination of an organization’s people, technology, processes and organizational structure in order to add value through reuse and innovation. This is achieved through the promotion of creating, sharing and applying knowledge as well as through the feeding of valuable lessons learned and best practices into corporate memory in order to foster continued organizational learning (p. 3).\[22\]

**CORE KM CONCEPTS**

Kransdorff\[23\] coined the term “corporate amnesia” to refer to the loss of accumulated expertise and know-how due to employee turnover as people take what they know with them when they leave. The costs of employee turnover to the organization have been well documented (e.g., separation costs, recruitment and selection costs, training of replacements, initial lack of productivity of new hire, and the loss of productivity of coworkers during the transition). Far less research attention has been paid to the cost to the firm of losing know-how that resides within the minds of individual employees who depart. In an era of knowledge workers, learning organizations, and service economies, individuals are increasingly responsible for value creation. Although many organizations have succession plans in place, the process usually involves transferring know-how from the departing employee to their successor but the whole process has to be repeated again for the next departure. Organizations need to “capture” this know-how and transfer it to a stable, easily accessible, cumulative knowledge base—an organizational memory—to retain and make accessible valuable knowledge gained through the experiences of all knowledge in a continuous and uninterrupted manner.

Organizations need to effectively manage their organizational memory in order to prevent the loss of essential knowledge, particularly knowledge that resides predominantly in the heads of their knowledge workers (“tacit knowledge”) and less in documents, procedures, and other tangible forms (“explicit knowledge”).\[24\] More often than not, it is this difficult-to-articulate “know-how” that is of greatest value in organizational competitiveness and viability and which represents the vast majority of experiential know-how. Fig. 2 shows how the metaphor of an iceberg is often used to depict tacit and explicit knowledge forms.

The National Aeronautics and Space Administration (NASA), for example, has publicly admitted that the knowledge of how to put a man on the moon has been lost.\[25\] The lessons that were learned and the innovations that were sparked cannot be found in the collective organizational memory of NASA. This means that NASA’s organizational memory cannot be used as a resource to plan a more effective mission to send another manned flight to the moon or to Mars. A well-designed and well-managed organizational memory does not only combat corporate amnesia, but it ensures knowledge continuity—the effective transfer of know-how amongst peers and to future generations of knowledge workers. A better understanding of the nature of organizational memory, what it should include (content), how it can best be retained (technological containers), and how the accumulated lessons learned and best practices can be used by newcomers (connections), will help mitigate the cost of lost, forgotten, or un-transferred knowledge and know-how.

Organizations today face escalating risks of losing strategic knowledge and know-how and face incredible difficulties in recruiting and retaining skilled employees. Many industries face astounding rates of high and constant turnover. In addition, we are experiencing a demographic pressure as baby boomers rapidly approach retirement age, which means that a “critical mass” of knowledge will literally walk out the door over the next 5–10 years. Approximately, 11,000 baby boomers are turning 50 years old every day.\[26\] Over 80% of Canadian government federal executives will be eligible to retire by 2010 and 53% of U.S. federal civil servants
will be eligible to retire within the next 2 years.[27] The number of workers age 55 and over is expected to increase by 47% during the year 2010.[28] Other vulnerable organizations include high technology companies with very high turnover rates and the military or banking, where constant turnover is the norm given rotational postings.

Most successful organizations will state that their two greatest assets are the people who work for them and the knowledge they possess. The imminent turnover signals a potential for the loss of valuable accumulated knowledge and know-how in the form of the competence and expertise possessed by the departing individuals. This valuable knowledge and know-how exists in both formal and tangible forms, such as documents, but also in less visible forms—often referred to as tacit or difficult-to-articulate knowledge. Particular emphasis must be placed on the tacit form as this often resides within a given individual or group and is therefore more easily and completely lost when the people leave the organization.[29]

The typical technological tools used in KM are some form of centralized database system, an intranet or Web portal, to access the database content as well as other organizational knowledge, some type of messaging system (typically e-mail and discussion groups), some content management tools to organize the knowledge resources (e.g., content management software, taxonomy software), and some form of collaborative software (e.g., virtual meeting tools, groupware).

The essential elements that go into organizational memory include best practices, which are innovations or improved practices, processes, and so forth; together with the flip side of the coin: lessons learned, outcomes that were not desirable, or errors that should not be repeated. By carefully capturing, documenting, organizing, and making available accumulated experiential knowledge in the form of best practices and lessons learned, KM can provide a framework within which we can process knowledge throughout its useful life cycle.

Knowledge management typically addresses three levels within an organization: the individual, the group, and the organization. Organizational memory resides at the level of the organization and this is the preservation layer of KM. Innovation and knowledge creation occurs at the individual level while knowledge dissemination and sharing occur at the group level. In KM, groups of a particular nature, called “communities of practice” (CoPs) are often key elements in ensuring that valuable knowledge flows or moves around appropriately. These CoPs are essentially thematic networks of like-minded individuals who share a common purpose, a common professional zeal, and agree to mutually help out one another to achieve some strategic goals for the organization.[30,31]

Szulanski[32] introduced the notion of knowledge “stickiness” to refer to knowledge that was difficult to move around, and thus could provide little in the way of value to individuals, groups, or the organization as a whole. The knowledge processing cycle is used to describe the various stages a particular knowledge resource goes through during the course of its “lifespan” within an organization.

THE KNOWLEDGE PROCESSING CYCLE

Nonaka and Takeuchi described how knowledge was disseminated and transformed as it made its way around an organization in their Knowledge Spiral Model.[9] Essentially, knowledge is created by an individual (an innovative idea for example), but remains initially tacit. This innovation or idea is typically shared only with trusted friends and colleagues at first (“socialization”). With time, others may be aware of the innovation and the knowledge may be transformed from its tacit state to an explicit one (“externalization”), by documenting it in the form of text, audio, or other formats. Once explicit, it is easier to disseminate more widely and to preserve in an organizational memory system. At this stage (“combination”), the content may be organized and reworked (e.g., addition of an abstract or executive summary). In the final stage (“internalization”), explicit knowledge once again becomes tacit as an individual learns, understands, and “buys into” a knowledge resource (e.g., sees its value and decides to apply this new knowledge). The knowledge resource then continues cycling through the four quadrants in a “knowledge spiral.” Fig. 3 outlines the major stages in the Nonaka and Takeuchi KM model, as knowledge is transformed, disseminated, and applied within an organization.

As knowledge resources circulate throughout an organization, value can be added at each step. A more detailed view of what happens to knowledge as it undergoes transformation from tacit to explicit and back again is provided in the form of a knowledge life cycle. The first stage is to either capture existing knowledge (e.g., already existing in tangible form such as project

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**Fig. 3** The Nonaka and Takeuchi knowledge spiral model of knowledge management.
reports, conference reports, or other documents), or to create knowledge that does not yet exist in documented form (e.g., by interviewing subject matter experts to document a particular procedure). This knowledge resource can then be contributed to or made available for reuse by others. Knowledge is then codified by the addition of sufficient descriptive information about both the content and the format it is in (e.g., metadata describing theme, whether it is a text or also available as a short video clip). At this point, knowledge is further refined by sanitization (removing all sensitive information that may identify a person, place, or event, or other confidential content) and reconstruction (e.g., recombining or synthesizing in a new version). Contributions that have been refined and reconstructed are then subjected to a selective filtering process and those that are deemed to be valuable are made available for knowledge sharing.

Knowledge sharing involves the pooling and distribution of valuable content, either globally (e.g., a “broadcast” mode) or selectively (e.g., targeted to specific users, communities, or based on user profiles, subscriptions, etc.). The knowledge is better organized (classified using a taxonomic scheme) and access is typically provided through an intranet or portal interface. These valuable knowledge resources are then learned and applied by knowledge workers. Each knowledge resource is evaluated periodically in order to ensure continued relevance and to decide whether to discard or to archive at the appropriate time. Table 2 lists the key phases in knowledge processing that occurs during the useful life cycle of a knowledge resource, such as a best practice or lesson learned.

### HISTORY AND EVOLUTION OF KM

Knowledge and management are concepts that have obviously been around for some time—the combination, “knowledge management,” however, is fairly new. The emergence of communication technologies that create real-time networks such as the Internet, intranets, e-mail, and so forth have made KM easier to implement.[33]

A number of management theories have contributed to the definition of KM. Two KM gurus were responsible for establishing the field as a serious target for scholarly study: Peter Drucker,[34] who coined the term “knowledge worker” and who wrote about KM from a management perspective in the 1970s and Nonaka and Takeuchi, who wrote the seminal book *The Knowledge Creating Company* in the 1990s.[9] Others such as Peter Senge[35] and Chris Argyris[36,37] have focused on the “learning organization” and cultural dimensions of managing knowledge. The notion of knowledge as an asset became more widely adopted by the mid-1980s. Early pioneers in information technologies from artificial intelligence and expert systems at Carnegie Mellon University (CMU) and Digital Equipment Corporation (DEC) developed hypertext and groupware tools that allow information to be better shared and organized. Knowledge management-related articles began appearing in prestigious journals such as the *Harvard Business Review* and *Organizational Science* and a number of foundational books were published such as *The Fifth Discipline* and *The Knowledge-Creating Company*. Table 3 illustrates the major milestones in KM history.

In 1989, the International Knowledge Management Network (IKMN) was founded in Europe and was

### Table 2  Key steps in knowledge processing cycle

<table>
<thead>
<tr>
<th>Step number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Knowledge capture</td>
</tr>
<tr>
<td>2.</td>
<td>Knowledge creation</td>
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<tr>
<td>3.</td>
<td>Knowledge contribution</td>
</tr>
<tr>
<td>4.</td>
<td>Knowledge codification</td>
</tr>
<tr>
<td>5.</td>
<td>Knowledge refinement (including sanitize) and reconstruction (e.g., synthesis)</td>
</tr>
<tr>
<td>6.</td>
<td>Knowledge selection—filter contributions</td>
</tr>
<tr>
<td>7.</td>
<td>Knowledge sharing and pooling</td>
</tr>
<tr>
<td>8.</td>
<td>Knowledge organization and access</td>
</tr>
<tr>
<td>9.</td>
<td>Knowledge learning and application</td>
</tr>
<tr>
<td>10.</td>
<td>Knowledge evaluation and reuse or divest (e.g., destroy, archive)</td>
</tr>
</tbody>
</table>

### Table 3  Major milestones in KM history

<table>
<thead>
<tr>
<th>Year</th>
<th>Source</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>DEC, CMU</td>
<td>XCON Expert System</td>
</tr>
<tr>
<td>1986</td>
<td>Dr. K. Wiig</td>
<td>Coined KM concept at UN</td>
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<tr>
<td>1989</td>
<td>Consulting firms</td>
<td>Start internal KM projects</td>
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<tr>
<td>1991</td>
<td>HBR article</td>
<td>Nonaka &amp; Takeuchi</td>
</tr>
<tr>
<td>1993</td>
<td>Dr. K. Wiig</td>
<td>First KM book published</td>
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<tr>
<td>1994</td>
<td>KM network</td>
<td>First KM conference</td>
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<tr>
<td>Mid-1990s</td>
<td>Consulting firms</td>
<td>Start offering KM services</td>
</tr>
<tr>
<td>Late 1990s</td>
<td>Key vertical industries</td>
<td>Implement KM and start seeing benefits</td>
</tr>
<tr>
<td>2000–2003</td>
<td>Academia</td>
<td>KM courses/programs in universities with KM texts</td>
</tr>
</tbody>
</table>
Table 4  Major peer-reviewed KM journals

<table>
<thead>
<tr>
<th>Journal title</th>
<th>Year founded</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Systems Journal</td>
<td>1962</td>
</tr>
<tr>
<td>Journal of Managerial and Organizational Learning</td>
<td>1970</td>
</tr>
<tr>
<td>Journal of Management Information Systems</td>
<td>1984</td>
</tr>
<tr>
<td>Journal of Organizational Change Management</td>
<td>1989</td>
</tr>
<tr>
<td>Knowledge and Process Management</td>
<td>1996</td>
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<tr>
<td>Journal of Knowledge Management</td>
<td>1997</td>
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<tr>
<td>Journal of Management Studies</td>
<td>1997</td>
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<tr>
<td>Journal of Knowledge Management Practice</td>
<td>1998</td>
</tr>
<tr>
<td>Journal of Intellectual Capital</td>
<td>2000</td>
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<tr>
<td>E-Journal of Organizational Learning and Leadership</td>
<td>2002</td>
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<tr>
<td>Journal of Information and Knowledge Management (IJKM)</td>
<td>2002</td>
</tr>
<tr>
<td>Electronic Journal of Knowledge Management</td>
<td>2003</td>
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<tr>
<td>International Journal of Knowledge, Culture and Change Management</td>
<td>2003</td>
</tr>
<tr>
<td>Knowledge Management Research and Practice</td>
<td>2003</td>
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<tr>
<td>Interdisciplinary Journal of Storytelling Studies</td>
<td>2004</td>
</tr>
<tr>
<td>International Journal of Nuclear Knowledge Management (IINKM)</td>
<td>2004</td>
</tr>
<tr>
<td>International Journal of Knowledge Management</td>
<td>2005</td>
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<tr>
<td>International Journal of Knowledge Management for Development Journal</td>
<td>2005</td>
</tr>
<tr>
<td>International Journal of Knowledge Management Studies</td>
<td>2006</td>
</tr>
<tr>
<td>Interdisciplinary Journal of Information, Knowledge and Management (IJIKM)</td>
<td>2007</td>
</tr>
</tbody>
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joined by the U.S.-based Knowledge Management Forum in 1994.

Businesses began implementing KM solutions earnestly in the 1990s. At first, projects tended to be technological implementations, mostly portals and knowledge repositories. This was followed by a wave of “people not technology” emphasis that led to the popularity of thematic networks or CoPs. A third wave emerged as knowledge workers, much like information workers, found themselves faced with “content overload” which in turn led to a number of content management, knowledge organization, or taxonomic classification projects to make the knowledge more readily accessible to users.

With the new millennium, KM faded a bit from public view, likely due to disappointment, the result of expectations having been raised too much by “KM hype” and focusing too much on technologies that were largely left untouched. Practitioners and researchers came to the realization that converting theory into practice was more challenging than previously thought. Among the missing elements were ensuring that KM was not being done for KM's sake but that there was a clear link to organizational objectives and that all participants saw value in KM (incentives for knowledge sharing, for example). By 2004, the field had finally shaken its burden of being yet another management fad. Organizations appreciated the holistic nature of KM and paid attention not only to tools but also to organizational culture requirements for successful KM solutions.

In parallel, the nature of work evolved, with collaboration becoming the default rather than the exception, not only for our professional lives but social interactions and learning objectives. Knowledge sharing with a group of trusted peers has become the de facto way of working, learning, and living. Knowledge management found itself in tune with these changes that greatly facilitated its adoption as a philosophy, a mindset, a strategic perspective, and a way of interacting to create, share, and use valuable content.

Knowledge management today is being taught in universities around the world, typically in business, computer science, education, and information studies departments. Doctoral students are completing Ph.D. theses on KM topics. International conferences are being held around the world, with both practitioner and researcher tracks. A number of consortia and KM professional organizations have been established. The number and type of KM journals have also changed. While at first publications were primarily authored by KM tool vendors and practitioners, and in more general management, computer science and organizational science journalists, there has been a significant shift to more scholarly venues and publications that represent KM research rather than KM project mandates. Along with the proliferation in the number of journals, there has also been increasing specialization (e.g., International Journal of Nuclear Knowledge Management), more interdisciplinary journals (e.g., Interdisciplinary Journal of Information, Knowledge and Management), and more emphasis on international KM (e.g., International Journal of Knowledge Management). Up until about the year 2000, only non-peer reviewed journals were available (e.g., KM World, KM Review). Some of the major peer-reviewed KM journals available today are shown in Table 4, ordered by the first year of publication.

Knowledge management is found in all vertical industry sectors (e.g., banking, pharmaceutical); in all sizes of organizations (including volunteer-run associations with less than 10 full-time employees); and profit and nonprofit organizations and organizations with a strong hierarchical structure (for example, the U.S. military was one of the early pioneers of KM). Organizations today are defining and staffing KM positions.
Knowledge management is increasingly perceived as an element that cuts across organizational structures, projects, and silos—it enjoys a status similar to that of “quality assurance” or “ethics” and it has become a critical element of organizational viability. Knowledge management is no longer something interesting to explore—it has become subsumed in the way in which individuals, groups, and organizations work, learn, and remember.

EMERGING ROLES FOR INFORMATION PROFESSIONALS

The KM field has transformed from one led primarily by consultants and other KM practitioners to a bona fide discipline, with a distinct body of knowledge. This has been paralleled by the growing number of academic programs that offer KM as compared to the predominately private sector training that had been the only way to learn about KM up until now.\(^{38}\) TFPL\(^{39}\) is a specialist recruitment, advisory, training, and research services company with offices in London focusing on KM, library and information management, records management, and Web and content management. Since 1987, TFPL has worked with organizations in both public and private sectors to help them develop and implement knowledge and information strategies and to recruit and train information and knowledge leaders and their teams. TFPL has drafted a KM skills and competencies guide to provide a clear and practical overview of KM skills and competencies that draws on the practical experience of organizations in a wide range of sectors and with varying approaches to KM.

In general, these KM skills include:

- Time management to use their time and energy effectively for acquiring knowledge (spending all day surfing the Net is probably counterproductive).
- Use of different learning techniques to absorb key knowledge and learning quickly.
- Effective skills of advocacy and inquiry to present knowledge to, and gather knowledge from, others.
- Informal networking skills to build influence to gain access to people with knowledge.
- Resource investigation skills.
- Effective information technology skills for recording and disseminating information.
- Skills of cooperative problem solving.
- Open dialogue skills.
- Flexibility and willingness to try new things and take educated risks.
- Active review of learning from mistakes, risks, opportunities, and successes.

The TFPL KM skills inventory\(^{40}\) is based on an extensive international research. The project team contacted over 500 organizations involved in implementing KM, and identified the roles that they had created, the skills that were needed in those roles, and the additional skills that were required across the organization. These key skills included an understanding of the KM concept—the philosophy and theory—and an awareness of the experience of other organizations in developing KM solutions and approaches; an understanding of, and the ability to, identify the business value of KM activities to the organization; an appreciation of the range of activities, initiatives, and labels which are employed to create an environment in which knowledge is effectively created, shared, and used to increase competitive advantage and customer satisfaction.

Knowledge management roles are quite diverse and include such categories as senior and middle management roles—Chief Knowledge Officer (CKO) who ensures that KM goals are in line with organizational strategies and objectives; Chief Learning Officer (CLO) who ensures that the organization acts like a learning organization, improving over time with the help of accumulated best practices and lessons learned; Knowledge Managers who are typically responsible for the acquisition and management of internal and external knowledge. Other roles include:

- Knowledge navigators, responsible for knowing where knowledge can be located, also called knowledge brokers.
- Knowledge synthesizers, responsible for facilitating the recording of significant knowledge to organizational memory, also called Knowledge Stewards.
- Content editors, responsible for codifying and structuring content, also called content managers; roles involving capturing and documenting knowledge—researchers, writers, editors.
- Web developers, electronic publishers, intranet managers, content managers.
- Learning-oriented roles such as trainers, facilitators, mentors, coaches—including those with responsibility for developing information and knowledge skills.
- Human resources roles with specific responsibility for developing programs and processes that encourage knowledge-oriented cultures and behaviors.
- Knowledge publishers, responsible for internal publishing functions, usually on an intranet, also called Webmasters, knowledge architects, Knowledge editors.
- Coaches and mentors, responsible for assisting individuals throughout the business unit or practice to develop and learn KM activities and disciplines.
- Help desk activities, including the delivery of KM and information related to training, also called Knowledge Support Office (KSO).
Knowledge management professionals require a multidisciplinary skill-set that consists of such competencies as finding, appraising, and using knowledge, beginning to be able to reformulate questions, navigating through content, evaluating the relevance of content, filtering out what is not needed, and synthesizing from diverse sources in order to apply the knowledge (e.g., to make a decision). Last but not least, they must contribute to the recording of such valuable experiences to organizational memory systems.\[41\]

**CONCLUSION**

Knowledge management has assumed a greater priority due to the demographic pressures created by retiring baby boomers. Retirement en masse means a loss of valuable knowledge and know-how that has been accumulated over the years. All organizations, regardless of type of industry, size, country, and so forth will have to face the issue of knowledge continuity. Knowledge continuity is analogous to business continuity: while the latter targets data loss prevention due to disasters, the former targets knowledge loss due to turnover in personnel. Valuable knowledge must not only be preserved and transferred to future workers, but also transferred across geographical and temporal boundaries due to the fact that work today is spread out over networks that may extend beyond organizational boundaries. Knowledge management is the discipline and field of practice that will equip us with the necessary tools, processes, and skill-sets to ensure that knowledge reaches all knowledge workers so that they can carry out their work more efficiently and more effectively.

**REFERENCES**

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