The knowledge management spectrum – understanding the KM landscape

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Abstract

Knowledge management (KM) is the subject of much literature, discussion, planning and some action. Effectively implementing a sound KM strategy and becoming a knowledge-based company is seen as a mandatory condition of success for organizations as they enter the era of the knowledge economy. Yet KM remains a broadly ill-defined term, with many, often disparate management theories, applications and technologies claiming a place under the KM banner. Read individually, the literature often presents a single view of what is a multifaceted topic. The KM spectrum has been developed to assist organizations in understanding the range of KM options, applications and technologies available to them. It provides a view of the totality and complexity of the various KM theories, tools and techniques presented in the literature. It provides a framework within which management can balance its KM focus and establish and communicate its strategic KM direction. This article introduces the KM spectrum as a synthesis of current KM theories, applications, tools and technologies described in the literature.

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Introduction

The broad range of knowledge management-related articles, papers, books, authors, disciplines, conferences and, lately, training is evidence that KM is a discipline which needs to be considered in any modern business strategy and planning.

Davenport and Prusak (1998) ask, "Why all this sudden interest in knowledge?", in the introduction to one of the many books available today discussing the characteristics and virtues of KM and the rewards associated with being a knowledge-based or learning organization.

As Leonard (1999) states, "Firms are knowledge as well as financial institutions. They are repositories and wellsprings of knowledge." Effectively implementing a sound knowledge management strategy and becoming a knowledge-based company is seen as a mandatory condition of success for organizations as they enter the era of the knowledge economy. Becoming a knowledge-based company need not be pure happenstance, as Edvinsson and Malone (1997) observe, "Companies can plan to increase their 'knowledge value'; this increase can be forecast and modeled".

Many organizations hearing such statements and reading the myriad of KM literature are considering KM-related investments to transform their companies into learning or knowledge-based organizations. The question is rarely, "Should I be making KM investments?" but rather, given the range of KM options available, "Where should I make my KM investments, balancing the options presented to me in the literature?"

The KM spectrum has been developed to help answer this question. It evolved from the author's experience in working with executives and strategists who are attempting to understand KM and the role it may play in their organizations. Often while working with

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such groups, in discussing KM and exploring its potential, participants will present a view of what KM is for their organization, which will frequently be challenged by others who have a different, but equally valid view. The ensuing discussion always expands each participant's perspective and in turn the scope of KM to be considered in a company's strategic plans. Having explored a broad range of KM applications in these discussions, the question often comes back to "What is a good KM reference book, one which will cover the breadth of KM we've been discussing?"

This question reflects one of the major issues facing people approaching KM – the baffling range of material in the literature, all under the KM banner. Whether it is the latest management bestseller book, a business school publication, a management journal, an information technology (IT) magazine or IT supplier marketing material, the reader is confronted with claims regarding KM's pivotal role in tomorrow's businesses. Each piece of reviewed literature presents a view of the KM landscape from that author's perspective. However none of the literature presents a complete view (as represented by the picture assembled from the individual views). This sub-setting of the KM landscape presents a problem to those who are trying to develop KM strategies to chart a course into tomorrow's knowledge-based economy. An incomplete view of potential KM applications and the options they represent can only lead to an incomplete or unbalanced KM strategy.

The KM spectrum was developed in response to these questions. There are a number of aims in writing this paper and in proposing the KM spectrum as a framework for understanding KM applications and technologies.

The first aim was to review the literature and categorize it in a way that will assist others who approach this topic to better understand and position the diverse aspects of KM being presented in the literature. In doing so, I also hope to provide a framework for the discussion of KM which will minimize confusion and allow for common understanding among those planning and making KM investments in organizations. The emphasis of this categorization will be on the business applications of the various KM investment options.

The second aim was to provide a checklist of KM applications and technologies which can be used to assess an organization's current level of KM-related activity and then plan and communicate future KM investments. KM spectrum has been successfully applied by the author and others in this capacity as an assessment and strategic planning tool. The paper covers the KM spectrum's theoretical foundation, overviews the major components of the model, discusses how the KM spectrum can be used as a tool to assess and inventory an organization's current KM-related investments and reviews its use as a strategic planning tool.

The KM spectrum is developed and discussed as follows:

- Introduction, the current section, sets out the framework and terms of the paper.
- Elements of the KM spectrum, introduces the KM spectrum, describing its elements and how the spectrum was developed.
- Enabling technologies, maps a number of enabling technologies to the spectrum, providing a quick reference guide and inventory of these technologies mapped to the KM applications they enable.
- Applications of the KM spectrum, describes ways in which the KM spectrum has been used as a planning tool.
- Observations on the KM spectrum, contains a number of observations on the KM spectrum which may further aid the understanding of the KM literature and assist in KM planning, leading to the concluding remarks.

Elements of the KM spectrum

This section introduces the KM spectrum, describing how the KM applications addressed in the literature have been synthesized into six common categories to establish the elements of the KM spectrum. The applications are then mapped back to these KM spectrum elements. This section defines "element" and provides an overview of the KM applications described in the literature.

There are a broad range of KM applications being championed and described in the literature selected for this review (Alavi and Leidner, 1999; Barclay and Murray, 1999;

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CIO Magazine, 1999; Cushman *et al.*, 1999; Davenport and Prusak, 1998; Edvinsson and Malone, 1997; Elliott, 1999a, 1999b; Fuld, 1994; Leonard, 1999; Neilson, 1997; Newell *et al.*, 1999; Nonaka and Takeuchi, 1995; O'Dell and Grayson, 1999; Parlby, 2000; Sveiby, 1997)[1].

The KM applications described in the literature, whilst often using differing terminology, can be observed to cluster around common ideas or business problems, e.g. creation of new knowledge, process consistency or improvement, understanding patterns in vast amount of data, tapping expertise in organizations or developing employee capabilities and competencies.

Individually these groupings have been called "elements" and labeled:

- transactional;
- analytical;
- asset management;
- process based;
- developmental; and
- innovation/creation knowledge management.

Collectively these elements are referred to as the KM spectrum.

The KM spectrum is a framework which covers all the KM applications reviewed. Figure 1 shows these groupings, which are called the elements of the KM spectrum. It also shows the KM applications mapped back to these elements, which are then described in this section.

Transactional KM

In transactional KM, the use of knowledge is embedded in the application of technology. Knowledge is presented to the user of a system in the course of completing a transaction or a unit or work, e.g. entering an order or handling a customer query or problem.

An example of transactional KM is provided by Davenport (Davenport and Klahr, 1998), as he describes case-based reasoning in a customer service application. "Case-based reasoning provides a method for representing past situations (cases) and retrieving similar cases when a new problem is input. Given a description of a problem, the system searches for similar known cases. The system asks the user questions (proactively) about the problem to narrow the search for similar problems."

In this case the knowledge is prepackaged and provided to the user in the course of interacting with the system in a transaction to assist in addressing a customer problem. Examples of transactional KM include help desk, customer service, order entry and field support applications.

In transactional KM systems, there may be a choice as to what the user does with the knowledge presented, but its access and presentation, at least, is not optional.

Analytical KM

Analytical KM provides interpretations of, or creates new knowledge from, vast amounts or disparate sources of material. In analytical KM applications, large amounts of data or information are used to derive trends and patterns – making apparent that which is hidden due to the vastness of the source material and turning data into information, which, if acted on, can become knowledge.

Traditional analytical KM applications such as management information systems and data warehousing have analyzed the data or information that is generated internally in companies (often by transactional systems).

Figure 1 KM applications mapped to the elements of the KM spectrum

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	▪ Case Based Reasoning (CBR) ▪ Help Desk Applications ▪ Customer Service Applications ▪ Order Entry Applications ▪ Service Agent Support Applications	▪ Data Warehousing ▪ Data Mining ▪ Business Intelligence ▪ Management Information Systems ▪ Decision Support Systems ▪ Customer Relationship Management (CRM) ▪ *Competitive Intelligence*	▪ Intellectual Property ▪ Document Management ▪ Knowledge Valuation ▪ Knowledge Repositories ▪ *Content Management*	▪ TQM ▪ Benchmarking ▪ Best practices ▪ Quality Management ▪ Business Process (Re)Engineering ▪ Process Improvement ▪ Process Automation ▪ Lessons Learned ▪ Methodology ▪ *SEI/CMM, ISO9XXX, Six Sigma*	▪ Skills Development ▪ Staff Competencies ▪ Learning ▪ Teaching ▪ Training	▪ Communities ▪ Collaboration ▪ Discussion Forums ▪ Networking ▪ Virtual Teams ▪ Research and Development ▪ *Multi-disciplined Teams*

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These analytical KM applications have focused on customer-related information to assist marketing or product development functions (Yoon, 1999). They are being joined by a range of competitive or business intelligence applications which incorporate external sources of knowledge or information. Such competitive intelligence applications are being used by companies and government agencies to analyze and understand what is happening in their marketplace and assess competitive activity (Elliott, 1999a; Fuld, 1994). The most common method used here is scenarios. For instance, if one needs to provide quick answers to complex questions such as "What are my competitors doing to take advantage of the Net?", then competitive or business intelligence applications may be the best option available.

Asset management KM

Asset management KM focuses on processes associated with the management of knowledge assets. This involves one of two things:

(1) The management of explicit knowledge assets which have been codified in some way (Guthrie and Petty, 1999).
(2) The management of intellectual property (IP) and the processes surrounding the identification, exploitation and protection of IP (Teece, 1998). IP has been included in the asset management category rather than the innovation and creation category as most of the literature around IP tends to discuss the assets as a product of some other business process. Once created in this way, the assets then need to be managed.

Once captured, the assets are made available to people to use as they see fit. This element of the spectrum is directly analogous to a library, with the knowledge assets being catalogued in various ways and made available for unstructured access and use.

These knowledge assets are often created as a by-product of "doing business" and are kept for future uses, often unknown at the time of creation, capture and/or storage. What differentiates this element from analytical systems is that the assets are often more complex and less numerous; they may also require some level of intervention in order to codify them. For example, capturing project or product development history, experiences or work products often requires some intervention.

Process-based KM

The process-based KM element covers the codification and improvement of process, also referred to as work-practices, procedures or methodology. Process-based KM is often an outgrowth of other disciplines such as the TQM and process reengineering. The knowledge assets produced in this category are also known as "engineered assets" in that they often involve third parties or specialists working with practitioners or subject matter experts (SMEs) to document these best practices in standard formats. Process knowledge assets are often improved through internal lessons, learned sessions, formal engineering of process by internal best practice selection, and codification and external benchmarking (Feltus, 1995; Hill, 1999; O'Dell and Grayson, 1999; Powers, 1995).

Developmental KM

Developmental KM applications focus on increasing the competencies or capabilities of an organization's knowledge workers. This is also referred to as investing in human capital (Edvinsson and Malone, 1997). The applications cover the transfer of explicit knowledge via training interventions, or the planned development of tacit knowledge through developmental interventions such as experiential assignments or membership in a community of interest.

This area of KM is taking on renewed significance with the emergence and ascendancy of the knowledge worker. Investing in developing the knowledge and capabilities of a company's workforce is becoming a measure of the value of an organization because this investment is now seen as increasing the knowledge content and capability of an organization. At the same time, such an investment also helps to attract the best knowledge workers in a highly competitive knowledge worker market.

In addition to traditional training in "explicit knowledge" often related to products, disciplines and technologies, there is an emerging emphasis on developing "learning organization" and collaborative skills. Communities where people can exchange ideas and learn from each other is another emerging form of tacit knowledge

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development where people can learn from the experiences of others.

Innovation/creation knowledge management

Innovation/creation-based KM applications focus on providing an environment in which knowledge workers, often from differing disciplines, can come together in teams to collaborate in the creation of new knowledge. There is still a role for individual innovation; however, innovations are increasingly coming from the marriage of disciplines and teamwork. More and more, turning an individual's innovation or insight into reality requires the power of "n".

This category of knowledge management is best summarized by Nonaka (Nonaka and Konno, 1999) when he says, "Knowledge is manageable only insofar as leaders embrace and foster the dynamism of knowledge creation. The role of top management is as the providers of 'ba' for knowledge creation. Their task is to manage knowledge emergence."

The innovation/creation of new knowledge is the most popular topic in today's management literature. The focus of the business and KM applications in this element is on providing an environment in which knowledge workers of various disciplines can come together to create new knowledge. The most common application referenced in the literature is the creation of new products or company capabilities.

The KM applications found in the literature have been mapped to the elements of the KM Spectrum, as shown in Figure 1. The assignment of the KM applications to the spectrum elements was done based on their occurrence in the literature not the number of occurrences in each piece of literature. This resulted in a number of KM applications appearing in more than one grouping. The final placement was then resolved by assigning the item to the grouping in which it occurred most frequently. For example, communities appeared in both developmental and innovation/creation applications but was pre-eminently discussed in the context of innovation/creation. The KM applications derived from the literature review are in normal font. Since it was originally produced, the table has grown through author and reviewer observations; these additions are shown in italic font.

Enabling technologies

This section reviews a number of the KM-enabling technologies and tools described in the literature and their relationship to the KM applications they enable. They are then mapped to the KM spectrum.

A number of the authors observed that KM is not new. What is new is the phenomenal growth of technologies that make it easier to implement KM systems. In fact, Davenport and Prusak coined the term "technology" in recognition of the instrumental role certain technologies are playing in "catalyzing the knowledge management movement"[2]. These technologies continue to evolve rapidly, especially in the areas of collaboration and search engines. This evolution, combined with the pervasive nature of and access to Web-based technologies, is "enabling" the KM applications the authors are describing.

In the review of the literature, a pattern or mapping between technology(ies) and specific KM applications emerged. This relationship between a technology and the KM applications it supports is shown in Figure 2.

There are a number of technologies which underpin most of today's KM applications and cannot be primarily assigned to only one element of the spectrum. These have been called "pervasive technologies". They include Internet/intranet technologies and generic Web elements such as portals. These pervasive and underpinning technologies have been highlighted in Figure 2. The enabling technologies derived from the literature review are in normal font. Since it was originally produced the table has increased through author and reviewer observations; these additions are in italic font.

Proposing that the KM spectrum encompass all the elements, KM applications and enabling technologies described in Figure 2, raises the immediate danger of criticism from proponents of KM applications in one part of the spectrum that KM applications in other parts of the spectrum are not "true knowledge management". However, remember that each of the elements of the spectrum is mentioned in the literature and is claimed by its author to be a valid part of the KM landscape. Including all of them in one framework, such as the KM spectrum, allows them to be equally considered when establishing KM strategies and plans.

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Figure 2 Enabling technologies mapped to the KM spectrum

	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
Knowledge Management Applications	▪ Case-Based Reasoning (CBR) ▪ Help Desk Applications ▪ Customer Service Applications ▪ Order Entry Applications ▪ Service Agent Support Applications	▪ Data Warehousing ▪ Data Mining ▪ Business Intelligence ▪ Management Information Systems ▪ Decision Support Systems ▪ Customer Relationship Management (CRM) ▪ *Competitive Intelligence*	▪ Intellectual Property ▪ Document Management ▪ Knowledge Valuation ▪ Knowledge Repositories ▪ *Content Management*	▪ TQM ▪ Benchmarking ▪ Best practices ▪ Quality Management ▪ Business Process (Re)Engineering ▪ Process Improvement ▪ Process Automation ▪ Lessons Learned ▪ Methodology ▪ *SEI/CMM, ISO9XXX, Six Sigma*	▪ Skills Development ▪ Staff Competencies ▪ Learning ▪ Teaching ▪ Training	▪ Communities ▪ Collaboration ▪ Discussion Forums ▪ Networking ▪ Virtual teams ▪ Research and Development ▪ *Multi-disciplined Teams*
Enabling Technologies	▪ Expert Systems ▪ Cognitive Technologies ▪ Semantic Networks ▪ Rule-based Expert Systems ▪ Probability Networks ▪ Rule Induction, Decision Trees ▪ *Geospatial Information Systems*	▪ Intelligent Agents ▪ Web Crawlers ▪ Relational and Object DBMS ▪ Neural Computing ▪ Push Technologies ▪ Data Analysis and Reporting Tools	▪ Document Management Tools ▪ Search Engines ▪ Knowledge Maps ▪ Library Systems	▪ Workflow Management ▪ Process Modeling Tools	▪ Computer-based Training ▪ Online Training	▪ Groupware ▪ e-Mail ▪ Chat Rooms ▪ Video Conferencing ▪ Search Engines ▪ Voice Mail ▪ Bulletin Boards ▪ Push Technologies ▪ Simulation Technologies
▪ Portals, Internet, Intranets, Extranets						

Applications of the KM spectrum

This section discusses two of the main uses of the spectrum; first, as a KM framework which can assist individuals and organizations better understand the KM landscape; and second, plan KM-related investment strategies based on the framework. The approaches described have been used by the author in working with executives and strategists to better understand their KM options, to inventory their organization's existing KM-related activities and plan future KM investments. The following uses of the KM spectrum build on its unique categorization and inventory of KM applications and enabling technologies.

A more complete framework for better understanding the KM literature

The KM spectrum provides a more complete KM framework than exists in the literature today. By attempting to include all the applications attributed to KM in the literature, without judgement or prejudice, it provides a handy one-page KM reference guide. In doing so, the KM spectrum allows KM practitioners to better understand the breadth of options being proposed and discussed in the literature, and not be blindsided to the existence and benefits of KM applications other than the ones each practitioner is familiar with.

Using the elements of the KM spectrum, readers are able to position the various KM applications they encounter in the literature. This positioning has proven useful for increasing both personal understanding and facilitating discussion between those exploring KM applications. Used in reverse the KM spectrum has proved useful as a prompt for people to consider KM applications they had yet to encounter or consider.

A KM assessment and strategic planning tool

The more significant use of the KM spectrum has been as a tool to inventory and position current KM-related activities in organizations, which in turn assists the planning of future KM applications.

The KM applications and enabling technologies covered in the spectrum provide a checklist to inventory KM-related activities and investments – past, present and projected for the future. Most organizations have existing KM-related activities and investments, often seemingly unrelated, and frequently not even thought of as KM investments. These can be identified either directly, by looking for the KM applications in the spectrum, or indirectly, by looking at the enabling technologies in use in the

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organization and mapping them back to the KM applications they are enabling.

The existing KM activities need to be acknowledged, understood and considered when developing KM-related strategies and plans. Most organizations have building blocks which can be incorporated into future or renewed KM investments. Most organizations also have a number of "failed efforts" which also need to be understood, so as not to become albatrosses to future or renewed KM-related efforts.

It is recommended that the inventory of KM applications and technologies be captured and shared using the KM spectrum format as it succinctly represents, in one diagram, the level and emphasis of current activity. One interesting side benefit of producing and displaying the inventory using the KM spectrum is that such an inventory often represents the first time that the range of existing KM-related activities can be considered as a related set of investments. This is very significant. All too often, KM enabling technologies and KM applications have been justified and implemented in splendid organizational isolation. When assembled, often for the first time, it is worth asking "Does this profile of KM investment seem right given where we think we need to take the organization?"

Having established the current inventory and engaged in some discussion around the current investment balance, the KM spectrum again provides a good checklist for ensuring that all potential KM applications have been considered going forward. This paper does not address the process of establishing business issues, challenges, needs and priorities, and using these to shape a KM strategy. Rather, the KM spectrum is being positioned as a tool to help ensure that all options are considered in this process. As with displaying the inventory using the KM spectrum, it is also useful to summarize the emphasis of planned KM applications and enabling technologies, and to show how the additional investments will change the mix over time.

Observations on the KM spectrum

As described in the preceding section, the KM spectrum provides a framework in which to consider the KM-related literature, KM applications and enabling technologies. Applied in a business context it can be, and has been, used to help inventory and position current KM-related activities in organizations.

In developing the KM spectrum, a number of other patterns or relationships emerged between the spectrum and what was being described in the literature. These observations have proven useful to people looking at various KM applications as they consider some of the related topics covered in the literature. These topics include knowledge type and definitions, organizational change and the valuation of knowledge. The observations are presented with a brief discussion.

1. There is a grouping of the literature within the spectrum consistent with the author's background

There appears to be author affinity to parts of the spectrum depending on each author's "discipline" and background. "Management theorists" tend to be primarily focused on the process, innovation/creation and developmental elements of the spectrum, with "technologists" focusing more on the transactional, analytical and asset management elements. While not surprising, the observation has significance when one considers the affinity various audiences have for their related "discipline" and the possibly limiting discussion they may therefore be exposed to.

2. The type of knowledge or information being discussed moves from explicit to tacit

The degree of codification of knowledge decreases, moving left to right across the spectrum. Transactional systems are dealing with codified or explicit knowledge embedded in the transactional systems; they also generate new data or information, which can be used by analytical KM systems. Asset management and process-based KM systems are concerned with the codification of tacit knowledge into explicit knowledge and making this available to be leveraged by others in the organization. KM systems focused on innovation/creation complement the above systems by focusing on connecting people, thus encouraging the flow of tacit knowledge across organizations.

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If one accepts the knowledge spiral as proposed by Nonaka[3], then knowledge in all these forms is a necessary pre-condition for true knowledge creation and innovation. A complete KM strategy may need to consider this in developing a KM environment which allows people to come together to work collaboratively having access to all the data, information and knowledge they need.

3. The degree of individual choice, or optionality, increases moving from left to right

The level of optionality increases, moving left to right across the KM spectrum.

In transactional KM systems the use of knowledge is embedded in the system. There may be a choice as to what the person does with the knowledge presented, but its access and presentation is not optional. At the other end of the spectrum, individual employees may choose to participate or not to participate in the KM systems the company makes available to them. For example, an employee may elect to join and actively participate in a community of interest or to invest in his/her own career development by taking self-directed training. There is little evidence that mandating participation is a sustainable intervention or adoption model. As Senge (Senge *et al.*, 1999) proposes, "No one person including a highly charismatic teacher or CEO can train or command other people to alter their attitudes, beliefs, skills, capabilities, perceptions, or level of commitment."

4. The modality of choice increases, moving from left to right

The ways in which the KM applications and technologies can be used increase in number, with their use becoming less predictable, moving towards the innovation/creation and developmental end of the spectrum.

The aspect of transactional KM systems which leads to their frequently being non-optional is that they are often the only way an employee can complete a certain task. For example, in help desk applications there is often no choice on how to report a problem or to handle a customer's query.

In most cases, having chosen to participate in a KM system, there is only one way that participation can be achieved – the company may only provide one set of data mining tools or one training library. Moving to the right, the ways in which this can be used are less prescriptive, both in terms of the specific use or queries the tools are used for and in terms of the sequence in which training can be undertaken.

Does this increase in modality and accompanying decrease in predictability (as to how the system will be used) need to be considered in designing, deploying and supporting the KM system?

5. The underlying adoption models changes from left to right

Most authors will describe an organizational end-state and the characteristics required to successfully implement the KM application being described. The emphasis on the importance of organizational change, or the cultural aspects required for such a change, increases, moving from left to right. This observation is possibly consistent with Observation 1. It is also possible that the technologists are bringing forward their traditional development approaches, founded in developing systems which have very low levels of optionality and single modality, to the development of knowledge management systems.

6. The intellectual capital (IC) models proposed by the KM valuationists map to the spectrum

The KM valuationists' views on structural and human capital, led by Edvinsson (Edvinsson and Malone, 1997) and Sveiby (1997), map to the KM applications in the spectrum. Edvinsson's IC model (Intellectual capital = Structural capital + Human capital) maps more completely than Sveiby's. Sveiby highlights a further distinction by splitting structural capital into internal and external structure, with external structure focussing on marketplace image, customer perceptions, etc.

The investments in KM applications and technologies, required to implement any or all elements of the KM spectrum, directly equate to investments which affect the IC value in terms of structural capital or internal structure. Investments in developmental KM systems are aimed at increasing the knowledge levels or capabilities of staff, in turn directly impacting the value associated with human capital or employee competence.

Figure 3 is a graphic representation of the above observations.

Figure 3 Observations mapped to the KM spectrum

Obs	Transactional	Analytical	Asset Management	Process	Developmental	Innovation and Creation
1	Technologist				Organizational Theorist	
2	Explicit				Tacit	
3	Low Optionality				High Optionality	
4	Single Modality				Multiple Modality	
5	Technical Mousetrap				Cultural Change	
6	Structural Capital				Human Capital	
6	Internal Structure				Employee Competence	Internal Structure

The mapping of the observations to the KM spectrum is not binary; rather it is intended to reflect the underlying emphasis that exists in the literature, which focuses on this part of the spectrum.

The observations have proven useful to others in helping them better understand the KM literature and some of the related messages it contains. The observations provide a level of insight into the material for those considering issues such as the degree, level or focus of organizational change required to make their KM investments successful; or questions regarding the return on KM-related investments and their impact on the value of a company's intellectual capital or intangible assets.

Concluding remarks

This paper has not attempted to answer the question, "So what is knowledge management?"; others have done this far too many times. If we accept the premise (offered by Edvinsson and Malone, 1997) that "...at the dawn of the twenty-first century, which companies aren't knowledge based?" or the broader organizational view (offered by Albanna, 2000) that "The management of knowledge resources is essential to the ability of business organizations to change, adapt, and seize new opportunities as they compete in this fast changing global environment. It is likewise essential for development processes which are focused on reducing the social and economic gaps between developed and developing nations", then knowledge management, whatever it is called in years to come, is something which needs to be considered by all organizations in their strategic thinking and planning. It is equally important to ensure that all available KM avenues, applications and technologies are considered.

The KM spectrum has been developed to assist organizations to understand the range of KM options, applications and technologies available to them. The KM spectrum is a model which helps organizations understand KM in its broadest sense. It provides a view of the totality and complexity of the various KM theories, tools and techniques presented in the literature. It also provides a framework in which management can balance its KM focus and establish and communicate its strategic KM direction.

Whether taking an organizational, national or global view of knowledge management, the question will remain: "What is the right mix of KM-related investments now and for all of our tomorrows?"

Whatever its moniker, I believe KM and the KM applications categorized in the KM spectrum will continue to be with us and be an increasing part of the strategic focus of all organizations and nations. I hope this paper and the observations made herein may make the current KM landscape a little clearer and provide a lucid framework in planning KM-related investments. This first version was derived from a subset of the literature. Additions to, or comments about the KM spectrum are welcome. Through such comments and feedback, the KM spectrum will continue to evolve and continue to be of value in assisting our understanding of KM as it grows and morphs. Please contact the author via e-mail at: dbinney@csc.com, with any feedback or comments.

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Notes

1 Refer to Martensson (2000) for an additional selection of current KM-related literature.
2 Refer Chapter 7 (Davenport and Prusak, 1998) for this quote and a discussion on selected enabling technologies.
3 See pp. 64-71 (Nonaka and Takeuchi, 1995) for a discussion on the knowledge spiral.

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