Key Issues In Knowledge Management

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Introduction

This is an article about key issues in Knowledge Management (KM). It is one person's view about some of the main issues dividing practitioners about how to pursue KM, comprehend it, and eventually realize its value. I cannot, of course, cover all of the main issues here. In fact, my view of what they are may not be shared by other writers in the field. Nevertheless, I hope to cover enough of them to provide a good introduction to newcomers and a reminder to experienced practitioners that there's still a long way to go before we have agreement on basic matters concerning us. The issues I will cover include:

- Approach to KM
- What is Knowledge?
- What is Knowledge Management?
- Hierarchical VS. Organic KM
- Knowledge Management and Data Management
- Knowledge Management and Information Management
- KM and Culture

Approach to KM

Some approaches to Knowledge Management seem to view any manipulation of knowledge as knowledge management. On this view, knowledge sharing, knowledge production, and knowledge transfer are knowledge management. On this view, knowledge use is knowledge management. On this view, knowledge management is part of every business process. But, is Knowledge Management really everything and anything having to do with knowledge and knowledge processing?

The obvious answer is no. I distinguish knowledge use and knowledge processing from knowledge management.

- Knowledge use occurs whenever any agent makes a decision. It is part of every business process.
- Knowledge processing is knowledge production and knowledge integration [1] [2], two distinct knowledge processes constituting the Knowledge Life Cycle (KLC) [1][2].
- Knowledge management is knowledge process management, that is, the management of knowledge production, knowledge integration, he KLC, and their immediate outcomes [3].

By discussing the other issues I will begin to clarify these distinctions and definitions and their importance.

What Is Knowledge?

There is no consensus on the nature of knowledge. Nor has there ever been in the history of human thought [4]. Here's a brief and far from comprehensive survey of definitions offered by writers and researchers in knowledge management.

Knowledge is:

- "Justified true belief": This is the venerable definition of many philosophers, especially of empiricists who believe knowledge claims can be justified by facts [5]. It also is the definition adopted by Nonaka and Takeuchi [6, P. 58].

- "Information in context": This is a definition that may have its roots in Cartesian Rationalist epistemology. Its import is that a knowledge claim is valid if it fits without contradiction and adds to the systematic coherence of a larger framework of knowledge. [7]

- "Knowledge is understanding based on experience": This is an idea that is central to modern pragmatism and its associated epistemology. [8] It's also a standard definition found in English language dictionaries.

- "Knowledge is experience or information that can be communicated or shared" [9, Allee, P. 27]

- "Knowledge, while made up of data and information, can be thought of as much greater understanding of a situation, relationships, causal phenomena, and the theories and rules (both explicit and implicit) that underlie a given domain or problem." [10, Bennet and Bennet, KI, V1, N1, P. 19]

- "Knowledge can be thought of as the body of understandings, generalizations, and abstractions that we carry with us on a permanent or semi-permanent basis and apply to interpret and manage the world around us. … we will consider knowledge to be the collection of mental units of all kinds that provides us with understanding and insights." [11, Karl Wiig]

- "The most essential definition of knowledge is that it is composed of and grounded solely in *potential acts* and in those signs that refer to them."

[12], Cavaleri and Reed. KI, V1, N2, P. 114]: This is another definition originating in Pragmatism and specifically in the work of Charles S. Peirce. A definition offered in the same spirit is "knowledge is social acts," provided by Ralph Stacey [13].

- "Knowledge is the capacity for effective action." This definition is the one favored by the organizational learning community [14, Pp. 2-3].

I will discuss these views shortly, but first I want to introduce the framework I prefer for looking at knowledge.

I distinguish three types of “knowledge:”

- World 1 “knowledge” -- encoded structures in physical systems (such as genetic encoding in DNA) that allow those objects to adapt to an environment;
- World 2 “knowledge” -- validated beliefs (in minds) about the world, the beautiful, and the right;
- World 3 “knowledge” -- validated linguistic formulations about the world, the beautiful and the right

All three types of knowledge are about encoded structures in one kind of system or another that arguably help those systems to adapt. The world 1, world 2, and world 3 distinctions were introduced by Karl Popper [15] [16], [17]. Popper also defined the distinction between world 2 and world 3 knowledge [15, Pp. 106-122], [16, Pp. 36-50] [17, Ch. 1]. But he did not define either type of knowledge in precisely the terms I have used. He also never defined world 1 encoding of adaptive information as knowledge, perhaps because he viewed knowledge as the outcome of our intentional attempts to solve problems and our consequent learning. World 1 encoding of information, in contrast, is not intentional and involves a much different time scale than human learning and knowledge-seeking.

In many organizations, there is little concern with world 1 knowledge, and with the beautiful, and only slightly greater concern with the right, so we are left with world 2 and 3 knowledge of reality as the outcomes of knowledge processes that are of primary concern to knowledge management. Let's consider some of the definitions of knowledge surveyed earlier in light of their internal difficulties and the world 2/world3 distinction.

World 2 definitions

- The definition of knowledge as "justified true belief" has the difficulty that we cannot know for certain that any knowledge belief, no matter how well-

validated is true. Yet some knowledge claims, the well-validated ones, are what we mean by knowledge.

- The definition of world 2 knowledge I provided above implies that knowledge is not the same thing as "understanding" whether qualified by experience, or greater understanding, or insight. *Our ability to understand an invalid network of knowledge claims is as great as our ability to understand valid knowledge claims.* So understanding is not a sufficient condition of knowledge.

- Nor is world 2 knowledge the same thing as experience we can share. *We can share experiences that communicate unvalidated knowledge claims.* On the other hand, tacit knowledge, as defined by Polanyi [18][19], is inexpressible. We know it, but cannot tell it. So this kind of world 2 knowledge is difficult and, in many instances, impossible to share even through non-verbal communication. So if we accept the idea of personal, tacit knowledge, we must also accept that knowledge is not always experience we can share.

So the above definitions of world 2 knowledge have serious difficulties as accounts of it. In my view, world 2 knowledge is belief that the agent holding it has "justified" by subjecting it to the agent's validation process. But it need not be true. World 2 knowledge is an immediate precursor of our decisions, and we use it to make them. Such knowledge is "subjective" in the sense that it is agent-specific.

World 2 knowledge exists at levels above the individual. An agent holding world 2 knowledge can be a group, a team, an organization, even a nation. Much research on culture, national character, social movements, political integration, and organizational theory suggests that group cognitive predispositions are a useful concept in accounting for group behavior. Without recognizing them we restrict world 2 knowledge to the level of the individual. Such knowledge is "personal," in the sense that other individuals do not have direct access to one's own knowledge in full detail and therefore cannot "know it" as their own belief. I'll return to the idea of group cognitive predispositions when I discuss culture later on.

World 3 Definitions

Four of the knowledge definitions I surveyed earlier may be viewed as World 3 definitions. These are knowledge as "information in context" and knowledge as "a potential act," "knowledge as social acts," and "knowledge is the capacity for effective action. All four definitions have severe problems. Here they are.

First, the idea that knowledge is information in context doesn't distinguish knowledge from information. Information can have every bit as much context as knowledge. What distinguishes knowledge from information is *the content of the*

validation context of knowledge. The history of an organization's tests of knowledge claims and their competitive performance, determines the validity of such claims.

Second, world 3 knowledge is also not the same thing as a potential act or as "social acts." *Not every potential or social act is a knowledge claim or even a validated knowledge claim.* Though every potential act may either be or imply a knowledge claim relating the act to its anticipated consequences, unless we already have validated the knowledge claim implied by the potential act, it is just information, no different than any alternative potential knowledge claim act. So the definition of knowledge as a potential act raises the question of how potential acts that are knowledge claims are validated.

Third, The definition of knowledge as "social acts" raises the same concern. Fourth, "knowledge is the capacity for effective action," has the political scientist's problem. That is, knowledge is a ***necessary*** condition for effective action. But, it is not sufficient. Effective action also requires (a) the intention to use one's knowledge, and (b) the capability or power to take those effective actions.

Instead of the above, I think that world 3 knowledge consists of validated models, theories, arguments, descriptions, problem statements etc., it involves linguistic formulations (world 3 information also exists) about these objects in themselves. It is not psychological in nature or even sociological. We talk about the truth, or nearness to the truth of such third world objects, and of knowledge defined as descriptions, models, theories, or arguments that are closer to the truth than their competitors.

This kind of knowledge is not an *immediate* precursor to decisions. It impacts decisions only through the impact it has on (world 2) beliefs. These beliefs, in turn, immediately impact decisions. This kind of knowledge, further, is "objective."

It is objective in the sense that it is not agent specific and is shared among agents as an object whether or not they believe in it. It is also not "personal," because (a) all agents in the organization have access to it, and (b) it emerges from the interaction of a number of agents. Finally, it is objective because, since it is sharable, we can sensibly talk about its organizational validation. To understand the essence of World 3 knowledge we can do no better than to quote Karl Popper [15, P. 116] who first formulated this idea of "objective knowledge," on the objective knowledge content in books.

> “A man who reads a book with understanding is a rare creature. But even if he were more common, there would always be plenty of misunderstandings and misinterpretations; and it is not the actual and somewhat accidental avoidance of misunderstandings which turns black spots on white paper into a book or an instance of knowledge in the

> objective sense. Rather, it is something more abstract. It is its possibility or potentiality of being understood, its dispositional character of being understood or interpreted, or misunderstood or misinterpreted, which makes a thing a book. And this potentiality or disposition may exist without ever being actualized or realized.
>
> To see this more clearly we may imagine that after the human race has perished, some books or libraries may be found by some civilized successors of ours (no matter whether these are terrestrial animals that have become civilized, or some visitors from outer space). These books may be deciphered. They may be those logarithm tables never read before, for argument's sake. This makes it quite clear that neither its composition by thinking animals nor the fact that it has not been actually read or understood is essential for making a thing a book, and that it is sufficient that it might be deciphered.
>
> Thus I do admit that in order to belong to the third world of objective knowledge, a book should - in principle or virtually - be capable of being grasped (or deciphered or understood, or 'known') by somebody. But I do not admit more."

The distinction between World 2 and World 3 knowledge raises the issue of which type of knowledge should be the object of KM? Can World 2 knowledge be managed by organizations? To what extent is World 2 knowledge about an organization determined by organizational interaction, rather than individual predispositions and interactions not manageable by the organization? Where does the distinction between World 2 and 3 knowledge leave the much better known distinction between tacit and explicit knowledge? Or the less well-known distinction between "implied knowledge" and codified knowledge? These questions will be considered in due course.

Data, Information, and Knowledge

Many writers have addressed the distinctions among data, information and knowledge (See for example, [20][21][9][22][23]]. My own version will provide a necessary background to taking up future issues on the distinctions between data management and knowledge management, and information management and knowledge management.

What are the differences among data, information, and knowledge in human organizations? That depends on whether we're talking about world 3 or world 2 phenomena. Let us consider world 3 first.

World 3 Data, Information, and Knowledge

Data, information, and knowledge all emerge from the social process. They are global properties of an organization, or its constituent agents, depending on the organizational level that is the focus of analysis. They are inter-subjective constructs, not personal data, information, or knowledge. Organizational data, information and knowledge are World 3 objects.

A datum is the value of an observable, measurable or calculable attribute. Data is more than one such attribute value.

Is a datum (or is data) information? Information is always provided by a datum, or by data, because data is always specified in some conceptual context. And it is important to note, the conceptual context is one that expresses data in a structured format. Without that structured format we would not call it “data." ***So data is a type of information.*** It is a type of information whose conceptual context provides it with structure and whose purpose is to represent observation.

Information, in more general terms, is data plus conceptual commitments and interpretations, or such commitments and interpretations alone. Information is frequently data extracted, filtered or formatted in some way.

World 3 knowledge is a subset of world 3 information. But it is a subset that has been extracted, filtered, formatted, in general, processed, in a very special way. It is information that has been subjected to, and passed tests of validation. It is information that has been enhanced by the record and experience provided by the validation process.

This brings us to the Case of the Misconceived Pyramid. In treating the distinctions among data, information, and knowledge, it is often assumed that these are arranged in a pyramid with data, the most plentiful type, at the bottom; information produced from data above it; knowledge produced from information through the hard work of refining or "mining," above it, and wisdom produced from knowledge, the rarest of all, at the top. This makes a nice picture (Figure One). But if data and knowledge are also information, what happens to the pyramid?

Figure Two presents a new picture. In it, information is not made from data. Data and knowledge are made from preexisting information, that is, “just information,” data, knowledge, and problems are used in the knowledge life cycle to produce more information including new knowledge. In effect this figure is saying "Get rid of the pyramid, get on to the cycle."

What has happened to wisdom in this new image? Wisdom is knowledge of what is true or right coupled with "just" judgement about action to achieve what is right

Another definition is the application of knowledge expressed in principles to arrive at prudent, sagacious decisions about conflict situations. Both these definitions are consistent with the parable of Solomon, but they suggest that wisdom is ambiguous. It is (a) either a form of knowledge (I.e. also information) about doing what is right or (b) a kind of decision (in which case it's not information, but a type of action in a business process). That is, depending on how it is defined, wisdom may not be the same kind of thing as data, information, or knowledge.

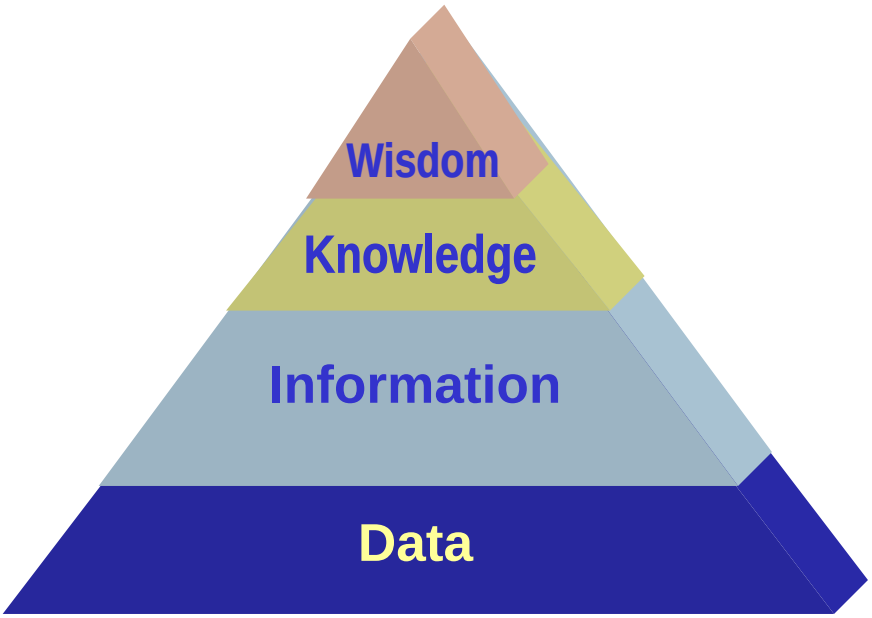

Figure One -- The Data, Information, Knowledge, and Wisdom Pyramid

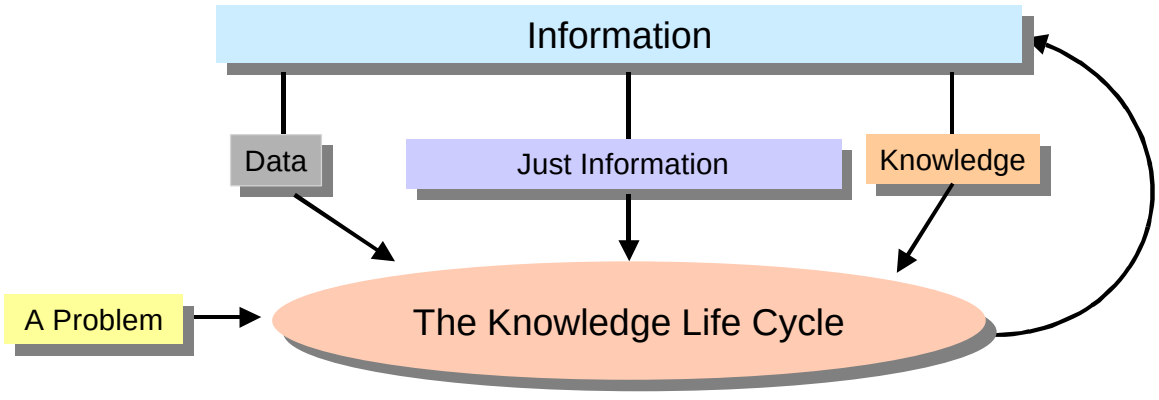

Figure Two -- Problems, Data, Information, Knowledge and The KLC

World 2 Data, Information, and Knowledge

Earlier I defined world 2 knowledge as: validated beliefs (in minds) about the world, the beautiful, and the right. What if the beliefs are unvalidated or invalidated? Then we have information. Are validated beliefs information, as well as knowledge? They are non-random structures, and as such fit Shannon's [24] definition of information. So, there is no reason to deny knowledge the appellation information, as well.

Where does data come into this picture? World 2 data must be beliefs about observational experiences. These beliefs are like other beliefs in that we view them as validated, unvalidated, or invalidated by our experience, and also they fit into and relate to the general structure of the rest of our beliefs So, they like world 2 knowledge and information, are also information.

What about the pyramid? Does the pyramid image make sense for world 2 data, information, and knowledge? Again, our experience argues against it. Data is not the foundation from which we produce information, from which we produce knowledge, from which we produce wisdom. Instead, we are born with genetically encoded knowledge that enables us to interact with the external world and to learn. This knowledge is more plentiful in quantity than all of the knowledge we will acquire through learning for the rest of our lives. We use it to approach the world with predispositions and beliefs. With these we create and structure experience and from the process of doing this we produce new data, information, and knowledge continuously and in no particular order.

How do we do this? Once again it is through the KLC. The KLC as visualized in Figure Two, produces both world 3 and world 2 data, information and knowledge. And within its processes world 2 and world 3 phenomena alternate in influencing the production of the other as the KLC operates through time.

What Is Knowledge Management?

Rather than doing a full survey of the field, (not consistent with my desire to focus on a number of issues in a relatively small space) my purpose here is to raise and address key issues arising from typical attempts to define KM. To fulfill this purpose it is convenient to rely on a range of definitions provided at Yogesh Malhotra's well-known web site [25] and a variety of views, beginning with Malhotra's own definition.

Malhotra [25]

> "Knowledge Management caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change.... Essentially, it embodies organizational

> processes that seek synergistic combination of data and information processing capacity of information technologies, and the creative and innovative capacity of human beings." Malhotra looks at KM as a synthesis of IT and Human innovation!
>
> "While information generated by computer systems is not a very rich carrier of human interpretation for potential action, knowledge resides in the user's subjective context of action based on that information. Hence, it may not be incorrect to suggest that knowledge resides in the user and not in the collection of information, a point made two decades ago by West Churchman, the leading information systems philosopher."

In this definition, it is not clear what management is. Or what knowledge is. It is not clear what information is. If knowledge is personal, does that mean that Malhotra rules out organizational knowledge? And why is information not personal, as well as knowledge? Does Malhotra think there is something about personal information that automatically makes it valid and therefore "knowledge." Is everything I believe "knowledge" just by virtue of my believing. If so this is a highly subjectivist view of knowledge and derivatively of KM.

> **Sveiby [25]**
>
> ". . . Both among KM-vendors (researchers and consultants) and KM-users (read short descriptions of what companies and other practitioners are doing) there seem to be two tracks of activities - and two levels. Track KM = Management of Information. Researchers and practitioners in this field tend to have their education in computer and/or information science. They are involved in construction of information management systems, AI, reengineering, group ware etc. To them Knowledge = Objects that can be identified and handled in information systems. This track is new and is growing very fast at the moment, assisted by new developments in IT."

This definition begs the question of defining KM. It doesn't define "management," or "knowledge." And it doesn't distinguish knowledge from information, or knowledge management from information management.

> "Track KM = Management of People. Researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or business/management. They are primarily involved in assessing, changing and improving human individual skills and/or behaviour. To them Knowledge = Processes, a complex set of dynamic skills, know-how etc, that is constantly changing. They are traditionally involved in learning and in managing these competencies individually - like psychologists - or on an organisational level - like philosophers, sociologists or organisational theorists. This track is very old, and is not growing so fast."

Knowledge is clearly not a process. Learning, KM and knowing are processes, but knowledge itself, the outcome of processes such as learning and knowing is not a process.

Sveiby's two alternative "definitions" of KM are presented by him as originating with others, identifying two schools of thought. My remarks just above are not intended to state that either view is subscribed to by him as the correct definition of KM. Rather my remarks should be interpreted as directed at the views stated without the implication that Sveiby subscribes to them. I note, however, that his statement of them declines to offer a critique of either.

Ellen Knapp (PWC) [25]

> "We define knowledge management as "the art of transforming information and intellectual assets into enduring value for an organization's clients and its people.""

Knapp thinks it's more important to tell us that KM is an "art" rather than a science, than it is to tell us what management is and what exactly it is we are managing. "Intellectual assets" is far too vague a construct to define the scope of KM. "Transforming" is not managing, and things other than knowledge can have "enduring value." In other words, this definition confuses acting upon information with managing knowledge. That is, knowledge processing with knowledge management. It is a characteristic error, committed again and again in knowledge management circles

University of Kentucky [25]

> "Knowledge is a vital organization resource. It is the raw material, work-in-process, and finished good of decision making. Distinct types of knowledge used by decision makers include information, procedures, and heuristics, among others. . . . A variety of computer-based techniques for managing knowledge (i.e., representing and processing it) have been and will continue to be devised to supplement innate human knowledge management skills. As a field of study, knowledge management is concerned with the invention, improvement, integration, usage, administration, evaluation, and impacts of such techniques."

Rather than being the "finished good of decision making" (a nice turn of phrase), knowledge is more the finished good *for* decision making. In any event, it is hard to see the distinction between information and procedures and heuristics, since these appear to be information also. Also, this definition limits KM to "computer-based techniques," a limitation neither acceptable to the KM community in

general, nor justified by the common concept of management which encompasses far more than computer techniques.

Karl Wiig [25]

"Knowledge management in organizations must be considered from three perspectives with different horizons and purposes:

> Business Perspective -- focusing on why, where, and to what extent the organization must invest in or exploit knowledge. Strategies, products and services, alliances, acquisitions, or divestments should be considered from knowledge-related points of view.
>
> Management Perspective -- focusing on determining, organizing, directing, facilitating, and monitoring knowledge-related practices and activities required to achieve the desired business strategies and objectives.
>
> Hands-On Operational Perspective -- focusing on applying the expertise to conduct explicit knowledge-related work and tasks."

Karl Wiig, one of the more systematic thinkers in the field of knowledge management today, is the closest so far on the management side. The business perspective focuses attention on resource allocation, certainly a managerial activity. The management perspective identifies a number of management activitiies. The "hands-on" perspective recognizes that knowledge managers must also do knowledge processing. But as we've seen earlier, Wiig's definition of knowledge as "understandings" and "mental units" is highly debatable and clearly entirely on the world 2 side of things. So his definition of KM doesn't orient us toward managing producing and/or integrating world 3 knowledge, or towards managing how either world 2 or world 3 information is validated and hence becomes "knowledge."

R. Gregory Wenig [25]

"Knowledge Management (for the organization): -- consists of activities focused on the organization gaining knowledge from its own experience and from the experience of others, and on the judicious application of that knowledge to fulfill the mission of the organization. . . . .

Knowledge: -- Currently, there is no consensus on what knowledge is. . . . The definition that I have found most useful when building systems is as follows: knowledge is understandings the cognitive system possesses. It is a construct that is not directly observable. It is specific to and not residing outside the cognitive system that created it. Information, NOT knowledge,

> is communicated among cognitive systems. A cognitive system can be a human, a group, an organization, a computer, or some combination."

Wenig's definition is strong on many of aspects of world 2 knowledge, especially on the distinction between individual knowledge and collective knowledge, and on the idea that it is information and not knowledge that is communicated among cognitive systems. But it is weak on the activities comprising KM and how they are distinguished from knowledge processing activities.

Philip C. Murray [25]

> "Our perspective at Knowledge Transfer International is that knowledge is information transformed into capabilities for effective action. In effect, knowledge is action. . ."
>
> For KTI, knowledge management is a strategy that turns an organization's intellectual assets -- both recorded information and the talents of its members -- into greater productivity, new value, and increased competitiveness. It teaches corporations, from managers to employees, how to produce and optimize skills as a collective entity."

If knowledge were action, we wouldn't need two words. In fact there is a great gap between knowledge and action and even between knowledge and the capability for action. Knowledge is a necessary condition for effective action, but it is not sufficient by itself. Not only knowledge, but also power is required. Also, let us not forget that information combined with capability and intention is also sufficient for action, but not for success. Finally, KM is a process and not a strategy as specified in Murray's view.

Tom Davenport [26]

> "Knowledge
> "information with value, from the human mind" (adapted from Information Ecology, by Tom Davenport).
> KM
> "Processes of capturing, distributing, and effectively using knowledge" (Davenport, 1994)

"Information with value" is getting close to knowledge. But what kind of value? Information can have value for producing knowledge and yet not be knowledge itself. Thus, in producing knowledge I may select among a number of competing models. All may be of value in providing the context for an assessment validating only one of them as knowledge, but that doesn't change the fact that all but one are just information.

The specific definition of KM, further, does not cover the interpersonal and decision making aspects of KM. Moreover, why are “capturing” “distributing” and “using” knowledge distinctively knowledge management, as opposed to knowledge processing, activities that all knowledge workers as well as knowledge managers engage in? Here is another case of someone confusing knowledge processing with knowledge management.

The General Picture

Knowledge

Very few authors in KM present careful, cogent definitions of knowledge. Definitions vary widely, and can be brushed aside easily. Many confuse knowledge and information. There is a steadfast refusal to spend any effort on analyzing the nature of knowledge, I believe marked by a fear that “real” analysis of knowledge takes years and will prevent one from getting on with the job of KM. As if we can do that without really knowing what it is we’re managing.

Knowledge Management cannot be successful if the field avoids philosophical and in-depth scientific analysis and theorizing about the nature of knowledge. I believe the brief survey provided above indicates that superficiality in definition and discussion of knowledge will get us nowhere.

We need to get tough -- tough in thinking about knowledge, in formulating our views of it; and tough with each other in our discussions about it. For too long KM as a field has practiced a live-and-let live policy with respect to discussion of its key concepts. As a result, we have a conceptual morass out there and a structural vacuum used by vendors to build additional chaos around the use of key concepts like knowledge.

KM

Most definitions suffer from the lack of careful treatment of “management” as well as “knowledge.” It’s almost as if KM experts think that “knowledge management” is not a form of “management” and therefore doesn’t have to be defined or characterized in a manner consistent with well-established meanings of that term. The above set of definitions are striking in that they tell us so little. Why do KM Definitions tell us so little about (a) the activities that are part of KM and (b) the target of those activities?

So the situation with respect to "KM" is very similar to that we have already found with regard to knowledge. There is no consensus and attempts to define KM are relatively superficial. It is a case of another key concept in KM being defined so vaguely and ambiguously that research and writing on KM is weighed down with conceptual baggage and difficulties in communication inhibiting both the search

for KM knowledge and effective KM decision making. My own attempt to solve the problem of definition follows

I define KM as human activity that is part of the Knowledge Management Process (KMP) of an agent or collective. This reduces KM to the definition of the KMP. And the KMP, in turn, is an ongoing, persistent, purposeful network of interactions among human-based agents through which the participating agents aim at managing (handling, directing, governing, controlling, coordinating, planning, organizing) other agents, components, and activities participating in the basic knowledge processes (knowledge production and knowledge integration) in order to produce a planned, directed, unified whole, producing, maintaining, enhancing, acquiring, and transmitting the enterprise's knowledge base. This definition is another way of stating the idea that KM is management of the KLC and its outcomes. But the idea of KM still needs further specification. The KLC itself has been described in articles in earlier issues of this Journal [26] [12] [27] and is discussed again in other articles in this issue [28] [29]. If you have not had previous exposure to the KLC and need to get a clear idea of the nature of this target of KM, please refer to these earlier articles and to [3] for specifics on the KLC itself.

In specifying KM further, let's note first that the KMP is a business process. I break it down further [30] [31] into three task clusters: interpersonal behavior, knowledge processing behavior, and decision making behavior. Interpersonal behavior may be further categorized into the following task clusters (there are two levels of task clusters in this hierarchy):

- Figurehead or ceremonial KM activity (focuses on performing formal KM acts such as signing contracts, attending public functions on behalf of the enterprise's KM process, and representing the KM process to dignitaries visiting the enterprise);
- Leadership (includes hiring, training, motivating, monitoring, and evaluating staff. It also includes persuading non-KM agents within the enterprise of the validity of KM process activities); and
- Building external relationships -- another political activity designed to build status and to cultivate external sources of support for KM.

KM Knowledge processing behavior includes:

- KM knowledge production (different in that it is here that the rules for knowledge production that are used at the level of knowledge processes are specified);
- KM Knowledge Integration (affected by KM knowledge production, and also affects knowledge production activities by stimulating new ones).

Decision making behavior includes:

- Changing knowledge process rules (involves making the decision to change such rules and causing both the new rules and the mandate to use them to be implemented);
- Crisis Handling (e.g., meeting CEO requests for new competitive intelligence in an area of high strategic interest for an enterprise, and directing rapid development of a KM support infrastructure in response to requests from high level executives);
- Allocating Resources (KM support infrastructures, training, professional conferences, salaries for KM staff, funds for new KM programs, etc.);
- Negotiating agreements (with representatives of business processes over levels of effort for KM, the shape of KM programs, the ROI expected of KM activities, etc.).

In brief, the nature of knowledge management is that it is a complex process composed of the above task clusters broken down into task patterns, executed by agents through decision cycles composed of planning, acting, monitoring, and evaluating activities. Further specification of KM, therefore, involves breaking down these task clusters, a task undertaken elsewhere [3]. Enough has been said here about the nature of KM to convey a much more concrete view in defining its scope, than is expressed elsewhere.

Hierarchical vs. Organic KM

A central issue in KM is whether it should be hierarchical in nature, focusing on designing and implementing a set of well-articulated rule-governed business processes implementing knowledge production or knowledge integration, handed down by knowledge managers, and implemented in a manner reminiscent of Business Process Re-engineering. Or whether KM should be organic in the sense that it focuses upon implementing policies that support "natural" tendencies of existing knowledge processing patterns occurring in communities of practice and generally outside the formal lines of organizational authority. The hierarchical approach is frequently called "Newtonian," while the organic approach is called the "Knowledge Ecology" approach.

The organic approach gets a boost from scientific research on Complex Adaptive Systems (CAS) [32][33][34]. CAS theory supports the idea that there is a Natural Knowledge Management System (NKMS) in any organization that is comprised of independent, autonomous, individuals, teams, and groups, whose self-organized interaction produces emergent knowledge. This knowledge, in turn, is the chief means organizations use to adapt to their environments and maintain their identity.

Put simply, the objective of KM is to leverage and enhance the natural tendencies toward knowledge production of the NKMS with appropriate policies

and above all to do nothing to interfere with these natural tendencies. The motto of organic KM is: “Above all, do no harm!”

CAS theory is very different in character from the essentially Newtonian classical theory of economics based on supply and demand. But it shares with it the idea that the system in question, in this case the NKMS, will naturally, and without interference from management, perform well in producing and integrating knowledge. There is a disposition then, among those who believe in CAS theory to be conservative about interfering with existing KM and knowledge processing patterns under the assumption that they are natural. The issue, however, is: are they “natural,” or are they simply the result of previous management interventions that distort the natural tendencies of the organizational system to produce and integrate knowledge? If the situation is the latter then the implication is that KM should not take a hands-off atttitude, but instead should attempt to intervene to restore the natural, productive tendencies of the NKMS.

So concrete situations in real enterprises may require different postures toward KM interventions. But we lack clear criteria for evaluating when we have an NKMS that requires laissez-faire KM, and when we have one that requires a more active KM policy. Without such criteria for making evaluations, the policy posture that follows from a belief in organic KM, is hard to apply, and should be approached with caution. The same applies to the re-engineering approach. It can easily exacerbate problems in knowledge processing caused by previous ill-advised interventions.

Knowledge Management and Data Management

What is the relationship of KM to data management? Both KM and knowledge processing must employ data management as an aspect of both, but it is immediately apparent that both KM and knowledge processing are much broader than data management. For one thing, data management is not about theories, models, or conceptualizations of system dynamics. It is about managing structures of information for testing and validating them. For another, data management is about managing how data is produced, distributed and processed, and data production and integration is only a small part of knowledge production and integration.

The path to knowledge management from data management goes through information management, because data, like knowledge, is really a type of information, and because knowledge management encompasses both data and information management.

Knowledge Management and Information Management

What's the difference between Information Management (IM) and Knowledge Management (KM)? Both concepts refer to managing (handling, directing, governing, controlling, coordinating, planning, organizing) processes and the products of those processes. In addition, since knowledge is a form of information it follows that KM is a form of IM. KM is a more robust form of IM that provides management of activities not generally available in Information management.

One difference between basic IM and KM is that basic IM focuses on managing how information is produced and integrated into the enterprise, while KM does the same with respect to knowledge. A second difference between basic IM and KM is that basic IM focuses on managing a more narrow set of activities than KM. The two information processes managed by an organization are Information Production, and Information Integration. The two basic knowledge processes are Knowledge Production and Knowledge Integration

Basic information processes are different from knowledge production and integration processes in that they lack knowledge claim validation. Information Production includes information acquisition, individual and group learning, even knowledge claim formulation, but stops at knowledge claim validation. Similarly, information integration includes broadcasting, searching/retrieving, teaching and sharing, but what is being broadcasted, searched for, retrieved, taught, and shared is information rather than knowledge.

KM and Culture

“Cultural” barriers are often held responsible for failures to share and transfer knowledge in organizations. It is frequently said that knowledge management must undertake the difficult task of changing an organization’s culture to achieve the knowledge sharing and transfer necessary to realize the full value of the organization’s knowledge resources. But “culture” is one of those terms used loosely, in a multiplicity of ways, to cover a multitude of sins, so when we are told the culture must be changed to solve a problem in KM we don’t always know what that really means.

Alternative Definitions of Culture

Here are some alternative definitions of culture summarized by John H. Bodley of the University of Washington [35] from a longer list of 160 definitions compiled in 1952 by the great anthropologists Alfred L. Kroeber and Clyde Kluckhohn. [36]

Topical: Culture consists of everything on a list of topics, or categories, such as social organization, religion, or economy. [I don't think this definition is very relevant for KM]

Historical: Culture is social heritage, or tradition, that is passed on to future generations. [This may be relevant to KM in that organizations may have traditions that are difficult to change. But to use this concept in KM we need to be very specific about which traditions in an organization impact either KM practices or activities or knowledge processing activities, and we need to realize that "traditions" generally change very slowly and most frequently as a response to behavioral change.]

Behavioral: Culture is shared, learned human behavior, a way of life. [This definition is used successfully in the analysis of cultures at a societal level. To use it at the organizational level, we need to distinguish shared, learned behavior among individuals in an organization that results from general socialization as opposed to shared, learned behavior that results from organizational socialization. This may be difficult to measure. But its measurement may be important because learned behavior resulting from organizational socialization may be much easier to change than learned behavior resulting from general socialization.]

Normative: Culture is ideals, values, or rules for living. [One could map organizational ideals, values, and "rules for living," But measurement is difficult. If you use behavior to measure these things you have the problem of explaining KM, knowledge processing and organizational behavior in terms of such behavior, rather than in terms of ideals, values and rules for living. On the other hand if you don't use behavioral measures you pretty much have to do analysis of cultural products or surveys to develop measures. In any event, ideals, values, and rules for living are emergent properties of social systems. They, like traditions respond to changes in behavior, but don't change very easily in response to organizational manipulation.]

Functional: Culture is the way humans solve problems of adapting to the environment or living together. [This definition is difficult for KM, because knowledge processing tempered by knowledge management is the way humans solve such problems. So this definition doesn't explain or predict knowledge processing and knowledge management as much as it equates culture with these things.]

Mental: Culture is a complex of ideas, or learned habits, that inhibit impulses and distinguish people from animals. [This is the "psychologized" version of the normative definition. As stated it is debatable because certain higher animals e.g. primates, dolphins also have learned habits and ideas, so this definition may not distinguish people from animals.

More importantly, this definition does not link the ideas or learned habits people have with any shared socialization. That is, ideas or learned habits resulting from individualized experiences are not distinguished from ideas or learned habits

resulting from shared societal or organizational experiences. The term culture can only coherently be applied to the second class of ideas.

When this idea is used in KM, it is important to recognize the importance of measuring such "subjective culture" as the result of shared organizational experiences, e.g., in "boot camps," organizational ceremonies, committee meetings, performance reviews, etc. That is, when claiming that culture is a factor accounting for characteristic patterns of knowledge processing it is necessary to show not only that attitudes, cognitive orientations and other mental phenomena are affecting knowledge processing behavior, but also that such phenomena result from some shared experiences the organization is implementing.]

Structural: Culture consists of patterned and interrelated ideas, symbols, or behaviors. [I think this definition covers too much and doesn't distinguish between culture and other aspects of information, knowledge, or KM]

Symbolic: Culture is based on arbitrarily assigned meanings that are shared by a society. [This is a societal concept. Is it also useful at the organizational level for KM. Perhaps, but this usage seems to me to be marginal.]

The upshot of this brief survey of "culture" is that when someone says that knowledge can't be shared or transferred due to cultural barriers one really has to ask for clarification to know which sense of culture is intended. Is culture really the barrier to effective KM it is frequently made out to be? The answer may well depend on what the questioner means by "culture."

Culture or Something Else?

Indeed it is even possible that when someone talks about cultural barriers that they are not talking about culture at all. Thus, when organizational politics is opposed to knowledge sharing and transfer, that is not culture, and while it may be difficult to change, it is easier to change than culture. When the organizational incentive system affecting knowledge worker behavior must be changed to facilitate knowledge sharing and transfer, that is not "culture," and it is certainly easier to change.

In fact, the claim that knowledge sharing and transfer do not occur because of culture sometimes sounds plausible because of the tacit assumption that we must somehow make knowledge workers "altruistic" before they will share and transfer, and that this in turn requires a fundamental change in behavioral culture. But the idea that we must make knowledge workers unusually altruistic to get them to share and transfer knowledge ignores the many examples of social systems and organizations in which collaboration is based on normal motivations including self-interest.

I believe that the problems besetting KM are not, primarily, cultural problems in the historical, behavioral, normative, or mental senses of the term discussed earlier (the only possibilities that apply). Instead, they are problems of structural organization and change that can be managed by political means. Structural changes can align individual motivational/incentive systems, whether of individual or cultural origin, with organizational incentive systems to affect behavioral changes without cultural change. In fact, in social systems, behavioral and structural changes frequently precede and cause cultural changes.

What is Culture and How Does it Fit with Other Factors Influencing Behavior?

As you can see from the above brief survey, there is great diversity in definitions of "culture." Is there a definition more or less consistent with previous usage and also useful for KM? I will propose such a definition below and discuss its implications for the role of culture in KM.

It will help in defining culture if we begin by noting that for every group and for the organization as a whole, we can distinguish analytical properties, structural properties, and global properties. These distinctions were originally introduced by Paul Lazarsfeld in the 1950s [37], and later used by Terhune [38] in a comprehensive review of the National Character literature. Analytical properties are derived by aggregating them from data describing the members of a collective (a group or a system). Examples of analytical attributes include:

- GNP
- GNP Per Capita
- Per Capita Income
- Average Salary
- Total Sales
- Sales per Sales Rep.
- Number of Accumulated Vacation Days
- Number of Lost Work Days Due to Injury

Structural properties are derived by performing some operation on data describing relations of each member of a collective to some or all of the others. Examples of structural properties are:

- Extent of inequality of training
- Extent of inequality of knowledge base distribution
- Extent of inequality of knowledge access resource distribution
- Extent of inequality of knowledge dissemination capability
- Extent of inequality of power
- Intensity of Conflict Behavior
- Intensity of Cooperative Behavior

- Ratio of e-Messages Sent to e-Messages Received by an agent

Lastly, global properties are based on information about the collective that is not derived from information about its members. Instead, such properties are produced by the group or system process they characterize, and, in that sense, they may be said to "emerge" from it, or from the series of interactions constituting it. Examples of emergent global attributes include:

- Value Orientations (reflected in social artifacts) [39] [40]
  - Achievement Orientation
  - Self-realization Orientation
  - Power Orientation
  - Mastery over Nature
  - Lineality (preference for a hierarchical style in social organization)
- Extent of democratic organization of the Knowledge Life Cycle
- Innovation Propensity (The predisposition of an organization to innovate)

The classification of social system properties into analytical, structural, and global attributes is exhaustive. To define culture let's first ask whether we should define it as an analytical, structural, or global attribute of some combination? Culture, first, is not an analytical attribute. Culture is not an arithmetical aggregation of survey results or individual man-made characteristics. It is not the percent of knowledge workers who trust their fellows, believe in systems thinking, believe in critical thinking, or are favorably disposed toward knowledge sharing. Why not? Because (a) culture influences behavior, statistical artifacts don't. And (b) the above attributes are social psychological, not cultural.

Second, culture also should not be defined as a set of structural attributes derived from relations among individual level attributes. Why not? Because "culture" refers to something comprehensive and regulative that accounts for and determines structure and also because if we define culture as structural in character we are assuming that we can model the structural relations defining it. Do we want to assume that, or do we want to assume that culture is global in character and emergent, or some combination of the three types of attributes?

Third, the alternative of culture as a combination of attribute types may at first seem attractive, but the following considerations argue against it. (A) The character of analytical attributes as arithmetic aggregations of individual level properties is not changed by defining a construct that includes such attributes with structural and global ones. (B) Analytical attributes still are not reflective of process or system-level attributes that are regulative or comprehensive. At best they are indicators of conditions caused by structural and global level attributes and are not causal in themselves.

As for culture being a combination of structural and emergent attributes, my objection to this view lies in how I think we want to use "culture." If we want to use it as an explainer or predictor of structural patterns, it is ill-advised to confound structure with culture, that is, to confound the "form" of a social system or organization, with its predispositions or "spirit." In other words, defining culture as a global attribute rather than as a combination of global and structural attributes appears most consistent with previous usage, and also our strategic need to use "culture" as a tool to account for "structure" in our models.

If culture is a global attribute of agents, we still must decide what kind of global attribute it is. The world1/world 2/world 3 distinction of Popper's is also important here. A key characteristic of all three types of culture is that each is man-made (or generalizing this concept, made by an intelligent agent). World 1 artifacts are material products. World 2 culture I will call subjective culture [41]. And world 3 culture I will call objective culture.

The subjective culture of a group or organizational agent is the agent's characteristic set of emergent pre-dispositions to perceive its environment. It includes group or organizational level value orientations and attitudes and the relations among them. It is a configuration of global attributes that emerges from group interactions -- that is, from the organization and pattern of transactions among the agents within a group.

The objective culture of a group or organizational agent is the agent's characteristic stock of emergent problems, models, theories, artistic creations, language, programs, stories, etc. reflected in its documents, books, art galleries, information systems, dictionaries, and other containers. It is a configuration of global attributes expressing the content of its information, knowledge, art, and music, apart from the predispositions the group or its agents may have toward this content. The objective culture of an organization is an aspect of the social ecology of its group agents, the cumulated effects of previous group interactions. As such, the perception of it by group agents (part of their subjective culture or psychology depending on the type of agent) influences their behavior.

Subjective culture affects behavior in groups or organizations at two levels:

- It affects agents at the decision making level of interaction immediately below the level of the cultural group by predisposing these agents toward behavior;
- It affects the behavior of the group itself by predisposing it toward behavior.

The context of objective culture in social ecology and its relationship to interaction within a group or organization is illustrated in Figure Three. The focus of the illustration is the decision making agent at the bottom left.

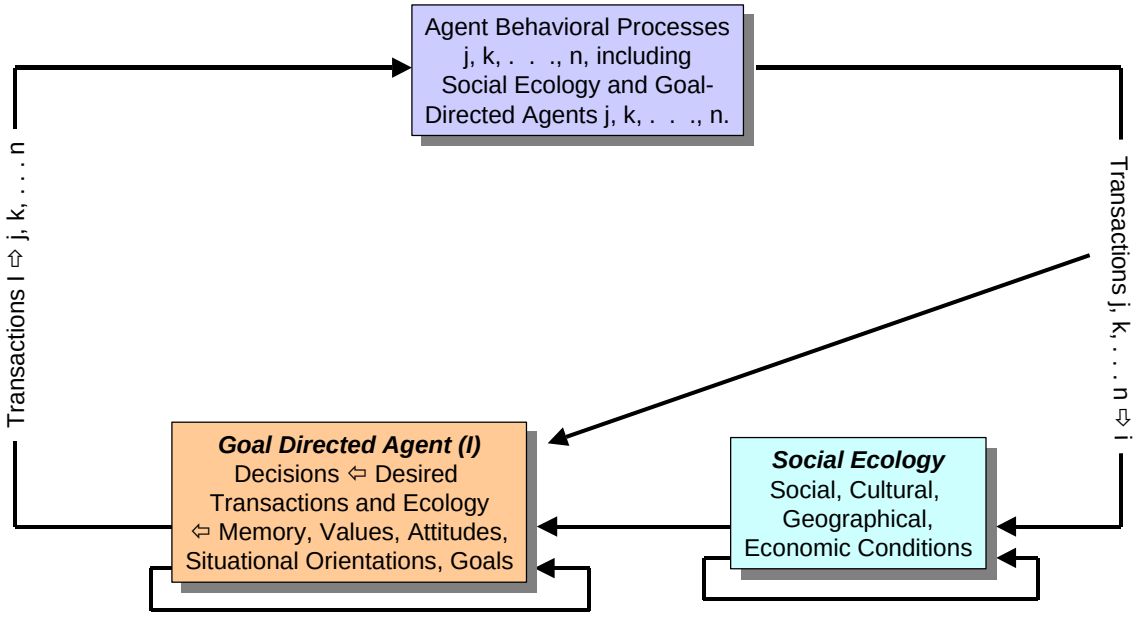

Figure Three -- Interaction within a Group or Organization

The agent may be an individual agent, or a group level agent depending on context.

Looking at the right hand side of Figure Three, transaction inputs received from other agents, and previous social ecology (the feedback loop on social ecology), determine the current social ecology (including objective culture) affecting an agent's decision. Next, transactions, social ecology, and previous decisions (goal-striving outcome feedback loop) are viewed as "impacting" on the goal-directed typical agent, whose internal process then produces decisions which result in transaction outputs from agent (i) directed toward other agents j, k . . . , n. These transaction outputs are inputs into the decision processes of these other agents. The interaction within and among agents j, k . . . , n, finally, produces transactions directed at agent (i) at a later time, and thereby closes the loop.

What goes on inside the goal-directed agent (i)? So long as (i) is a group level agent and its components are also groups, then the interaction process may be viewed in the same way as in Figure Three, ***but specified at a lower level***. But if one either eventually runs out of group level agents and arrives at the level of individuals; or alternatively, decides to ***move from a transactional to a***

motivational perspective on a group level agent (i), then the conception is somewhat different.

Figure Four presents a decision making process in a pre-behavior situation. Here the pre-behavior situation is filtered through the decision-making system of a given individual, or a group level agent, specifically through value orientations and through attitudes existing at increasingly domain specific levels of abstraction. This interaction between the external world and the agent's predispositonal reality screens produces a discrete situational orientation, a ***"definition of the situation,"*** which in turn feeds back to the predispositional levels in search of choice guidance. This guidance then determines the final situational orientation, which leads to behavior and to new feedbacks to the situational orientation, and to attitude and value orientation predispositions.

The predispositions in Figure Four represent psychological attributes when the agent involved is an individual, but when the agent is a group, ***these are the group's characteristic set of emergent pre-dispositions to perceive its environment, including group level value orientations and attitudes and the relations among them. That is, these predispositions are group subjective culture.***

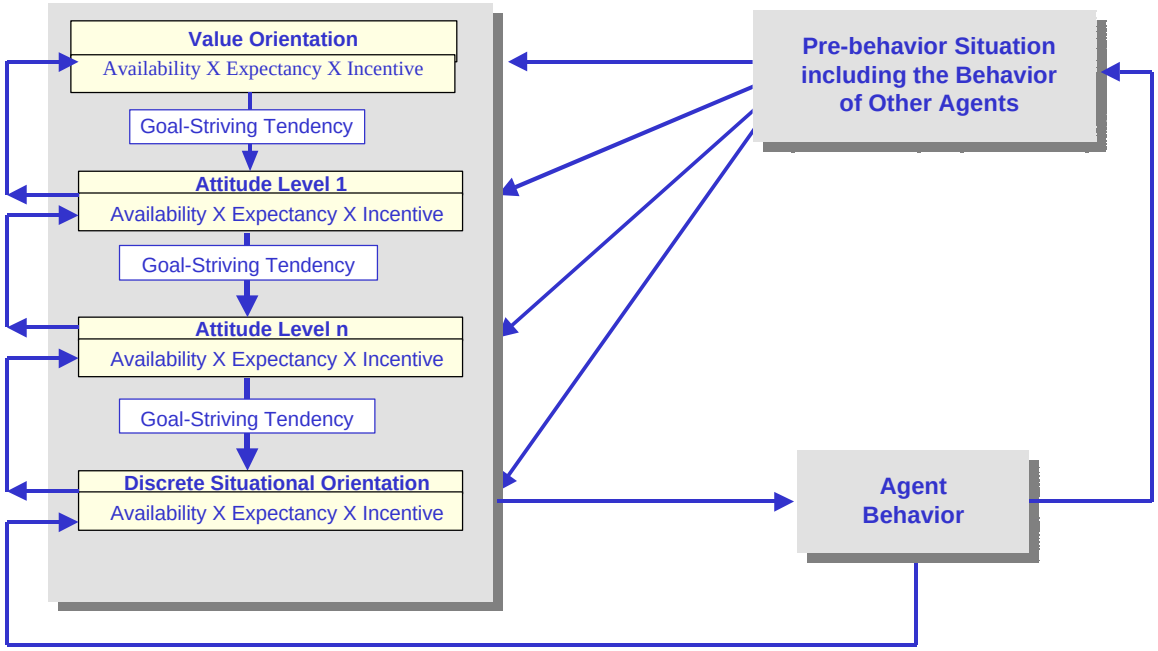

Figure Four -- Decision Making Process in a Pre-behavior Situation

Based on this account of culture a number of conclusions are immediately suggested.

- First, there is an organizational objective culture that is part of the social ecology of every group and individual in the organization and therefore is a factor in the decision making of agents at every level of corporate interaction. This objective culture is shared. Not in the sense that all agree with what it says or assent to it. Indeed, it may be contradictory in many ways. But it is shared in the sense that all members of the group have access to this objective culture.

- Second, each group level agent, each team, each community of practice, each formal organizational group, each informal group, all have group subjective cultures that predispose their decision making. So behavior of group agents is influenced both by their internal subjective and objective cultures and by objective organizational culture.

- Third, the most pervasive, but also the weakest subjective cultural predispositions in intensity are those most far removed from situational stimuli. These are the most abstract value orientations and attitudinal predispositions in the hierarchy of Figure Four.

- Fourth, though value orientations and high-level attitudes are both the most pervasive and the weakest influences on immediate behavior, they are also the hardest predispositions to change in a short time. This is true because they form and are maintained as a result of reinforcement from behavior patterns in diverse concrete situations experienced by agents in the group or organization. The most abstract patterns of any subjective culture are self-reinforcing through time. To change them one needs to break down the structure of self-reinforcement and the integration of the many subsidiary patterns supporting this structure.

How Does Culture Relate to KM?

As I have argued earlier, we can distinguish KM processes, and knowledge processes. And knowledge processes may be viewed in terms of the knowledge life cycle framework. These processes produce knowledge that is used in the other business processes of the enterprise. And these, in turn, produce outcomes. Figure Five illustrates this pattern.

Moreover, KM processes, knowledge processes and business processes are performed by decision making, behaving, agents. As we have seen, agents, if they are groups, have an internal culture, both subjective and objective. At the same time the objective cultural component of social ecology also impacts agent decisions**.** Finally, knowledge and KM processes are affected by culture through the influence it has on behavior constituting these processes.

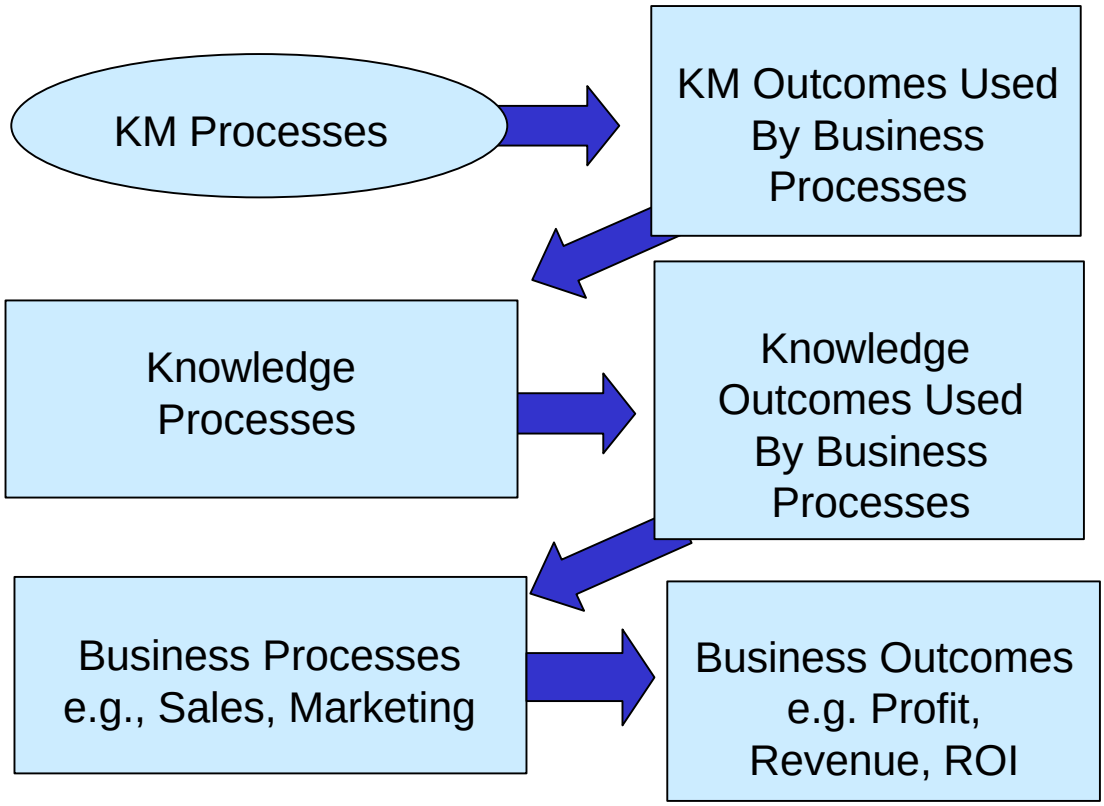

Figure Five -- KM, Knowledge Processes, Business Processes, and Outcomes

In turn, these processes are keys to producing culture. So culture is pervasive in KM. But many other factors (social ecology, situational factors, transactional inputs, See Figure Three), also contribute to the complex interactions associated with it. So culture is only a small part of all there is to KM, or any other business process, and therefore there remain substantial problems in measuring and analyzing its precise impact.

Conclusion

Knowledge Management is an exciting, vibrant field of practice. Full of challenges and surprises. Full of cross-disciplinary applications and the need for innovation. But it is also a field struggling to find its foundations in a sea of communications, demands, and conflicting interests, not all of which are consistent with the need to found a productive discipline based in both theory and practice. In this paper, I have examined a number of key issues in KM.

I selected these issues based on their centrality to the need to build sound conceptual foundations for KM, the controversy surrounding them, the confusion

besetting them, and their importance in illustrating how far off the mark much of what passes for theory in KM is today. The connecting thread in my discussion of the various issues is the inadequacy of KM theory and conceptualization. I hope I have shown that only a much more rigorous approach to discussion of these key issues can possibly result in progress in KM.

If we proceed on the present course of loose talking and loose thinking about basic issues, there will never be cumulation in our knowledge about KM and knowledge processing. There will never be improvement in KM practice. There will never be improvement in KM solutions. There will never be proof that KM solutions actually benefit the enterprise, and ultimately there will be movement away from KM as a source of useful solutions for the enterprise. KM will fail, and it will have deserved to fail.

And this will be a great shame. Because for the first time in the history of man's experience with formal organizations, there is systematic pursuit of the idea that knowledge is the key to performance. As such, its production and integration in the enterprise deserves the same attention as we provide to production of other vital assets. This realization is a real step forward in organizational development. It would be a shame if it were wasted by confused approaches resulting in a loss off faith in this promising idea.

References

[1] Mark McElroy, "The Second Generation of KM," Knowledge Management (October, 1999), Pp. 86-88, also available at www.macroinnovation.com

[2] Joseph M. Firestone, "Accelerated Innovation and KM Impact," Financial Knowledge Management, 1, no. 1 (1999), 54-60, also available at http://www.dkms.com.

[3] Joseph M. Firestone, "Knowledge Management: A Framework for Analysis and Measurement," White Paper Prepared for Executive Information Systems, Inc., Wilmington, DE, October, 2000, available at: http://www.dkms.com/White_Papers.htm.:

[4] W. T. Jones, A History of Western Philosophy (New York, NY: Harcourt, Brace and World, 1952)

[5] Alan H. Goldman, Empirical Knowledge (Berkeley, CA: University of California, 1991)

[6] Ikujiro Nonaka and Hirotaka Takeuchi. The Knowledge Creating Company (New York, NY: Oxford University Press, 1995).

[7] Bruce Aune, Rationalism, Empiricism, and Pragmatism (New York: Random House, 1970)

[8] William James, Pragmatism (New York: Longmans, 1907)

[9] Verna Allee, The Knowledge Evolution: Expanding Organizational Intelligence (Boston, MA: Butterworth-Heinemann, 1997).

[10] Alex Bennet, and David Bennet, "Characterizing the Next Generation Knowledge Organization" Knowledge and Innovation: Journal of the KMCI, 1, no.1 (2000), 8-42.

[11] Karl Wiig in Yogesh Malhotra's compilation at www.brint.com

[12] Steve Cavaleri and Fred Reed, "Designing Knowledge Generating Processes", Knowledge and Innovation: Journal of the KMCI, 1, no. 1, (2000), 109-131.

[13] Ralph D. Stacey, Complexity and Creativity in Organizations (San Francisco, CA: Berrett-Koehler Publishers, 1996).

[14] Chris Argyris, Knowledge for Action (San Francisco, CA: Jossey-Bass, 1993)

[[15] Karl R. Popper, Objective Knowledge (London, England: Oxford University Press, 1972)

[16] Karl R. Popper and John Eccles, The Self and Its Brain (Berlin, Germany: Springer, 1977).

[17] Karl R. Popper, Knowledge and the Body-Mind Problem (London, UK: Routledge, 1994)

[18] Michael Polanyi, Personal Knowledge (Chicago, IL: University of Chicago Press, 1958).

[19] Michael Polanyi, The Tacit Dimension (London, UK: Routledge and Jegan Paul, 1966).

[20] Gene Bellinger, "Data, Information, Knowledge and Wisdom" at http://www.radix.net/~crbnblu/musings/kmgmt/kmgmt.htm

[21] Stephen Beller, "The DIKUW Model," National Health Data Systems, April, 2001, available at www.nhds.com/toc.htm.

[22] Arthur Murray, “Knowledge Systems Research”. Knowledge and Innovation: Journal of the KMCI, 1, no. 1, (2000), 68-84.

[23] Ramon Barquin, "From Bits and Bytes to Knowledge Management," January - February, 2000, www.e-gov.com. also available at: www.barquin.com.

[24] Claude E. Shannon, "A Mathematical Theory of Communication, Bell System Technical Journal, 27 (1948) 379-423, 623-656.

[25] Yogesh Malhotra's compilation at www.brint.com

[26] Mark W. McElroy, “The New Knowledge Management”, Knowledge and Innovation: Journal of the KMCI, 1, no. 1 (2000), 43-67.

[27] Joseph M. Firestone, “Enterprise knowledge Portals: What They Are and What They Do”, Journal of Knowledge and Innovation, Vol. 1, No. 1 (October 2000), 85-108.

[28] Steven Cavaleri and Fred Reed, "Organizational Inquiry: The Search for Effective Knowledge," Knowledge and Innovation: Journal of the KMCI, 1, no. 3 (April 2001), .

[29] Jay J. Karlin and Robin Holland, "Knowledge Management and Organizational Belief Systems: Are They Compatible Knowledge and Innovation: Journal of the KMCI, 1, no. 3 (April 2001), .

[30] Henry Mintzberg, "A New Look at the Chief Executive's Job," Organizational Dynamics," (AMACOM, Winter, 1973).

[31] Joseph M. Firestone, "Enterprise Knowledge Management Modeling and Distributed Knowledge Management Systems," available at http://www.dkms.com/White_Papers.htm.

[32] John H. Holland. Hidden Order (Reading, Mass.: Addison-Wesley, 1995).

[33] John H. Holland, Emergence (Reading, Mass.: Addison-Wesley, 1998).

[34] Stuart Kauffman, At Home in the Universe (New York, NY: Oxford University Press, 1995)

[35] John H. Bodley, "What is Culture," available at: http://www.wsu.edu:8001/vcwsu/commons/topics/culture/culture-definitions/bodley-text.html.

[36] Alfred L. Kroeber and Clyde Kluckhohn, "Culture: A Critical Review of Concepts and Definitions," Papers of the Peabody Museum of American Archaeology and Ethnology, 47, (1), (1952).

[37] Paul F. Lazarsfeld and Herbert Menzel, "On the Relation Between Individual and Collective Properties," in Amitai Etzioni (ed.), Complex Organizations (New York, NY: Holt, Rinehart and Winston, 1961).

[38] Kenneth W. Terhune, "From National Character to National Behavior: A Reformulation," Journal of Conflict Resolution, 14 (1970), 203-263.

[39] Florence Kluckhohn and Fred Strodtbeck, Variations in Value Orientations (New York, NY: Harper and Row, 1961)

[40] Joseph M. Firestone, "The Development of Social Indicators from Content Analysis of Social Documents, " Policy Sciences, 3 (1972), 249-263.

[41] Harry C. Triandis, et.al., The Analysis of Subjective Culture (New York, NY: Wiley, 1972).

Biography

Joseph M. Firestone, Ph.D. is Vice-President and Chief Knowledge Officer of Executive Information Systems (EIS), Inc. Joe has varied experience in consulting, management, information technology, decision support, and social systems analysis. Currently, he focuses on product, methodology, architecture, and solutions development in enterprise Information and knowledge portals. He also performs knowledge and knowledge management audits, training, and facilitative systems planning, requirements capture, analysis, and design. Joe was the first to define and specify the Enterprise Knowledge Portal Concept. He is widely published in the areas of Decision Support (especially Enterprise Information and Knowledge Portals, Data Warehouses/Data Marts, and Data Mining), and Knowledge Management, and has written a full-length industry report entitled "Approaching Enterprise Information Portals."

Joe is a founding member of the Knowledge Management Consortium International (KMCI), Its Secretary, a member of its Executive Committee, of the Governing Council of the KMCI Institute, the Director of the KMCI Research Center, the Director of the Certified Knowledge and Innovation Manager (CKIM) Program and the Editor-in-Chief of the new journal "Knowledge and Innovation: Journal of the KMCI." Joe is a frequent speaker at national conferences on KM and Portals. He is also developer of the web site www.dkms.com, one of the most widely visited web sites in the Portal and KM fields. DKMS.com has now reached a visitation rate of 125,000 visits, and 950,000 accesses annually.