Chapter One

Conceptual Theory – "What Do You Know?"

Final draft

Meir Russ
Associate Professor, Management and Marketing
Chair, Master of Management
Frederick E. Baer Professor in Business
Professional Programs in Business
University of Wisconsin - Green Bay
WH460, 2420 Nicolet Drive
Green Bay, WI 54311-7001, USA
Tel.: +1 920 465 2757 Fax: +1 920 465 2660
russm@uwgb.edu

Robert Fineman
Independent Consultant
906 Ainsworth Street West
Lehigh Acres, FL 33974
Tel.: +1 239 369 8986
Robert.Fineman@tmlbusinessservices.com

Jeannette K. Jones
American Intercontinental University – Main Campus
5550 Prairie Stone Parkway --Hoffman Estates, Illinois 60192
jeannette.jones@faculty.aiuonline.edu

Abstract

This chapter will provide the reader with two definitions of knowledge, one at the individual level, the other at the organizational level. This will be followed by connecting the knowledge base of the organization to its sustainable competitive advantage by using a multiple-layer framework of organizational knowledge. Then, the chapter will discuss the frameworks of knowledge management vision, mission and goals for the organization. Temporary and functional gap analysis frameworks will follow. The chapter will end with a brief description of three tools developed by the authors.

Keywords: knowledge, knowledge-based strategy, framework, knowledge management vision and mission, knowledge management goals, knowledge gaps.

Introduction

This chapter will provide the reader with a number of theoretical aspects that we consider important as a background for understanding and effectively utilizing the later developed subjects related to knowledge management strategy discussed by us later in this book. We will begin this chapter by introducing you to three epistemologies that can and do frame the discussion about knowledge and knowledge management. We will continue by discussing two conceptual aspects of knowledge. We will define knowledge at the individual (personal) level and then at the organizational level. Once these definitions have been solidified, we will place these concepts into a practical application by describing knowledge within an organization's strategic discussion. In a practical application, it is critical for an organization to understand where their knowledge should be located. Some of this discussion might seem tedious at first, but we hope you will commit to reading through the entire discussion to see for yourself that, while it might sound theoretical or philosophical, it is actually very practical. We hope the examples will illustrate why it is crucial for you to understand the foundation of our tools. Following that, we will introduce you to vision, mission, and goals for KM as well as gaps. We will close the chapter by briefly introducing three tools that we have developed to make it easier for you and your organization to systematically manage knowledge as a strategic asset to create value. A more in-depth discussion of those tools can be found in this book in chapters 4, 7 and 9.

Knowledge as a Complex and Living System: Three epistemologies

Knowledge can be viewed from different perspectives (what academics call epistemology[1]). The three epistemologies are: the cognitivist view, the connectionist view and the autopoietic view. They are detailed and illustrated below in Table 1. We want the reader to realize that there is more than one way to look at knowledge, and that by using the three perspectives you can have more and richer opportunities to use knowledge effectively. You will see the use of these three perspectives again in chapters 4, 7 and 9, within this book.

PERSPECTIVE/ EPISTEMOLOGY DIMENSION[2]	**COGNITIVIST**	**CONNECTIONIST**	**AUTOPOIETIC**
Cardinal Idea (Brain…)	Representation. Transparency of information.	There are rules for how components operate and there are rules for connections between components. Global properties emerge spontaneously without a central control.	Is an autonomous, simultaneously open and closed, self-referencing (knowledge about itself is effecting the structure and operations).
Humans are seen as	Information processing (sequential, localized). Logic Machines. Truth seekers.	Thought and activities that result from self-organizing properties, some similar to learned states, some novel. Relationship seekers (social-psychological).	A living system, an autonomous unit, responsible for their own maintenance and growth, consider the environment only as a potential source of input for their inner functioning.
Lemma	I am, therefore I act in the world.	I know, therefore I co-act in the world.	I know, therefore I act in my world.
Organization is seen as	Input-Output entity. Problem seeker and solver. An instrument of strategic planning and forecasting.	Network of individuals connected by Information Systems (communication), rules of access, shared consensus, resources, incentives. Network of activities.	A self-similar, autopoietic system of knowledge and distinction , a living system, shared awareness. A domain of structural coupling.
Knowledge is	Time invariant. Abstract, independent of human act. Transferable.	History dependent. A state in a system of interconnected components interacting with the environment. Transferable.	Embodied, self-referencial. Allows for distinction making in observations of categories and in values. It is bringing the world forth (coupling with). It is NOT transferable.
Learning	Is a process by which an increasingly accurate definition of representations corresponding to the external world arrives.	Is an emerging behavior, history and rules dependent.	Create the potential for and change in scope of potential and actual behavior resulting in improved effectiveness.[3]
Organizational Learning	Organizations as rational entities are capable of observing (their own and others') actions, and experiences to discover effects of actions and modify actions to improve performance.[4]	"an organizational process, both intentional and unintentional enabling the acquisition of, access to, and revision of organizational memory, thereby providing direction to an organizational action[5]."	Results in change of organizational behaviors which may enhance (or not) effectiveness, which will include change in the scope of organizational potential behaviors.[6]
Environment	Given. To be represented, pre-defined, highly structured, bounded, limiting.	Negotiable.	Structurally coupled with knowledge.
Relationships	Adaptation.	Shaping.	Structurally coupled.
Locus of Control	Central.	Network.	Internal.
Organizational networks	Input-output device.	Network of individuals/activities.	Autopoietic system.
Boundaries	Real, limiting.	Can be modified by using new actors.	An issue of knowledge.

Strategy	The choice of product/market and the competitive thrust (focus and set of priorities) to create value for shareholders, using coordination, reinforcement, allocation and control mechanisms.[7]	Choices in regard to: 1. Value creation - a choice of which value (profit maximization versus social responsibility) and for which stakeholder (shareholders versus customers). 2. Managing imitation - sustaining competitive advantage. 3. Shaping the perimeter of the organization - defining profitable business scope using, for example, outsourcing and vertical integration. [8]	Creating value (e.g. capturing synergies) and managing uncertainties (e.g., " differentiate roles based on the strategic uncertainty decision-makers face and integrate them by way of the strategic commitment to be made.)" [9]
Business Model	Describes how the organization creates and captures value by specifying the profit generating mechanism.	Define the value created for users, within a product market (for whom and what). Define the structure of the complete value chain (from suppliers to final customers). Describe the position of the organization within the value network. Specifies the profit generating mechanism.[10]	Define the value created for users, within a product market (for whom and what) as understood by the organization. Define the structure of the complete value chain (from suppliers to final customers) as understood by the organization. Describe the position of the organization within the living eco-system. Specifies the profit generating mechanism.[11]
Internationalization	"A process of increasing involvement in international operations"[12] "is the process of mobilizing, accumulating and developing resource stocks for international activities."[13]	A "process of developing networks of business relationships in other countries through extension, penetration, and integration."[14] "the emphasis is on gradual learning and the development of market knowledge through interaction within networks."[15]	A process of changing the existing geographic business scope, and the editing mechanism of structuralizing various kinds of innovative market knowledge for the creation of new business opportunities to connect the establishment of the new organization with future of unknown international opportunities.[16]
Entrepreneurs	Opportunity identifiers, resource marshaling, knowledge acquirers, star players.	Connectors, recombining resources and opportunities, by filling up structural holes in networks. Head of a team, builders of partnerships. Knowledge holders and creators in knowledge communities within a social network.	New reality creators, creators of new eco-systems. Builders of shared domain consensus.
Entrepreneurship	"Activities to promote socio-economic stabilization and effective utilization of resources by stimulating socio-economic progress, creating new values , and providing employment opportunities." [17]	Is "a diachronic process based on multiple decisions and action…..provides opportunities to newly combine heterogeneous ideas, promote their realization, and create new activities and potentials through interactions." [18]	"activities of changing the existing business paradigms, and to the editing mechanism of structuralizing various kinds of knowledge for the creation of a new business….to connect the establishment of the new organization with future of unknown opportunities" [19]

Table 1
Perspectives of knowledge and their implications on Knowledge Management and Strategy

Modified from Russ, 2008

First Definition of Knowledge

Any discussion of Knowledge Management must begin by defining the terms to be used. We all assume that the reader knows what knowledge is but, in fact, everyone has his or her own conceptual idea of knowledge. That unique conception creates a problem because there is no universally agreed upon accepted definition. As an old story suggests, it's like trying to understand what an elephant looks like by asking several blind men to describe an elephant based on touching a different part of the animal. Knowledge is many things to many people. Knowledge is not easily understood, managed, or quantified. Indeed, since there is no universally accepted definition of knowledge, understanding, managing, and quantifying are nearly impossible tasks. Through this book, our goal is to show you that there are empirically based measures of knowledge that can be quantified, utilized, and exploited! If we are to be successful, however, we must be assured that the definition of the key terms we are using aligns with the definition you have of the term.

Any definition of knowledge is biased, individualized, and carries with it social, political, and cultural baggage. As we look at common usage today, we find that *knowledge*, *information*, and *data* are as easily interchangeable as cola and "Coke." One simple way to explore the issue is to look into their definitions in any dictionary. If you do, you will see that the definitions are circular. Each one of the three is defined by the use of the other two terms. The loop feature of the terms can make the distinction between them quite difficult to find. We have developed definitions that clearly demonstrate that these terms are distinct (related, but distinct) entities. We believe that data and information are the building blocks of knowledge. In order to clarify what we mean, we will begin by sharing our definition of knowledge and then will break down the knowledge definition into its actionable components.

Knowledge - an action, or a potential of an action, that creates, or has the potential to create, value based on data or previous knowledge, and/or information.

Data – basic building blocks

Metadata – context of the building blocks, "the baskets"

Information - meaning

In order to understand Knowledge, we have to understand its parts. Assume that data elements are the most basic building blocks of knowledge. Data are entities that are meaningless (like bytes or letters) until there is context or metadata wrapped around them; something to give the data meaning, which is what you would call information.

For example, the data that comprises written romance languages would be the 26 letters of the alphabet. The data that comprises a spoken language would be the different sounds used to identify each letter. Add to that all the different sounds available in all the romance languages and you are beginning to build quite a large database. But at this

point, you still don't have anything that is instantaneously useful and that has meaning or value. Another point that adds complexity to this issue is how these elements are represented. The database is now comprised of the physical representation of letters A – Z, but the sounds require a different media, a .wav file for instance. Add to that the various pronunciations between the languages as well as the multiple dialects and regionalisms within a language. We use this example to demonstrate the variety of data and their potential inter-relationships. It's not until we get to the next step in the process that we can take a variety of data elements and begin to determine what they mean.

The next step is to understand metadata. Metadata is a frame (the context creator) wrapped around a single piece or multiple pieces of data. You can easily see the power of metadata as it transforms data into something potentially useful. If we go back to our letters example, the concept of say, names, would provide a context that would give the letters and sounds the ability to become useful. Remember, at this point there is only data with context. We now have a construct where we have the ability to take the data and metadata to the next level.

When we agree on the definition of data and metadata, we can then move on in the knowledge definition to look at the term information. We will define information as simply data plus metadata. Information lacks the actionable punch of knowledge, but it allows the transformation of six pieces of data such as J-O-S-H-U-A into a name. By wrapping the context of name around the letters, we have something that can represent the first name of Joshua Jones. We could look at numbers in the same way. Data of 0-1-0-1-0-0 is meaningless in a vacuum. If we add the context of date, then 010100 turns into the first day of the 21st century and can be represented as 01/01/00. If we changed the context to student identification, it could just as easily represent Joshua Jones's student ID number simply by attaching that label. The name Joshua, the date 01/01/00, and the student ID number 010100, now reflect information that we can use. Therefore, information is interchangeable and totally dependent on the context or metadata.

Our favorite real world example deals with the loss of the Mars Climate Orbiter (MRO) in November of 1999[20]. Prior to the success of the two Mars rovers, there was an attempt to place the MRO in orbit over Mars that ended as a failure. A course correction had to be sent to the spaceship to align it correctly for entry into an orbit over Mars. The course correction instructions (the data) were sent but it is assumed that the craft entered the Martian atmosphere at too low an altitude and the ship crashed into the surface of the planet. We liken this to the classic metadata problem. Why? Because the data was correct. However, the context or metadata was incorrect. An investigation board concluded that NASA engineers failed to convert English measures of thrust into a metric system or newtons (the metadata context). Although the actual difference between the acceleration when using the two different units was small, it was enough to terminate a potentially successful and scientifically significant mission. Therefore, the "information," the combination of the data and metadata, that the ship was given was faulty. If we align this example to our definition, the knowledge (action step) was present, the information (meaning) was present, the metadata (context) was present but inaccurate, and the data was present. Because the metadata was incorrect, the information and overall knowledge

sent to the orbiter was wrong and the result of the mission reflects this fact. We believe this example reflects our definition, but also demonstrates how fragile information that we use everyday to make strategic decisions can be. This complex circular relationship between data, metadata and information is the reason it is important to discuss and align meaning within an organization. We want to make sure that the building blocks of knowledge are housed on a solid foundation. You cannot assume the metadata is correct and understood by all concerned parties; you must confirm your assumptions at every step in the process. As you can see from this example, a simple misunderstanding or wrong assumption/context can have significant consequences on the information shared, action and outcomes.

As a general guiding principle, when determining data for a specific application, it is best to use the smallest manageable unit (lowest common denominator) as data. The most important point in this discussion is not to break down say, atoms into protons, neutrons, electrons, and then into the myriad sub-atomic particles. It is to have everyone involved understand what the data means (which makes it information). Metadata can be simple or complex, so spend the time building a consensus around the metadata. Get rid of all the assumptions! Belabor the point! Make sure everyone is talking apples and apples! If a house has a faulty foundation, it will never stand straight. If knowledge has a faulty foundation, it won't have any real value.

We've been talking about information as data and metadata and now it's time to go to the next step, knowledge. Our definition of knowledge states: *Knowledge is an action, or a potential of an action, that creates or has the potential to create, value based on data or previous knowledge, and/or information.* Consider knowledge as the outcome of a catalytic event or kinetic energy and information as potential energy. In this context, there is a vast difference between the two terms. In order for knowledge to be created, there must be an actionable event that occurs or has the potential to occur. Therefore, if one starts with data and then adds metadata, information is created and the potential for knowledge or an action is in place. New knowledge is created when such potential for an actionable event occurs.

The equation would look like this: K = ke + pe. Where K=Knowledge, ke = kinetic energy, and pe = potential energy.

Knowledge gets more complex and gives us better insight into what is required for knowledge creation. As we look into additional equations, the process gets more complex. For example, another way to express the value proposition inherent in knowledge creation is the following equation: $K = (D+MD) \times A \longrightarrow V$. Where Knowledge (K) is equal to Data plus Metadata (D+MD) times Action (A) that creates or has the potential to create Value (V).

For purposes of this illustration, assume the knowledge has been created by an individual. Only two events can occur once the knowledge has been created and stored by the individual as tacit knowledge. It can either be exploited by the individual to produce value (for example a new product or new service), or it can be transferred to other

individuals. In the latter instance, the knowledge must be codified as explicit knowledge by the original knowledge creator and transferred as data to other individuals. Once they receive the data, they must add metadata and create the knowledge for themselves. Although this sounds counterintuitive, we contend that only data, metadata, and information can be transferred, but knowledge has to be re-created individually. Lots of information such as the speed of light, the number of feet in a mile, the number of days in a year, is available. Lots of knowledge is also available. For example, we know how to calculate the speed of light, we can measure the number of feet in a mile, and we have standards that allow us to determine the number of days in any given year. The difference between information and knowledge is an actionable event or the potential to create an actionable event. That event is the catalyst that transforms potential energy into kinetic energy and produces value. Therefore, using our definition, the information that reduces uncertainty to allow an action is knowledge and that action creates value. The same information, if it does not allow for an action as it has meaning to the user is NOT knowledge. It is just useless information. Knowledge is dynamic. Data and Information are static. Just because data and metadata are present does not mean that knowledge will be created; it only supplies the necessary framework for knowledge to be created. Remember an individual or organization does not have to re-invent the mousetrap; they only have to make a better one.

Let us give you another example. In a recent book "*Decoding the Universe*," Seife[21] describes a number of examples of how information (knowledge by our definition) creates value by reducing uncertainty. He describes Paul Revere's scheme for sharing information (knowledge) about the British intentions (pp. 60-61) and the story of breaking the Japanese JN-25 code named AF (the attack on Midway, pp. 5-7). What he misses completely is the metadata and the intentions that framed this information (knowledge) and allowed this knowledge to create value. Just look into the misreading of the weak signals preceding the 9-11 events, missing the early indications of the Challenger and Discovery disasters in this country, or the Israelis missing the signals of the coming Yom Kippur war and you will see the difference.

Our reasoning of presenting this variety of examples is to support the point that information does NOT always translate to knowledge. Interestingly, we are NOT the first ones to come up with this idea. von Baeyer[22] in his recent book: "*Information: The New Language of Science*" describes three levels of complexity of information (pp. 32-33) developed originally by Shannon and Weaver[23] in their classic book about information theory. Shannon and Weaver suggest that knowledge is present only if it can answer the following questions: 1. "How accurately can information be transmitted" (p. 32)? This is what we refer to as data. 2. "How precisely do the symbols convey the desired meaning" (p. 32)? This is what we refer to as information. 3. "How effectively does the received meaning affect behavior in the desired way" (p. 32)? This is what we refer to as knowledge. Unfortunately, most experts dealing with this subject (for example, Seife and von Baeyer) refer to those three levels as nothing more than different aspects of information, missing the importance of metadata (the context) and intentions (the knowledge). For example, adding the metadata to the data will allow the sender to convey the desired meaning, (see question 2 above) or, to answer question 3, adding

context and intention to the information will ensure the appropriate behavior by the receiving entity.

The real issue here is the creation of value and you can clearly see that knowledge builds on itself. In fact, as we move up the knowledge ladder, we build more and more complex structures. Since our definition allows knowledge to be based on data and previous knowledge, we have the ability to utilize existing knowledge to increase our knowledge base.

A more detailed discussion regarding the actionable event that transforms data elements into knowledge will be presented later in this chapter. Our intent for this chapter is to lay a working definition foundation. The difference between Information and Knowledge as we have just outlined is critically important. It is NOT simply an issue of semantics. Thousands of business executives and hundreds of Information Systems (IS) companies do NOT understand this issue. Organizations that purchase software and hardware intending to create a Knowledge Based System can not use these tools to capture knowledge as an asset by itself unless the system is embedded in the appropriate context. While it might have the potential to utilize knowledge, unless the system is embedded in the appropriate context, it is strictly information. This, at least to us, explains the failure of the first generation of many of the KM initiatives. Companies that bought Knowledge Based Systems assumed that the systems will work as indeed KNOWLEDGE based systems, without comprehending that knowledge has human-systems interactive aspects and is a social-technical phenomenon.

Knowledge is an asset. Good managers exploit their assets to position their companies well within their particular environment. As you will see, the ability to determine where your knowledge assets are and how to utilize those assets can start you on the road to identifying and sustaining a competitive advantage. Our intention is to provide a roadmap that will allow you and your organization to navigate the very tricky waters of knowledge management. We don't claim to have all the answers, but we hope to give the reader what he or she needs to make the trip as smooth as possible.

Second Definition of Knowledge

Until now, we have been talking about knowledge as a stand-alone entity at the individual level of analysis. If this is true, how can there be "smart" organizations and "not-so-smart" organizations? Even within your own company there are "smart" teams and "not-so-smart" teams. Although it would be easy to say that the best people are in the "smart" teams and the worst are in the "not-so-smart" teams, we know that just isn't the case. You are smart and bring a lot of knowledge to any team. You have also been on "good" teams and "not-so-good" teams. Shouldn't your knowledge have brought the "not-so-good" team to the level of a "good" team? Let's examine this last piece of the puzzle.

To help you visualize the process, draw a triangle on a piece of paper or a white board. Now label the points of the triangle People, Process, and System. These are the building blocks of knowledge creation and the drivers for the actionable event that actually creates knowledge. Now, convert the triangle into a pyramid and make it three dimensional by giving it height and label the top Knowledge. You have just constructed a three-dimensional actionable event model of knowledge creation based on the organizational drivers People, Processes, and Systems, (see Figure 1 below).

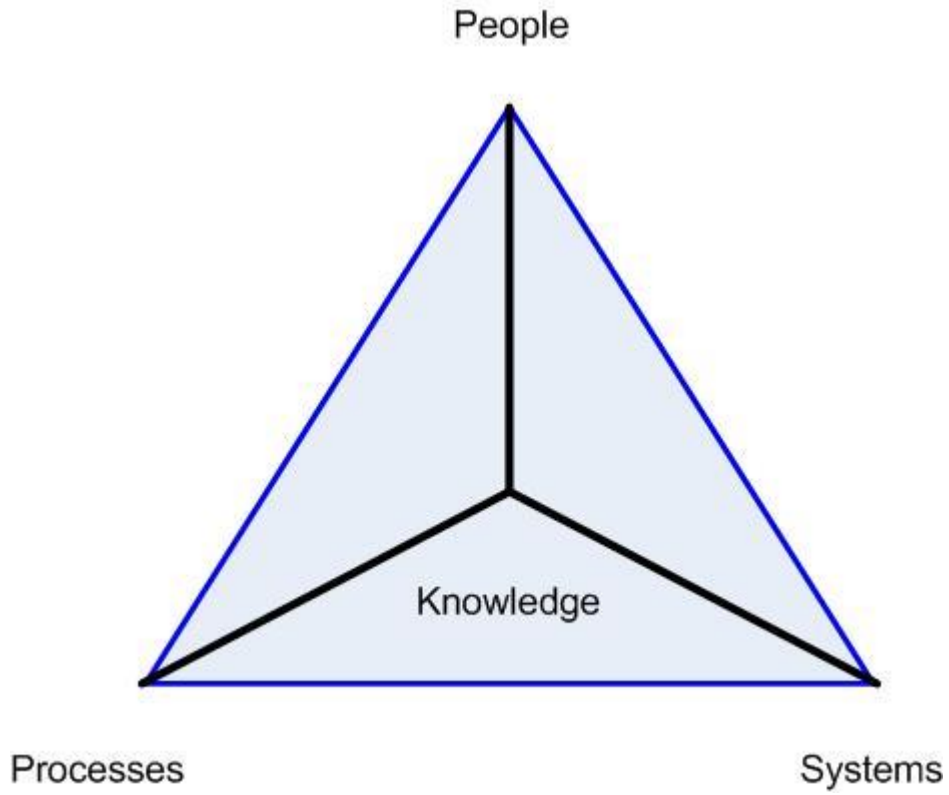

Figure 1: The Knowledge Space

Although we didn't discuss these three items in our definition of knowledge, each of the entities we labeled at the base of the triangle is a knowledge component or driver that is either active, passive, or both. The diagram you drew describes the support structure for Knowledge at the organizational level that can be represented in an equation as K = P*(P+S+P*S) or *Knowledge* equals *(People)* times *(Processes* plus *Systems* plus *Processes *Systems)*; where P*S is the synergy between the processes and the systems. The equation stipulates that a Person must be present in order to create knowledge. However, either Processes or Systems (or both) can be present and these variables times Person will generate knowledge. This is the genesis of the actionable event we referred to earlier.

Consider an example where a company "owns" a process that manufactures a specific product and has systems that do much of the work. This process incorporates two of the

three essential ingredients, Processes and Systems, however, if there are no people who possess the knowledge to put the process and system to work (into action), the product cannot be produced. There is an exception to this and it deals with embedding knowledge into processes and systems. We'll deal with embedded knowledge later in the chapter, but a simplistic example would be driving a car. The mechanical knowledge to actually get the car moving is embedded within the vehicle, all the driver has to know is how to start the engine, how to put the car in gear and how to drive.

Organizational Knowledge-Base and Strategy

The definition of knowledge is complex at the individual level and organizational levels. Incorporating knowledge management into the strategic discussion of an organization adds yet another layer of complexity. We see the knowledge-base of the organization feeding into the core competencies and capabilities of the organization. Those are the core competencies and capabilities that allow the organization to develop a strategy and its sustainable competitive advantage. This, in turn, results in performance in the marketplace. So, the other aspect of knowledge that reinforces the complexity of knowledge management's processes is the multi-layering aspect of the interrelationships between the four layers[24] mentioned above (see also Figure 2 below). This complexity increases due to the potential time lag between managing the knowledge at the bottom layer and the final outcome at the top layer. There can be a time lag between the bottom layer, (managing the knowledge base), to the top layer, (final market performance) of up to 15 years. The time lag is caused by the slow movement through all four layers as they build upon each other. An analogy that illustrates this aspect is the public education system. Society is paying for education today with an expectation of a return for the next generation of the workforce. However, there is no tool that allows us to quantify that X dollars spent today will return Y dollars in the future. Additionally, there are no tools available to allow us to see what type of education will be required for the workforce of the future. Who could have predicted the explosion of programming skills that were needed to fuel the Internet revolution?

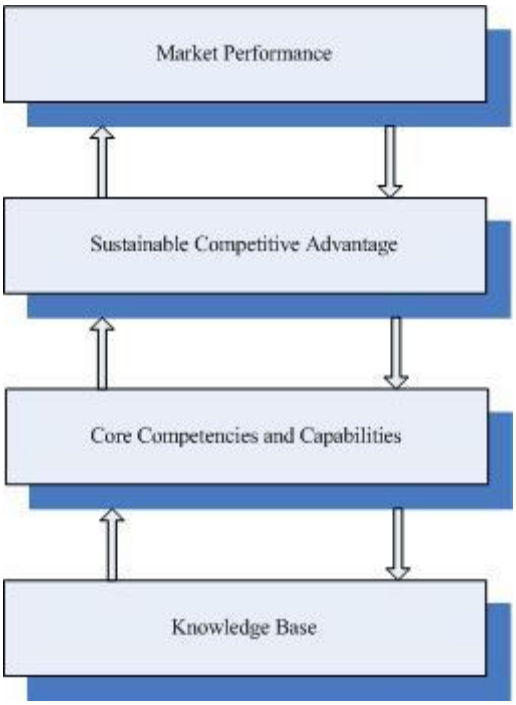

Figure 2: Organizational Knowledge Base and Business Strategy as a multilayer construct

We have provided a conceptual explanation of what knowledge is and have discussed how to make it operational. An organization can create knowledge and derive value from that knowledge. That happens in some organizations. The problem stems from the fact that, by and large, management doesn't recognize knowledge as an asset. We are not saying that knowledge is dismissed by companies; on the contrary, knowledge is prized. However, most organizations don't know where their knowledge resides, what pieces of knowledge are missing, how to value knowledge, or how it should be managed. This book will provide several tools to enable you to understand the complexities and misunderstandings of this management gap.

Where do you want to go - the Knowledge-Based vision, mission and goals

The first step in every strategic journey is to decide where you want to go. This is an interesting dilemma that we always have when we consult with companies: should you start with where you are and frame the discussion of the future in present terms; or should you start with the future and frame the discussion of where you are in terms of the potential future. Starting with where you are presently is easier and more helpful in only a few cases, such as when you need to learn a new language (in our case this will be the knowledge audit-KARMA, see chapter 4). BUT, in the future, once you become familiar with the concepts, language and tools, you might be better starting with the future, then the audit, and then the gaps (see Figure 3 later in the chapter). Framing the discussion of the present situation in terms of the future simply makes it easier to get there.

One way to start this discussion is to define broad and specific goals for your organization in business and KM terms. A second way is to have a discussion about your KM vision and mission statements and how they relate to your business vision and mission. Some people are better at developing the long term vision and mission before they (or usually others) go into the detailed goals. Some are better the other way around--they have the goals and they let the vision and mission bubble up. Regardless, before you are done developing the picture of the future, you will need to clearly define the vision, mission and goals. At this first stage you should develop the KM vision- mission and relate it to the business. We rarely find companies that have an explicit vision-mission statement for their KM, even when they have an explicit KM strategy, which again, few have.

We have identified a number of approaches companies have used to develop explicit or implicit vision and mission statements (see Table 2 and Table 3 below). In the technology management literature this is called technology push or market pull.[25] High-tech companies will develop a unique knowledge, patent it, and then look for markets. Service companies will have the customers/markets and then will look for products and knowledge to satisfy their changing needs. Companies that have an explicit strategy will patent knowledge or trademark brands, realizing that they have intellectual assets to protect, while those that have an implicit strategy will not, or will do so reactively.

	Product		Process	
	Explicit	Implicit	Explicit	Implicit
Internal, technology driven				
Externnal, market/ customer driven				

Table 2: Vision statement framework

What is unique about knowledge that impacts how you develop your vision-mission? Since the product life cycle and the half life of knowledge are continuously shrinking (can be as short as 18-30 month today[26]), competitors are changing the "rules of the game" more frequently, and the capital investments needed for new knowledge creation are increasing. The uncertainties and the risks involved in committing long term (in some cases 10-15 years) to a knowledge path are growing continuously since by the time your knowledge embedded in a product or a service gets to the market it may be obsolete. Here, large companies e.g. large pharmaceutical companies, banks, etc., use their size muscle and transfer their business model from knowledge driven to customer driven,

assuming (mostly correctly) that instead of gambling on technology, they will secure the channels of distribution to the customers and that their size and power will allow them to buy needed knowledge when risks are lower at a reasonable cost, and as such, they will leave new knowledge development to small companies that are willing to take higher risks. One problem for the large companies is that they are shifting their business models, so pharmaceutical companies have to hire more marketing and sales people and less PhDs in chemistry. In addition, if the large companies are completely losing their R&D they are putting themselves at risk of losing knowledge. Their marketing people will now have to talk to external PhDs of chemistry which sooner or later will give the knowledge provider power. So here, we can predict a shift of power to Indian and Chinese R&D companies in the long run. Also, the large companies now have to learn how to evaluate, to negotiate with external partners and to develop partnerships and relationships within the industry. This causes a shift from content/area knowledge to process knowledge- which is also one of our six strategic dilemmas. As you can see, process knowledge is tricky. American companies that tried to copy the Japanese process knowledge of TQM and Six Sigma learned this the hard way. Process knowledge can be easily embedded in some cultures but might be very difficult in others. Such knowledge is also more tacit and embedded in people, even when you put it into policies and procedures.

Once you know what kind of vision-mission you want to develop, you have to decide on the time frames and specifics. Traditionally, vision is long term and less specific, while mission is shorter term and includes specifics regarding the scope of KM in question. For example, technological scope, market scope, product/service scope. We found the following framework especially helpful in developing KM mission statements (see Table 3 below).

KM Scope	Time Horizon		
	Short	Medium	Long
Business you are in			
Business Model			
Technological Scope			
Market Scope			
Product Scope			
Geographic Scope			
Innovation Scope			
Intellectual Assets			

Table 3: Mission statement framework

Of course you do not have to use all of the KM scopes to define who you want to be. Just use those that are appropriate. In chapter 9 of this book we describe the case of Fiat and how the company's new CEO was able to change the path of its future by utilizing its core competency of product development and driving a new mission of their product scope to get them out of a financial crisis.

Once you have your vision-mission it is a good time to translate that into outcomes, or what some people call, broad goals, specific goals, and measurable key success indicators.

There is an interesting academic debate surrounding the idea of whether or not companies need specific indicators, and especially if those indicators inhibit or support innovation and creativity. Some academics[27] claim that specific indicators prevent creativity, if they are the wrong indicators, or if they are followed by a wrong reward system. We tend to fall on the other side. We think you should have specific indicators and the appropriate reward system. It is wrong to assume that more innovation is always better, but if you

want that, CHANGE the indicators and the reward system but be sure to have some indicators. Why? In our minds, the answer is simple: transparency (which happens to be another strategic dilemma, see our discussion in chapter 7). We are confident that only companies that are transparent (of course by and large-not absolutely) will be successful in the future. As we will tell you later, this is probably the only way the markets (capital and human) will be able to evaluate the value and decide if they want to invest money (capital) or be employed (human), since the power is shifting from the demand side to the supply side (both capital and talent). The other reason why measurable indicators are crucial is that they force you to deal with gaps first (if you don't measure, you don't know) and second, they force you to deal with real gaps, not perceived or imaginary gaps. Our experience is telling us that many executives and managers will go a long way to avoid measurable indicators because they want to avoid the accountability trap. If you measure and you fail, someone is accountable. In the old economy this was a bad thing. You could pay with your career. We suggest using failure as a trigger for learning, not for execution. This does not mean that stupidity should be rewarded, nor does it mean that failure should be punished. This is a tricky balance. If a nurse is being sued for criminal negligence when mistakes happen, what do you think is the probability that the hospital will be able to implement a six sigma initiative? In our humble opinion balance and common sense are the answer, not a heavy-hand, regulated environment driven only by judicial concerns. Why do we believe purely judicial is not the answer? Check the cost and quality of the British healthcare system and compare it to the American and tell us what you think.[28]

What are some of the dimensions of the outcomes that are affected by KB strategies and/or are KM specific? In our consulting experience and academic research we identified two frameworks that are of interest and relevance; the intellectual capital (e.g., Edvinsson and Malone, 1997) and the balanced scorecard (Kaplan and Norton, 1992). We added a few additional potential outcomes to their recommendations, e.g., social responsibilities and talent, and arrived at ten possible goals organizations might have. Each of these possible goals is discussed in the following paragraphs.

Intellectual Property (IP)

Some of the most valuable assets companies in the knowledge economy have are intellectual assets or intellectual properties like brands names, patents etc. The intellectual asset/property values are relatively easy to quantify, since they are regulated and have markets. They incur costs, and in some cases take a long time to build, but when managed appropriately will have an enormous value. Cases of building value worth billions of dollars by IBM (patents) and Coca Cola (brand equity) are well known but are by no means unique. Companies can also choose other IPs like: trade secrets, copyrights, trademarks, and internet domain names, among others.

Sales, Earnings, etc.

Some of the most import and simple to achieve results for KM are in the area of sales. As such it should not be surprising that one of the first successful Knowledge Based Systems

successfully implemented by companies is Customer Relationship Management (CRM). Recently companies moved into the next generation of CRM, one that allows them to use analytics to improve sales force and customer service effectiveness as well as to acquire the ability to identify new products or services, including after sale service. More and more companies are realizing the potential of identifying the "big fat tail" of customer markets and the potential for true one-to-one marketing and, as a result, increasing revenues and profits (see also discussions in chapters 15 and 16).

Liability, Risk reduction

The value of the reduction of liabilities and risks is very hard to quantify, unless you have to pay for a mistake someone made. Then the costs are clear, and unfortunately, in many cases prohibitive. For example, 40% of Small and Medium Enterprises (SMEs) companies hit by a disaster (fire, flood, etc.) do not survive the 5th year after being hit by disaster[29]. The current (Nov. 2008) financial crisis is another example of financial and other risks accrued by companies. The same can be said about liabilities encountered by companies, in many cases without realizing the consequences. Foreign suppliers, outsources, etc. that can provide the company with an enormous cost advantage, can also create huge liabilities (see for example China[30]). Engineering knowledge is currently required to manage risks and liabilities reduction when designers of new products are using knowledge base tools and the risks can be quantified and the costs known. Taking that kind of thinking to the business realm requires a change in scope and tools and, as the current financial crisis illustrates, is not easy to accomplish.

Delivery Performance

At times, when Supply Chain Management (SCM) should be intertwined concurrently with innovation while creating the business model at the inception of the new business, it is seen as the next new "game breaker". Having the right goals and indicators to manage SCM could make or break a company. On time delivery and inventory management on the go are legendary for making Wal-Mart and Dell what they are. Other delivery performance indicators might be error elimination, rush orders, damaged goods, etc., (see also the discussion in chapter 18).

Cost Savings

The simplest goal to document, the easiest to implement, and the most important at the early stages of the KM journey for the organization's set of goals and indicators is the cost savings one. Early studies suggest that successful KM initiatives in this area have an extremely high rate of ROI.

Quality

Quality initiatives, TQM and/or Six Sigma (you name the buzz word of the month) are everywhere. Underlying quality is the knowledge and talent needed to support such initiatives (see also the discussion in chapter 17) as the experience and tremendous success of Toyota illustrates.[31] The goals here can be quality improvement in processes

resulting in cost savings, or improving sales due to increased customer satisfaction. There is one goal that we are strongly NOT recommending (which will not make us the favorites of quality gurus) and that is the quality awards. If you want to know more, look into how many quality awards Motorola[32] received and the correlation this had with market share of profitability. Or look into companies that tried to reengineer their processes and on their journey to successful reengineering eliminated a whole slew of middle managers and resulted in losing critical knowledge.[33]

Flexibility, Agility, Responsiveness

Knowledge embedded in process management can support flexible strategic (and operational) moves, agility under attack and responsiveness to market, and customers' opportunities (see also the discussion in chapter 3). Specific goals here might be, for example, having a flexible manufacturing strategy that allows every facility in the world to manufacture every car within a specific time frame (Honda[34]) or receiving compliments from customers, translated into better location in stores or new orders from customers (Blue Rhino[35]).

Innovation, Creativity

Probably the most difficult area in which to use KM, since the systems are not so helpful, is at the fuzzy front end of the creativity and innovation process. Due to the time lag, complexities, etc. it is easy to measure lagging indicators in this area like new product sales but defining and validating leading indicators for innovation and creativity is much more difficult.

Learning, Talent Improvement

In the knowledge economy the most import assets and the most difficult to measure are related to human capital (HC), succession planning, and talent mentoring, just to mention a few. Also, relationship or social capital, learning and forgetting, and investing in and depreciation of HC are difficult to define and validate.

Social Responsibility, Sustainability

Social responsibility and sustainability have been recently accepted as an important set of goals and indicators, are highly debatable and are not strongly and positively reinforced by the markets and shareholders. For example, some companies are using the Leadership in Energy and Environmental Design (LEED) building rating, or some investment companies will only invest in companies that are socially responsible. So a company can make a decision that x% of it s new buildings will be LEED platinum certified, or that by a specific date it will have a chief ethics officer.

By no means is this a comprehensive list. You may want to add, eliminate, or modify it to your specific needs. As always, too few or too many is a bad thing. You also have to

think about progression. It is really very hard to run unless you can walk (as any parent with toddlers can tell you). This is what absorptive capacity[36] talks about. In other words, if you are a young start-up company you can run, BUT you must have legs, and since yours have not had the time to grow and mature you have to get them from the outside: buy, hire, etc.

To find the right set of outcomes for you, you will have to go through the whole cycle a couple of times and each time refine, modify, etc. until you find what works for you. One word of warning, though---You are NEVER done, since a accelerated pace of change is the only constant.

The Knowledge-Based Gap Analysis

The next step is to identify the gaps between where you are and where you want to be. Starting with the vision-mission takes us back to the discussion about assumptions, or how you frame the discussion (e.g. present or future terms). Consider Amazon.com's strategic dilemma in the late 90's: if you frame the discussion of vision-mission as Amazon.com being a company selling books (present) the gaps are of one kind, BUT if you frame the discussion in terms of the future (multilayer market, retailer) then you have very different gaps. Of course, at the time only the top executives of the company were aware of this dilemma, because the rest of us saw the actions. But, this is exactly the point. What are the assumptions you have? In our opinion you are always better documenting (codifying) your assumptions if you can[37]. This documentation process will make your life easier in the future.

Regardless of where you started earlier and how you framed the discussion (see Figure 3 below), you now have to begin to face the music and start the hard work of identifying the gaps.

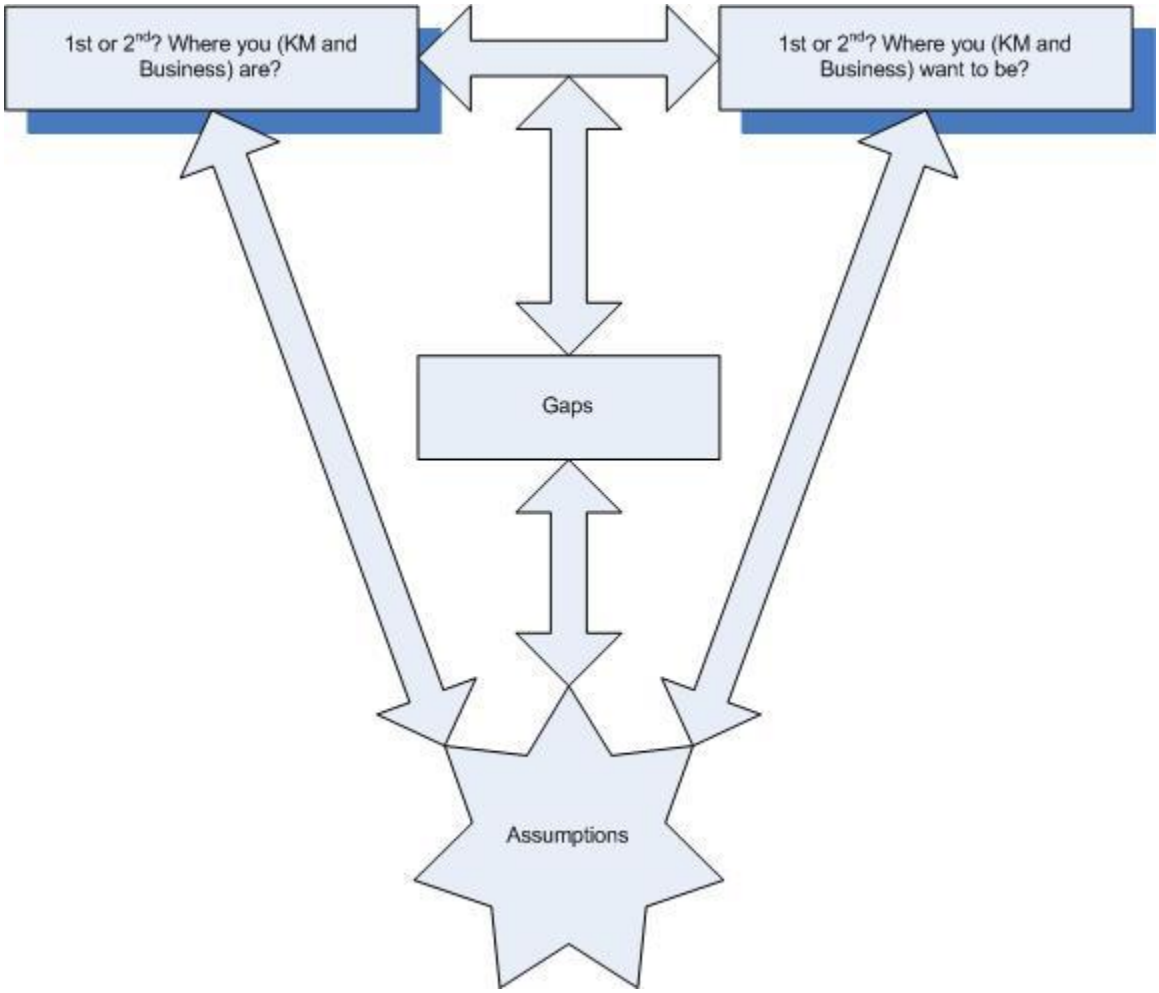

Figure 3: Gaps and assumptions

The gaps identified might be between now and the future, and/or between the KM part and the business part. Here you face an interesting and critical dilemma. We know that there is a very long time-lag between developing the knowledge base and turning it into strategy. It can take anywhere from 5 to 15 years, depending on the industry and product life cycle you are in currently. In order to arrive at a knowledge base that will drive your sustainable competitive advantage you may have to invest in a long term commitment that might turn out to useless by the time you need it for your strategy, and you may find that a much more flexible and faster changing approach is needed. Years ago companies assumed that the only way to control an entity (and its knowledge) was to own it, so they bought it. But since many mergers and acquisitions failed, companies had to learn how to partner and collaborate. They had to create joint ventures or alliances which afforded them less control, but also exposed them to less risk. The same is happening in the KM

area. Fewer companies are doing the research part of the R&D part and more are doing the development. Also, not all companies that invest heavily in R&D are doing well (did we mention Ford[38]?). What is this suggesting? Companies must rapidly learn what their REAL gaps are and how they can close them quickly and at a reasonable price. If they do not, bad things will likely happen.

Next, we will discuss the different types of gaps that you might identify. For example, you might identify that you do not have an explicit KM strategy, but you do have an explicit business strategy (most companies have) and you have a quality strategy (more and more companies have). You also might be aware of innovation issues that you have, and you begin to hear more and more about environmental issues, but you do not have those strategies explicitly stated. First you have to identify the gaps you currently have between your KM strategy, your business strategy and your quality strategy. For example, is your reward system consistent with all of your explicit strategies? We rarely find companies that have their reward system aligned with their strategies, so this is one simple test. Then you have to develop strategies in the other areas (see Figure 4 below) while making sure that there are no gaps. Next you have to think in terms of time horizons (see Figure 5 below), present (audit) and the three future time horizons (near, medium, long).

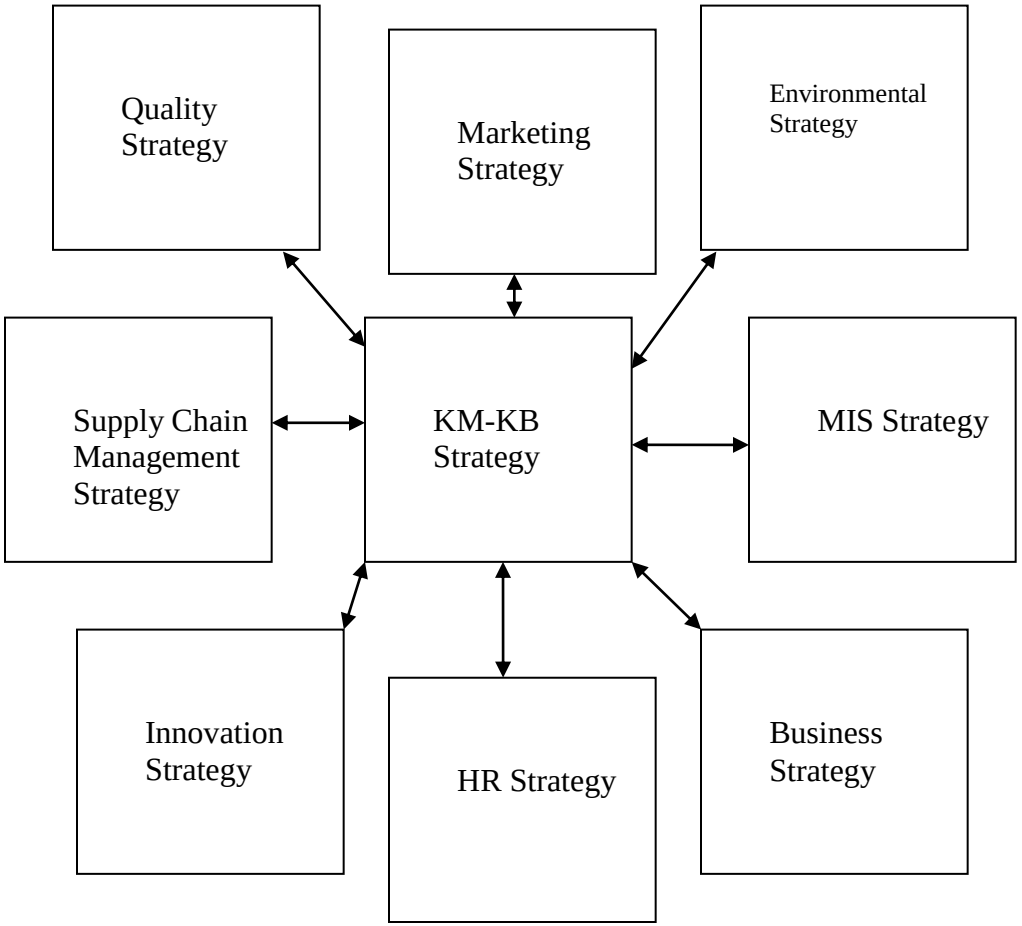

Figure 4: Framework A for gaps analysis

Some gaps are more important than others. For example at "Agresco" the gap that killed KM was the one between MIS and KM. Paradoxally, KM was originally located within MIS. The head of MIS was very supportive of KM and provided the KM team with resources and operated as their mentor and sponsor. But along the way, information security and hardware strategy were obstacles and issues that were difficult to resolve. KM was never truly (in our opinion) incorporated into/with MIS strategy. And so, when the team head retired and the sponsor moved on, the KM team was dissolved. This might be an extreme, endearment/survival case, but it illustrates the point that some gaps are more important than others. Obviously, over time, the relative importance changes. This change brings us to the second kind of gap, the one between time frames (see Figure 5 below). In another words, it is not sufficient to identify the gaps, they also must be rank ordered so the strategy (closing the gaps) will be meaningful and fruitful. You can identify up to twenty four gaps (eight gaps within a time frame * three gaps between time frames) in our model presented here. Which of them you choose to focus on and how to close them will be your strategic decision. One tool that could be helpful here is the technology roadmap[39]. The Technology roadmap was developed by Motorola[40] and allows for a graphic description of the gaps, closing the gaps, different time frames, and complex relationships.

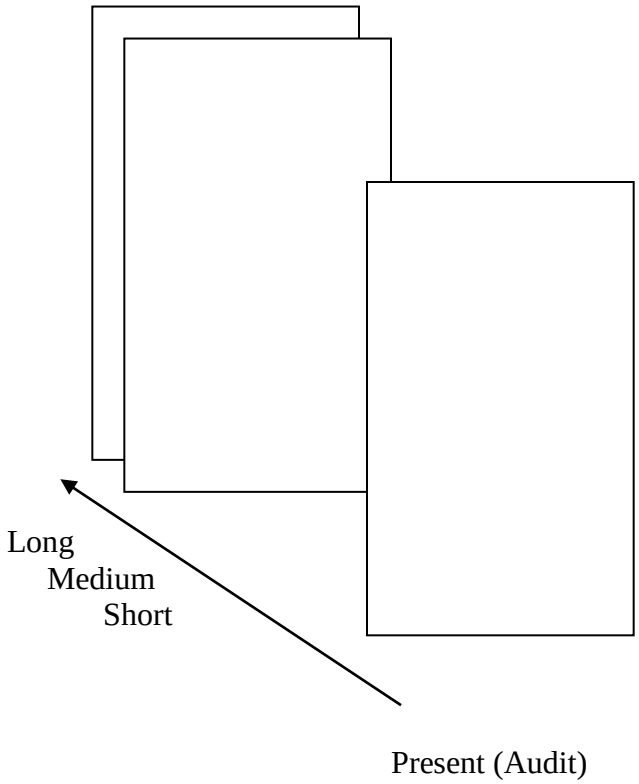

Figure 5: Framework B for gaps (between time frames) analysis

Finally, we want to take a moment to provide an overview of the tools we have created to give a better understanding of how to utilize and value knowledge assets. Those tools will be elaborated on later in chapters 4, 7 and 9 in this book.

The Tools

KARMA – The Audit

KARMA or the Knowledge Audit Review and Management Assessment has been developed and utilized in over 70 organizations. Its purpose is to allow an organization to systematically assess the current status of its knowledge base. For example, KARMA allows organizations to understand what knowledge they possess as well as where their knowledge assets reside. Most organizations don't really know what knowledge they have, and those that do, usually don't know how to utilize that knowledge effectively. It should be noted that most organizations that value and use their knowledge assets, do so intuitively (not systematically). Our research affirms that there is no evidence that points to a systematic evaluation and exploitation of knowledge to support strategic management in companies.

We will take a more in depth look at KARMA in the next chapter but you should keep the following issues in mind:

- ✓ KARMA identifies where you have pockets of knowledge building blocks as well as potential "Knowledge Gaps."
- ✓ KARMA is not the driver of your knowledge management systems or your strategic plan.
- ✓ KARMA can show you where you need additional knowledge; it can't tell you how to get that knowledge.
- ✓ KARMA can show you where to put the "X."

C^3EEP – The Strategic Dilemma Matrix

C^3EEP (Codification, Complementary, Concealment, Exploration, External Acquisition, and Product dilemmas, see chart below) frames the data collected from KARMA and presents management with specific questions based on the organization's knowledge base. Up to this point, we have mentioned strategic thinking but here is where it begins to come into play. We have developed a matrix that requires management to focus on the types of knowledge it possesses or would like to posses and begins to guide management to make the most appropriate decisions based on "Where do you want to go"?

Codification	Versus	Tacitness
Complementary	Versus	Destroying
Concealment	Versus	Transparency
Exploration	Versus	Exploitation
External Acquisition	Versus	Internal Development
Product	Versus	Process

At this point we know where our knowledge assets reside. Now we have to decide what to do with those assets. We will explore the details of each decision and the ramifications of those decisions as they relate to the strategic planning process later in chapter 7.

To quickly review, we have defined earlier in this chapter what knowledge is. We also know that data is the basic building block of knowledge. Once we have the data context, or metadata, all we need is an actionable item that creates or has the potential to create value. Now that we have defined knowledge, we have a framework to identify where it resides (KARMA), and the six strategic dilemmas (C^3EEP) that will put you on the road to utilizing the knowledge base to it fullest advantage. Now we can look at the final piece of the puzzle, the Action Engine. This is a tool that allows you to complete the work started earlier.

ACTION ENGINE – The Strategic Framework

The Action Engine is a strategic tool that incorporates an organization's knowledge base. Its decisions are based on the six strategic dilemmas, systems and processes within the organization, culture, time, money, and many other inter-dependent variables that tell the organization not only where it wants to go, but the best way to get there. The output of the Action Engine tool is a Knowledge Management Action Plan. By using the tool to create an action plan, the resulting strategic framework will provide Knowledge Management Outcomes (KMOs) from a variety of sources. The outcomes might include some of the performances below (as mentioned earlier):

- ✓ Intellectual Property
- ✓ Sales, Earnings, etc.
- ✓ Liability
- ✓ Delivery, Performance
- ✓ Cost, Savings
- ✓ Quality
- ✓ Flexibility, Agility, Responsiveness
- ✓ Innovation
- ✓ Learning
- ✓ Social Responsibility

These performances are created by: KM Processes, KM/IS Systems, and KM Levers. The KM processes might include Communities of Practice, Product Councils, Functional Units, Project Teams, Informal Networks, etc. There is no predefined list and each organization will dictate the processes that it deems appropriate. The systems might include KM/IS Architecture, Security Policies, Access to Systems (internal and external), Maintenance and Update Policies, etc. The levers might include HR hiring practices, Reward Systems, Cross Functional Collaboration, Core Competencies, Top Management Support, External Relationships, Culture, and Risk Tolerance. Again, the specifics of the systems and levers will be dictated by the organization.

Think of these KMOs as the forces pulling up the KM Action Plan. If it were that simple, a management team could create a strategic plan and be on its way to success. However, there are also a number of forces pulling down from the bottom. An organization must be very familiar with the pull downs as well since we all deal with them on a daily basis. We're talking about the pull downs of Resources and Constraints.

On the Resource side, you have things like Time, Money, Physical Plant Capacity, and Real Estate for Human Resources (Offices and Cubes), Authorized Head Count, etc. On the Constraint side, you have Time (again), Money (again), Reward Systems, HR Policies, Top Management Support (or lack of), Culture, and (lack of) Risk Tolerance.

This is the most complex area to work in because there are interdependencies that actually build the plan of action. This is where strategic action is actually put in place and you can quickly see the implications and rewards of this kind of thinking. This is not an easy road to travel. Organizations will find many bumps and potholes in the road. The obstacles the organization may have to maneuver around may challenge some closely held beliefs. When we discuss the concept of KARMA later in the book, we will dig deeper into the specifics and mechanics.

Conclusions

To recap the highlights of this chapter, we would like to provide you with what we believe are the most important concepts to assist in your understanding of the process:

- Don't assume metadata exists – verify and make the metadata explicit.
- Managing knowledge is a complex process – use systems thinking as a framework of reference.
- Sharing data and information is not sharing knowledge – don't confuse the three definitions.
- If there is no action (or potential for action) that creates (or has the potential to create) value, there is no new knowledge created.
- For a team or an organization to create knowledge, people, and systems (and/or) processes working in tandem are required.
- Watch for assumption when you are working on the audit (KARMA).

- Frame your strategic discussions as a set of trade-offs/dilemmas.
- Your Knowledge Management strategy should be driven by outcomes, supported by People, Systems, Processes, and other KM levers, and mitigated by available resources and other restraints.

The use of these tools, KARMA, the C^3EEP Matrix, and the Action Engine, will give an organization the means to create and sustain a competitive advantage. The results obtained from the use of these tools may confirm management's suspicions. The tool results may point the organization in a direction that was different from its original expectations. At the very least, the results should provide insights into an organization that management never knew existed. The use of the tools may even surprise you by exposing opportunities where none were thought to exist. The use of the tools may also lead an organization to the realization that a process or technology it possesses isn't as valuable as once thought.

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[5] Robey, Boudreau, and Rose, 2000, p. 130.
[6] Based on Robey et al., 2000.
[7] Bowman, 1974, p. 46.
[8] Frery, 2006.
[9] Raynor, 2007, quoted, p. 3.
[10] Chesbrough, 2007, p. 13, exhibit 1.
[11] Modified from Chesbrough, 2007.

[12] Welch and Luostarinen, 1993, p. 156.
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[18] Cooper et al., 1995; cited from Yamada, 2004, p. 295.
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[24] See discussion in Brush et al. (2001) and by Hafeez et al. (2002).
[25] See for example Mowery and Rosenberg, 1979, or Phaal, Farrukh and Probert, 2001.
[26] see for example Ulrich and Smallwood 2004, http://kwork.org/Stars/Ulrich/Capabilities.pdf
[27] See for example Pfeffer, 2002.
[28] You can see the answer in the article in Time Magazine, June 8, 2009, vol. 173, No. 22, pp. 44-45, New Lessons From the Old World, by Eben Harrell.
[29] http://jobfunctions.bnet.com/abstract.aspx?docid=66602
[30] For example http://wistechnology.com/articles/4150/
[31] See discussion of Toyota KM and talent in for example: Pfeffer, 2001, Ichijo and Kohlbacher, 2007 and Ichijo and Kohlbacher, 2008.
[32] See examples in http://www.answers.com/topic/motorola-inc or Iaquinto, 1999 and Shahabuddin, 2008.
[33] See Adamson, 2005.
[34] See discussion of Honda's manufacturing strategy in Takahashi and Vandenbrink, 2004, or Zaun, 2003.
[35] See Mooney, 2007.
[36] Cohen and Levinthal, 1990.
[37] See example of KM assumptions in Elenurm, 2003, available at http://www.ejkm.com/volume-1/volume1-issue-2/issue2-art5-elenurm.pdf
[38] See discussions about Ford R&D in: Mikkola, 2001, Lin, 2009, Holmes and Glass, 2004.
[39] See example at Garcia & Bray, 1997 and in Phaal et al., 2001.
[40] CH Willyard, CW McClees - Research Management, 1987.