

6th Generation Knowledge Management: Realizing the Vision in Working Knowledge

Owen Ambur, University of Maryland University College, July 20, 1999

Prefacing his *Knowledge Management Handbook*, Liebowitz (1999) poses the rhetorical question "Knowledge Management: Fact or Fiction?" No doubt, since he and so many others are now focusing on KM, there must be something to it. Answering his own question, he notes that the idea is not really new but that the current "... craze ... [aims] to harness the intellectual capital, especially the human capital [of] organizations." However, the fact that Liebowitz leads with such a question highlights the fuzziness of the concept. Clarity is lacking, even in the minds of learned scholars, whose various definitions of "knowledge" include⁽¹⁾:

... organized information applicable to problem solving. - Woolf

... information that has been organized and analyzed to make it understandable and applicable to problem solving or decision making. - Turban

... truths and beliefs, perspectives and concepts, judgments and expectations, methodologies and know-how. - Wiig

... sets of insights, experiences, and procedures that are considered correct and true and therefore guide the thoughts, behaviors, and communications of people. - van der Spek & Spijkervet

... reasoning about information and data to actively enable performance, problem-solving, decision-making, learning, and teaching. - Beckman

In *Working Knowledge*, Davenport and Prusak (1998) disclaim the ability to provide a definitive account since "epistemologists spend their lives trying to understand what it means to know something." However, they offer a "working definition" that characterizes the value of knowledge as well as what makes it difficult to manage:

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

They highlight that "values and belief are integral to knowledge, determining in large part what the knower sees, absorbs, and concludes from his observations" and that people "see" different things based upon their values. (p. 12) That suggests that knowledge is not necessarily based in objective reality, and while that may certainly be true in the sense of reality in popular culture,

those grounded in the scientific method may have a problem accepting such a relativistic definition of knowledge. The KM paradox harkens back to the debate in the social sciences as to whether research is, should be, or can ever be value-free.

Many in our society value diversity and, at least in nature, there can be little doubt that diversity is a strength in the survival of ecosystems. On the other hand, others are far less comfortable with differences in our own society, and many nations and cultures decidedly do not share our openness to freedom of expression of religious, sexual, and other preferences. The problem with including values and beliefs within the definition of "knowledge" is that doing puts us firmly on a slippery slope toward meaninglessness - where superstition, rumor, and innuendo are considered to be on par with more objective, verifiable, and repeatable evidence. That is not to question the accuracy of Davenport and Prusak's "working definition" as a reflection of current reality, but it does suggest second thought in terms of whether it reflects a desirable vision toward which we should strive - in our organizations or in our society at large, within the context of an ever shrinking world in the cyberage.

In any event, for better or worse and fuzziness aside, *knowledge* clearly has something to do with organization, methodology, and guidance that establishes the potential for effective action by people, individually and collectively. In turn, *knowledge management* has been variously defined as⁽²⁾:

... the systematic, explicit, and deliberate building, renewal, and application of knowledge
... - Wiig

... the process of capturing a company's collective expertise wherever it resides ... and distributing it to wherever it can help produce the biggest payoff. - Hibbard

... getting the right knowledge to the right people at the right time so they can make the best decision. - Petrash

... systematic approaches to find, understand, and use knowledge to create value. - O'Dell

... explicit control and management of knowledge within an organization aimed at achieving the company's objectives. - van der Spek

... the formalization of and access to experience, knowledge, and expertise that create new capabilities, enable superior performance, encourage innovation, and enhance customer value. - Beckman

Addressing *The Psychology of Everyday Things*, Norman (1988) noted that knowledge may reside in two places - in the heads of people and/or in the world. Concerning the need for precision in order to achieve effective action, he observed (pp. 54 & 55):

It is easy to show the faulty nature of human knowledge and memory... [For example] when professional typists were given caps for typewriter keys, they could not arrange them in proper configuration... [Yet] all those typists could type rapidly and accurately.

Why the apparent discrepancy between the precision of behavior and the imprecision of knowledge? Because not all of the knowledge required for precise behavior has to be in the head. It can be distributed - partly in the head, partly in the world, and partly in the constraints of the world. Precise behavior can emerge from imprecise knowledge for four reasons:

1. *Information is in the world.* Much of the information a person needs to do a task can reside in the world. Behavior is determined by combining the information in memory (in the head) with that in the world.
2. *Great precision is not required.* Precision, accuracy, and completeness of knowledge are seldom required. Perfect behavior will result if the knowledge describes the information or behavior sufficiently to distinguish the correct choice from all others.
3. *Natural constraints are present.* The world restricts the allowed behavior. The physical properties of objects constrain possible operations: the order in which parts can go together and the ways in which an object can be moved, picked up, or otherwise manipulated. Each object has physical features ... that limit its relationships to other objects, operations that can be performed on it, what can be attached to it, and so on.
4. *Cultural constraints are present.* In addition to natural, physical constraints, society has evolved numerous artificial conventions that govern acceptable social behavior. These cultural conventions have to be learned, but once learned they apply to a wide variety of circumstances.

Norman pointed out that natural and artificial constraints reduce the number of alternatives in any particular situation and, thus, the amount and specificity of knowledge required within human memory. He posited "Seven Principles for Transforming Difficult Tasks into Simple Ones" (pp. 188 & 189):

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the gulfs of Execution and Evaluation.
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize...

In his treatise written in 1988, Norman remarked: "Standardization is simply another aspect of cultural constraints... Today's computers are still poorly designed, at least from the user's point of view... the technology is still very primitive ... and there is no standardization... When we have standardization ... suddenly we will have a major breakthrough in usability."⁽³⁾ (p. 202) With reference not only to the usability but also the *utility* of information technology, Davenport (1997) makes the following observations:

Our fascination with technology has made us forget the key purpose of information: to inform people... Information and knowledge are quintessentially human creations, and we will never be good at managing them unless we give people a primary role. (p. 3)

... most managers ... who don't want to get involved in the IT "function" ... have relied on the machine-engineering model far beyond its ability to add value. (p. 4)

Despite twenty years of attempts to control information by creating an "architecture" of what is needed by whom and how they might receive it, the centralized engineering approaches ... have often neither informed nor improved our discussions about information needs. (p. 6)

... virtually no one feels their company has a well-managed information environment... For years, people have referred to data and "information"; now they have to resort to the high-minded "knowledge" to discuss information - hence, the current boom in "knowledge management." (p. 8)

... *data* [can be defined] as "observations of states of the world" ... Peter Drucker has eloquently defined *information* as "data endowed with relevance and purpose." ... People turn data into information, and that's what makes life difficult for information managers... *Knowledge* is information with the most value and is consequently the hardest form to manage. It is valuable precisely because somebody has given the information context, meaning, a particular interpretation. (p. 9)

Knowledge *can* be embedded in machines, but it's tough to categorize and retrieve effectively... Ideas can be distributed in the form of text, photos, and graphics, or as audio and video recordings. An idea may constitute one page or an entire book. It may be on paper, film, or computer. (p. 10)

However, in order to have significant value an *idea* - much less a more fully developed kernel of *knowledge* - must be **recorded**. That is, it must be made explicit - at least as a "record." if not as a design principle embedded in a working product. To be efficiently "distributed" and used, knowledge **must** be effectively documented, categorized, and managed as a record. That may be tough to do, but it is in fact **doable**. As oft said, when the going gets tough, the tough get going ... while others merely talk, which is to say bemoan or complain, and/or withdraw from the field of battle. As Davenport and Prusak point out: "The aim of codification is to put organizational knowledge into a form that makes it accessible to those who need it... Knowledge managers and users can categorize knowledge, describe it, map and model it, stimulate it, and embed it in rules and recipes." (p. 68)

Liebowitz (pp. 1-3 & 1-4) identifies the following **dimensions** of knowledge:

- Storage Media
 - Human Mind
 - Organization
 - Document
 - Computer
- Accessibility
 - Tacit
 - Implicit

- Explicit

He notes that accessibility can be mapped to storage media, and that knowledge gains value as it becomes more accessible and formal, as follows:

Tacit (human mind, organization) - accessible indirectly only with difficulty through knowledge elicitation and observation of behavior

Implicit (human mind, organization) - accessible through querying and discussion, but informal knowledge must first be located and then communicated

Explicit (document, computer) - readily accessible, as well as documented into formal knowledge sources that are often well-organized

However, in reality, more often than not, even formal knowledge is ill-organized and inaccessible *within* organizations, much less *among* their partners and customers in the supply chain. Sadly, that is true even though implicit in the notion of "knowledge management" is the fact that knowledge must be shared among individuals working toward a common objective.⁽⁴⁾ And that means procedures and systems must be formalized in a fashion that is common to the workgroup.

Lacking a classification system, together with an information system in which records can readily be accessed exactly when and where needed, exhortations about the need for more "communication" are essentially a prescription for worsening the problems of misinformation, disinformation, and information overload.⁽⁵⁾ Communication without classification inevitably increases the "noise-to-signal" ratio.

"Noise" is already bad enough when it is conveyed face-to-face, synchronously, by word of mouth. At best, it constitutes unproven hypotheses and uninformed questioning. Worse, in many instances it is best characterized as superstition, rumor, innuendo. When automation is applied to increase such "communications" asynchronously to 24 X 7 X 365, the problem is more than irritating; it becomes intolerable. It confuses individuals, paralyzes systems, and can cripple organizations.⁽⁶⁾ As Liebowitz (p. iv) says, "Many organizations are drowning in information but starving for knowledge." Davenport suggests:

[The information ecology] approach puts humans back at the center of the information world, banishing technology to its rightful place on the periphery. It places primary emphasis not on generation and distribution of reams of information, but rather on the effective use of a relatively smaller amount... In short, ecological approaches to information management are more modest, behavioral, and practical than the grand designs of information architecture and machine engineering.⁽⁷⁾ (p. 11)

That is a nice thought and it is certainly worthy of some amount of effort to shape the culture of our companies and communities, including the world wide community of the Net. However, it should be noted that technology is an important driver of cultural change, and getting the technology right may be one of the most important ways to facilitate cultural improvement.

Indeed, as Davenport says: "It's a business truism that firms must achieve some level of 'fit' or congruence with their external environments - a truism that applies to a company's information environment as much as to anything else." (p. 193)

Davenport and Prusak expand on that thought by observing that many firms have recently "... come to understand that they require more than a casual (and even unconscious) approach to corporate knowledge." Whereas traditional economics view the firm as a black box, they say the new understanding "... accords with a renewed emphasis among strategists and economists on ... a competency-based or resource-based theory of the firm." They note that theorists are now attending to the dynamics within the box, most particularly "the knowledge embedded in the routines and practices that the firm transforms into valuable products and services." (p. ix) They suggest that disappointment with theories and fads has led firms to look for "something more basic ... irreducible and vital to performance, productivity, and innovation." And they say that search has resulted in the realization that "what an organization and its employees *know* is at the heart of how the organization functions." (p. x)

However, almost all of the managers they interviewed admitted to being clueless as to how to manage "value-added information and knowledge" in their companies. Nor did they have any effective methods for "managing and understanding how to better use information themselves." That is true even though "... much of the knowledge they needed already existed within their organizations but was not accessible or available when required." (p. xii) Davenport and Prusak assert:

A company truly is a collection of people organized to produce something ... The material assets of the firm are of limited worth unless people know what to do with them.⁽⁸⁾ If "knowing how to do things" defines what a firm is, then knowledge actually *is* the company in an important sense. (p. xiii)

In support of the case for the next generation of management philosophy, Peters (in Savage, p. xii) takes a slightly different emphasis:

Our companies are no longer just in the one-at-a-time transaction business; more often they are co-creators along with other members of the "value cluster." We call this mass customization, and the trick is that we do not just customize *for*, but *with* our customers to meet the aspirations of *their* customers.

Building on that theme in his book entitled *5th Generation Management*, Savage begins with the assertion that: "... our steep hierarchies, the legacy of the industrial era, are incapable of effectively absorbing and using the computer and networking technology ..." (p xvii) No doubt, a combination of factors, including streamlining of hierarchies, are at the root of our present prosperity. However, Federal Reserve Board Chairman Greenspan has recently suggested that technology may be a primary cause of the unprecedented length and depth of the economic expansion. Even so, the worldwide gap between performance and potential remains vast, as Savage observes:

Preliminary studies done around the world indicate that we are leveraging from five to fifteen percent of our knowledge potential in organizations... We can tell how effectively we are turning our inventory, but we hardly have a clue as to how well or poorly we turn our knowledge. (p. xxi)

Savage cites the following factors contributing to the deficiencies and offering the prospect for enhancements in productivity and success in competitive markets:

- The hierarchical organizational chart is based on narrowly defined rectangular "job" boxes knitted together with thin horizontal and vertical lines." (p. 10)
- ... we can move beyond just looking at transactions, and instead learn to discover the patterns in our customers' aspirations. (p. 18)
- ... we could talk about "customer empowerment ..." ⁽⁹⁾ (p. 21)
- ... when we start to look at customer aspirations, then we need to think more about capabilities and competencies. (p. 21)
- ... in HR we have always just looked at our own people and our jobs... But if we're going [to look] at ways to strengthen our customers' capabilities ... we're going to need another model... just having competencies doesn't do anything for us, unless we can organize them. (pp. 22 & 23)
- We need the discipline of quality dialogues among ... our different functions, and ... with our suppliers and customers... We need to tap people's learning, their experiences, their thoughts and feelings, and their knowledge and aspirations in new ways. ⁽¹⁰⁾ (p. 24)
- ... we might see better through our ears than our eyes ... By careful listening, we see possibilities that we can develop into concrete products and services ... sales and marketing [are turned] upside down ... We can listen for ... aspirations ... spot capabilities [and] begin to generate value at the overlaps [with our customers, their customers, and our suppliers] ... (p. 28)
- ... the quality of the interaction ... is as important as the quality of our internal products and processes ... our challenge is to discover patterns ... what the opportunities are and how they fit together ... Instead of being a value chain, it is a "valuing cluster" ... (p. 30)
- ... requires openness to the truth and willingness to trust ... Respect for the truth and a trusting culture are absolutely essential to be effective ... ⁽¹¹⁾ (p. 31)
- We ... need skill in dynamically teaming capabilities across companies. ⁽¹²⁾ (p. 33)
- ... it is not just our individual talents, but how we knit these talents together that gives us our core competencies. (p. 41)

There is strength in numbers. United we stand; divided we fall. These are truisms. Organizations, including governments, are formalized to do for individuals what they cannot do for themselves. However, with respect to such formalisms and the assumptions that are implicit within them, Savage notes:

... it [is] easy to fall into the "either/or" trap [but] we [should shift] to thinking in terms of "both/and." (p. 34)

Things are moving too swiftly to be able to predefine everything. The only way is to allow the organization to define itself as we go. (p. 46)

Many people are uncomfortable with rapid change. The desire for stability and predictability is not only understandable but, in large measure, it is a requisite for life. Moreover, the tendency to view others in terms of us-versus-them and me-against the world may be embedded in our genes, based upon eons of the evolutionary dynamics of survival in the nature. However, the happy predicament facing us in the virtual world of the information age is that we now have the ability as a society and a life form (human beings) to break the linkage between survival and being able to "predefine everything," i.e., to **know** in advance everything that is necessary for life.

Paradoxically, though, the freedom that we as individuals now enjoy in the so-called "industrialized" nations is dependent upon the **explicit** knowledge built into our **organizations** and our **tools**, including not only our industries and information systems but also our governments, educational institutions, and voluntary associations.

"Continuous improvement" is not just a slogan for practitioners of Total Quality Management (TQM); it is a fact of life. At least it is for business enterprises in a competitive marketplace ... if not necessarily for individuals and government agencies, to whom neither the forces of nature nor the marketplace may directly apply. On the other hand, the wonders of modern communications - which contribute so greatly to our prosperity - will not permit us to forget that much of the world's population still ekes out an existence in areas where continuous improvement is not yet possible for lack of the necessary cultural, social, educational, and institutional support. Nonetheless, in the happy space and time of human existence in which we find ourselves, Savage cites a propitious paradox and an even more enticing potential:

... the eternal marketer's dilemma: how do we continually adapt to ever-changing customer needs? ... We keep ... looking for customer problems ... it will be so much more exciting to look for aspirations, where we can grow new possibilities together.⁽¹³⁾ (pp. 52 & 53)

... we need to excel not only with transactions-based relationships with our customers, but also through innovative alliances where we can more openly discover one another's capabilities and aspirations.⁽¹⁴⁾ (p. 60)

Work is a process of giving form to something ... "adding value" to raw materials and ... "generating value" through quality interaction ... (p. 64 & 65)

[People and organizations] need to move from a product push to a market pull position ... (p. 71) ... Rather than pushing ... why not go to a Just-in-Time pull system? (p. 259)

Amen! In the information age, to do otherwise is tantamount to giving up control not only of one's precious and limited time on earth but also one's free will. As the capabilities of our technology grow, we should not lose sight of the fact that both our technology as well as our institutions, including our profit-oriented businesses, exist to serve the needs and interests of people - not the reverse. Nor should those who wield our legal and institutional arrangements with particular skill be permitted to use the power of technology to gain undue influence and control over others. Unless we are prepared to renounce our beliefs in liberty, freedom, and democracy, this is more than a matter of monopoly in the marketplace; at some point it becomes

an issue of control of our hearts and minds. That is especially true if our culture accepts Davenport and Prusak's definition of knowledge as including values and beliefs.

Based upon the traditional meaning of the word, it is understandable, acceptable, and even desirable that a lower standard of "evidence" would be applied to beliefs, for two reasons: On one hand, some things - including those that may be most important to many of us, such as belief in a supreme being - are beyond the bounds of human experience and comprehension to prove. Logically speaking, such things must either be rejected or taken on faith. At the other extreme, priorities and economies of human potential dictate against devoting the time and attention to "know" with certainty, based upon detailed understanding of complex material, everything that it is possible to know among the multitude of facts, trivial and significant, discovered and yet to be revealed.

In many and perhaps most cases, it is perfectly reasonable and even preferable to accept some assertions as facts based upon belief in the reliability of the sources, rather than actual understanding or experience with the realities involved. However, if there truly is no difference between what we "believe" and what we "know," the processes and particularly the "promotions" by which our beliefs are "pushed" and shaped should be scrutinized far more closely and critically than they have thus far in human history.

If the process of creating real value is based equally upon personal values and beliefs as upon logic and fact, it is in fact a much different process than the scientific method would allow. No one has ever said that establishing truth is easy, but that is no excuse for lowering the bar on excellence and success. Indeed, as Savage notes:

The truth is often buried in the confluence of a variety of human perceptions. Only through the give-and-take of hard dialogue can it be discovered... the notion of "push-back" [means w]hen someone makes a statement or takes a position, others are expected to push back until the truth of the matter is discovered. (p. 248)

Blurring the lines between fact and belief effectively diminishes the value of each. This is definitely a case of the whole adding up to less than the sum of its parts, an instance of $1 + 1$ adding up to far less than 2. It is not even a zero-sum game. The actual sum is more probably negative. It is precisely the separation of fact from belief that enables and ennobles our spirit and our aspirations ... our visions that extend hopefully far beyond our present realities. It is our ability to distinguish fact from fiction, and to contemplate current reality in the context of that which might come to be, that allows us to dream, to plan, and to work toward a better tomorrow, individually and collectively.

Savage suggests, "Our aspirations are our contribution to the ... future" (p. 226) and "[w]hat really holds us together is our ability to build upon one another's aspirations and visions, our ability to envision collaboratively." (p. 90) Moreover, he asserts:

The quality of the process ... is very much dependent upon our ability to listen to themes being expressed and to respond accordingly. Our work is also dependent upon our ability to envision and actively sort out what we know (knowledging). In other words, our ability

to listen (present), see (future), and remember (past) must play together in the process of work. (pp. 207 & 208)

The product is not an isolated entity but the statement of an effort at a particular point in time. It is, in essence, an invitation to *dialogue*. (p. 209)

Examples of the past flowing with us abound... This information may be well ordered and readily accessible, or it may be ... piled high with the door forced shut... Individuals, like companies, also have information that flows through time ... more or less readily available, depending upon how well it is grasped, categorized, and arranged in memory. (p. 218)

There is a lesson ... Live in the past, the present is too late! ... If we have sorted out and arranged our thoughts and experiences, they can become a resource to help us live more effectively in the present. If we have done a slipshod job, the past can be an anchor weighing us down ... (p. 221)

In order to make the past a resource rather than an anchor, Savage notes that the "... biggest challenge is to manage complexity ... The swirling multiple interrelationships ... both internal and external ... are often more chaotic than orderly." (p. 97)

To the (substantial) degree that tools can help to address the challenge of managing complexity, breaking down needless hierarchical barriers, and bringing some sense of order to chaos, **relational** database management systems (RDBMS) are the appropriate technology to be applied. That may seem obvious, but in this author's experience it is too infrequently noted. Likewise, the fact that SQL (Structured Query Language) is the pertinent standard may be taken as a given, but may not be widely observed as individuals and organizations continue constructing proprietary, anti-customer-focused information silos and stovepipe systems leading inevitably to inefficiency, if not directly to dead ends. Moreover, the accommodation of interrelationships in a worldwide marketplace calls for the use of an international directory standard like X.500.⁽¹⁵⁾

Hoffmann-LaRoche (in Davenport and Prusak, p. 69) asserts: "Relevance is far more important than completeness" and relevance is certainly about interrelationships - among people, information, ideas, and things. However, Hoffman-LaRoche poses a false "either/or" choice of the sort decried by Savage. In fact, the objective should be **both** relevance **and** completeness, and adherence to international standards is not only the best but also the only way to achieve that objective. By definition, any other course leads inevitably to incompatible and incomplete information silos containing only a subset - an outdated as well as incomplete set - of the information "in the world."

Faced with unmanageable complexities, Savage declares: "Finely tuned bureaucracies with carefully defined policies, procedures, and job descriptions will be no match for the marketplace in the next millennium." (p. 98) True, no doubt. However, bureaucracies will be replaced by finely tuned **information systems**, in which two things are very carefully and well defined: a) the attributes and ever-growing and changing capabilities and interests of **individuals**, and b) the

evolving *relationships* among people, organizations, products, services, and other natural and person-made "entities" or "objects."

Indeed, building upon the Internet, a single, logical information system will come to prevail worldwide. Already, Savage observes, "... organic communities on the Internet ... sometimes become communities of practice [and] few reach the community of co-creation." (p. 141) The *technical standards* embodied in the system will empower individuals anywhere to throw off the yolk of oppression of thought and words, if not necessarily deeds.⁽¹⁶⁾ In Savage's words, organizations need to:

... recognize how important it is to define a limited core set of data elements that can be used by all the different functions. [Perhaps] twenty to thirty core elements that cut across the enterprise.⁽¹⁷⁾ (p. 271)

... standardize ... tools and procedures, and ... ask task teams to identify core data elements that can be added to the enterprise data dictionary ... begin by listing all applications and grouping them by function... develop a list of twenty key items ... choose ten key applications and see how [the] terms are defined ... in the context of the application ... (p. 272)

As with the use of a common language, such standardized data elements and application tools will free people to the maximum of their desire and capability to participate in an ever-expanding web of prosperity and knowledge. As the interests of customers, consumers, and citizens of the world come to prevail, neither kings nor dictators nor potentates of proprietary information systems can remain on their exalted perches to command the masses.

However, as Savage remarks: "We can only bring about our desired future if we can sort out our past. The ideas and assumptions of the past ... are largely bankrupt." (p. 98) He suggests: "Networking technology is absolutely essential if we hope to build agile enterprises, but by itself it is not enough. Human knowledge networking is at the core of the integrative process... We need not only teams, but 'teamwork of teams' and 'networks of teams.'"⁽¹⁸⁾ (p. 99) And Savage asserts that we should not expect much help from information technology because:

... artificial intelligence and expert systems have not delivered what some had promised, primarily because rule-based systems have difficulty in capturing the larger context in which activities must be understood. ... the best databases are in people's heads [but] human distrust slows real communication to a snail's pace.⁽¹⁹⁾ (p. 100)

This may be an apt description of the status quo. However, that does not mean that people's "heads" are necessarily the *best* place for "databases" of knowledge to reside.⁽²⁰⁾ In fact, one of the reasons that distrust "slows" real communication is that human memory is both so fallible as well as so malleable. If we can't trust our own memory, who in their right mind would trust anyone else's for anything that is truly important, at least anything that is important in a business sense. Mistrust is not only logical but also a necessary response to the unreliability of "tacit knowledge," much of which has more to do with beliefs and values than with objective realities. In addition, Savage observes:

... executives are facing a whole new set of management challenges: [to] move beyond the ... *fragmentation* of industrial-era companies ... maintain *accountability* in flat, dynamic network organizations ... support *focusing* and *coordination* of multiple cross-functional task teams [and] build into the ... organization the capacity for *continual learning* and *quick market responsiveness* ... (p. 101)

Yet he notes that many organizations are ill-equipped to meet the challenge because "... in steep hierarchies, task teams often remain invisible to those who are not involved." (p. 272) Another problem is that "... learning is often impeded because we are afraid that if we give away our good ideas, someone else may get credit for them... many project teams fail to retain their knowledge as they proceed through the project... much of what they have learned evaporates ..." (p. 274)

On the other hand, he suggests: "... teams should be responsible for defining their goals, purpose, and mission - together with their project plan - in a shareable database." (p. 273) And he notes: "... if visibility and accountability are built into the system, [inefficiencies self-imposed by workers] are no longer problems. (p. 276) " As Savage puts it:

One of the challenges of the knowledge era is to capture individual and team learning on a continuing basis, making it available to others in the enterprise. Much learning remains at the tacit level, and it often takes concerted effort to make [it] explicit and accessible to others. "Time-to-learn" is as critical as "time-to-market." (p. 102)

Beckman (in Liebowitz, p. 1-6) points out:

Learning from experience is more vivid, but not very efficient. There is also a human tendency to overgeneralize from one or several experiences. When available, it may be preferable to learn from experts, books, and training. Learning from the experience and mistakes of others is often more effective. ⁽²¹⁾

Beckman's points are well taken. Savage and others wax poetically about organizational and team learning. However, in reality and in plain language, neither teams nor organizations "learn"! Only *individual* people do. Two heads may always be better than one but, in the final analysis, each acquires its knowledge independently of the other. Of course, that does not mean we cannot learn from each other by informal means nor that group dynamics (such as brainstorming, discussion, and debate) cannot facilitate the process. However, the fact remains that human brains cannot be hard wired in series, much less in parallel. Knowledge must enter human heads individually, regardless of how many people may be in the "room" - virtually or in reality.

Theoretically, all of the knowledge that will ever be in the heads of people is already in the world, waiting to be discovered. However, to the degree that human knowledge can and will be used to effect action in the world, it must be made explicit - embedded in physical objects in the world. If the knowledge is embedded in an object - such as a piece of paper, computer hard drive, or CD ROM - that is not intended directly to effect action by people or machines, it is a "record" that may be employed indirectly toward that end.

Thus, to the degree that an individual or organization is not directly empowered to take appropriate action, readily accessible and directly applicable *records* are essential not only to reduce "time to market" but also "time to learn." Ultimately, gossip aside, records are vital to support timely, effective, and appropriate action - even if the action taken is merely talk. The key to effective action is efficient access to knowledge, and the key to efficient access to knowledge is that it must be both explicit and well codified - rather than being locked away in the minds of those who happen to occupy an arbitrary location in a hierarchy.

In terms that are somewhat ethereal yet essentially true, Savage outlines his vision of the next generation of management philosophy:

- We need to be in touch with ourselves - our visions, knowledge, thoughts, and feelings - and with one another in new and creative ways... fifth-generation management is a question of leadership... not being preoccupied with one's own power, but with how we *empower, energize, and enable* one another. (p. 102)⁽²²⁾
- Too often [the command-and-control] model degenerates into not what but whom a person knows. (p. 253)
- The challenge is to develop a culture that supports the establishment of core teams that are free to draw on knowledge resources wherever they are found, within or outside the enterprise. (p. 257)
- Instead of envisioning the organization as mutually exclusive boxes, we should think of overlapping teams and overlapping companies ... (p. 277)

If Savage's description of fifth-generation management is apt, it might be said that sixth-generation management is about moving still further beyond outmoded notions of hierarchy that place individual human beings in positions subservient to others. Empower, energize, and enable - these are all good words. However, in terms of personnel management philosophy, they still embody the "either/or" thinking that Savage appropriately decries. In short, they assume that "leaders" must empower, energize, and effect action by others. That is, leaders must "manage" the behavior of people or they will fail to act or to act appropriately. Such is a fairly dismal and elitist view of the human condition.

On the other hand, Savage outlines a more egalitarian and hopeful perspective based upon the employment of automated tools, rather than the subservience of employees to the dictates of overlords. Although he downplays the prospects for significant contributions from artificial intelligence and expert systems, he does acknowledge:

A good technically networked infrastructure is fast becoming a precondition for marketplace success ... Even more important, however, is our human ability to network with one another on real business and technical opportunities... A management strategy based upon "command and control" is giving way to one centered on "focusing and coordinating" multiple teams within and between companies. (p. 105)

The task of the 1990s and early part of the next millennium is to build networked infrastructures and adjust our mindsets so that, working together, we will be adroit in our thinking and agile in our actions... an "elegantly simple" enterprise. (p. 107)

By contrast, Savage says the traditional "... automationist approach presupposes the computerization of steep hierarchies." On the other hand, he acknowledges that more flexible and open communication "... is, by definition, 'confusingly complex' because of all the little kingdoms ..." However, he asserts, "An elegantly simple organization is one that is easy for customers, suppliers, and distributors to interact with because of its sophistication."⁽²³⁾ (p. 107) "Little kingdoms" are built upon restrictive bureaucratic procedures and proprietary information systems. The sophistication of an "elegantly simple organization" must be undergirded by international standards for openness and technical interoperability. Such standards must embed sufficient complexity so as to support not only all organizations but also all "customers" (human beings) worldwide.⁽²⁴⁾ As Savage observes:

It is not possible to command external resources in the same way in which internal resources can be dominated. Instead, the fine art of alliance building between peers becomes critical...⁽²⁵⁾ Computer networking both enables and demands the exchange of information within the firm and among firms... business success will increasingly depend upon the knowledge resources of the firms rather than on their fixed capital. (p. 109)

As we enter the knowledge era, virtual enterprises will shift focus from "control" to "commitment," from "monitoring" to "motivating," and from "commanding" to "conducting." (p. 236)

The general theory of the firm holds that enterprises form when the cost of transactions becomes too great without them. Thus, to the degree that networks reduce the cost of transactions, the need and justification for "firms" declines. One of the ironies in current trends in management philosophy is the thought that organizations should no longer be based upon functional expertise. However, to the degree that computer networks - particularly directories and document management systems based upon open-systems standards for interoperability - can reduce the "friction" involved in drawing together the diverse technical expertise to accomplish any task, **functional** "centers of excellence" may be the **only** remaining justification for any "firm" incorporation of individuals.⁽²⁶⁾ Indeed, those who cooperate to form centers of excellence may prefer to call their unions "agiles," "supples," "flexibles," "knowledgeables" or perhaps even "functionals" - instead of "firms." Savage continues:

The industrial era defined fixed resources. The knowledge era needs to draw upon variable or virtual resources to meet unique market and customer demands in a timely manner by configuring and reconfiguring the appropriate capabilities and competencies within and between companies to seize concrete and profitable market opportunities. (p. 123)

... agility is not an end unto itself, but a way to help make ... customers more successful... Agile companies are self-organizing... People who need to work together ... simply team up... This takes excellence in leveraging the capabilities of people and information systems. (p. 135)

With respect to the relationship between information management systems and KM, Davenport and Prusak draw an important distinction between data and documents and, thus, database management systems versus *document management* systems:

Since it is the value added by people - context, experience, and interpretation - that transforms data and information into knowledge, it is the ability to capture and manage those human additions that make information technologies particularly suited to dealing with knowledge. While technologies designed for managing data are structured, typically numerically oriented, and address large volumes of observations, knowledge technologies deal most frequently with text rather than numbers, and text relatively unstructured forms, such as clauses, sentences, paragraphs, and even stories. Volume may be the friend of data management, but it is the enemy of knowledge management - simply because humans have to sift through the volume to find the desired knowledge. (p. 129)

Davenport and Prusak observe that most firms whose "knowledge architectures" are based upon Lotus Notes, for example, are a "bit haphazard ..." and that "discussion databases" are a "somewhat less structured form of accumulated knowledge ..." Engaging in understatement, they acknowledge that "finding the knowledge one wants from so many different places ... is very challenging ..." (pp. 132 & 146) However, this observation merely highlights the weakness of their own working knowledge of the appropriate usage of *database technology* to *codify* the myriad *relationships* among *textual documents*, thereby making knowledge not only explicit (in the form of records) but also readily accessible based upon the pertinent parameters and relationships. In fact, the relational model is embedded in the COTS products of many of the market leading vendors of electronic document management systems. ⁽²⁷⁾

Indeed, even though Davenport and Prusak's commentary on "discussion databases" is itself a bit haphazard, they do redeem themselves somewhat by noting that "... structured, explicit knowledge [in documents] does not become usable simply by being codified ..." ⁽²⁸⁾ (p. 85) However, they assert more specifically the following key point:

Codifying knowledge is an *essential* step in leveraging its value in the organization. Codification gives permanence to knowledge that may otherwise exist only inside an individual's mind. It represents or embeds knowledge in forms that can be shared, stored, combined, and manipulated in a variety of ways. (p. 87, emphasis added)

Regardless of the relative merit of the knowledge itself, and whether it is in tacit or explicit form, *codification* is a critical success factor (CSF) for leveraging the value of explicit knowledge. Moreover, making tacit knowledge explicit is a CSF for competitive advantage in any large-scale organization. Knowledge that is documented and readily accessible and/or embedded in technology can be potent indeed, perhaps even so as to reshape our organizations from the outside in. Those who fail to learn from their (documented) history may either be forced to relive it or they may be "reconfigured" by external forces beyond their control. As Savage observes: "The irony is that the technological developments may themselves force more profound organizational changes than all of the theorists combined." (p. 176)

As noted, the theory of the firm holds that business organizations form when the cost of transactions becomes too great without them. The Internet - more specifically, the technical standards of the Internet - is breaking down the artificially high cost of carrying out transactions using proprietary stovepipe information systems. Thus, the technology is dissolving the distinction between internal and external resources. Beyond redefining the boundaries of the "firm," information technology is calling into question the very need for artificial organizational constructs that exist more for their own sake than for the purpose of delivering anything of value in a supply chain leading to customers.

To the degree that corporations are formed to reduce the risk to individuals, serious study should be devoted to the question of whether the benefits may not be outweighed by the bureaucratic costs in terms of loss of accountability, responsiveness, and satisfaction to all of the individuals involved. It seems that there must be more cost-efficient means of insuring individuals against the risks involved. Pooling explicit business process knowledge and insuring the resulting functions against risk would seem to be a function tailor-made for inter-networking by electronic means supported by directories and documentation (E-records). There is vast potential for improvements in efficiency, accountability, and responsibility relative to the current reality of our hierarchical bureaucracies and litigious society. Current reality is that no one is responsible when everyone is responsible, and we all end up paying the price of management structures and philosophies that lead to a disconnect between personal thoughts, intents, and deeds versus the outcomes visited upon others through "corporate" action.

With reference to accountability, it is instructive to consider the definition of "manage" as set forth in *Webster's New Collegiate Dictionary* (1975):

vt 1. to handle or direct with a degree of skill or address a. to make and keep submissive ... b. to treat with care: husband. 2. to alter by manipulation. 3. to succeed by accomplishing: contrive

vi 1. a. to direct or carry on business or affairs b. to admit of being carried on 2. to achieve one's purpose, syn: conduct

Savage reminds us that the connection between servitude and the lack of or failure to use technology is hardly new: "Aristotle ... foresaw [automation as the] one condition on which we can imagine managers not needing subordinates, and masters not needing slaves." (p. 176)

In plain language, it might be fairly stated that the behavior of kids, criminals, and domesticated animals should be "managed" ... but what of the rest of us? Do we really need to be "handled" and "manipulated" so as to be kept "submissive"? Is the job of leaders truly to "contrive" to make the rest of us do as they wish? Does that really serve the interests of marketplace efficiency? "Free" enterprise? Entrepreneurship? Society as a whole? The interests of individual human beings?

In truth, it is nobody's business to *manage* the behavior of other law-abiding adults - at least not the behavior of knowledge workers, whose business is to contribute to the world's knowledge store. What most of us should aspire to manage is machines, inanimate objects, data,

information, and knowledge. Most particularly, we should aspire with glee to manage, build, and enhance *explicit* knowledge, which is to say, the *records* of that which has already been discovered, justified, and/or proven. The ability to do so is what separates us from lesser creatures. The lack of will and skill in managing and using explicit knowledge is perhaps the greatest single failure of leadership to advance the human condition more rapidly, with less waste and inefficiency.⁽²⁹⁾

It has been said that "the mind is a terrible thing to waste." A corollary is that it is a tragedy to waste the collective wisdom of the multitude of mankind over the millennia simply by failing to make knowledge both explicit, in more or less formal records, as well as readily accessible by virtue of careful and complete codification. Moreover, as Savage points out, if results are made visible in the information system, accountability will take care of itself.

As Savage notes: "The shift from the industrial to the knowledge era is primarily one of attitudes, values, and norms. It can only come through a struggle of thought, because most of the changes are counterintuitive." (p. 110) Efforts to manage or even to influence the behavior of other law-abiding knowledge workers are wasteful, inefficient, and misdirected - *except* through the careful documentation and sharing of expert knowledge. Lacking substantiation, those who "push" their own views or "push back" against the views of others are essentially being obnoxious, argumentative, and/or dictatorial - regardless of their position in any hierarchy. Their views may indeed reflect their deeply held values as well as their arbitrary position of authority. However, in absence of verifiable, explicit evidence and supportable logic, emoting one's beliefs adds little or nothing to the store of human knowledge.

Moreover, Savage points out, "Research has shown that ... the hierarchical model is, in most companies, a fantasy." (p. 115) Yet organizations continue to draw hierarchical boxes and pretend as though they mean something, and in many organizations they do: They are a rather large impediment to the efficient processing of information and sharing of knowledge. To combat that effect, in *Future Perfect*, Davis suggests that the best management structure to replace the hierarchy is networking, because it relies "not on an informal web of personal contacts, but on a technological web of information handling systems." (in Savage, p. 116)

Trusting that Davis is right, it will be interesting to see how long inefficient and ineffective bureaucracies can hold out against the forces of technological advance that enable and empower knowledge workers to "synergize" new knowledge without regard to hierarchies that are irrelevant to the informational interrelationships involved. As Savage observes:

The evolution of computers offers an interesting parallel to what we are being challenged to do organizationally... The key to the fifth-generation computer, parallel processing, is in the networking of multiple processing units... to divide the problem so that the multiple processors can work on portions of the same problem concurrently, then piece together the solution. (pp. 111 & 112) ... Fifth-generation management makes it possible for the functional departments to work in *parallel* through the use of multiple task-focusing teams within and between companies... (p. 114)⁽³⁰⁾

Regardless of how the boxes are drawn on the org chart, the confines of the traditional organization, or how efficiently it manages data, information, or knowledge, Savage suggests:

Knowledge is not something that is possessed like a commodity. Instead, it represents a capability to see broad new patterns among fuzzy old ideas and new impressions and relate them in a larger context. "Knowledging" ... is more than the accumulation of and access to information, because it looks at both the known (information) and the visionary (what could be). (p. 121)

... knowledging is a process of refining meaning and significance in concrete situations... a dynamic and ongoing process that involves our human capabilities to see existing patterns and at the same time envision new patterns. (p. 122)

... much of a company's knowledge is located in highly subjective insights, intuitions, hunches, ideals, values, images, symbols, metaphors, and analogies... It is necessary ... to consciously mine these ideas and insights... (p. 138)

Beyond the confines of the bureaucratic hierarchies, Savage notes that "... people form alliances and coalitions that cut across traditional boundaries... yet traditional computerization approaches are blind to their existence." (p. 157) Despite all the platitudes about customer focus and massive promotion of notions of "customer service," traditional approaches to automation are neither customer- nor service-oriented. Rather, they are proprietary, self-centered, and profit-oriented. Please do not misunderstand, profit is a *good* word; it is just that there are better ways to achieve it in the long-term interest of all concerned. Companies cannot have it both ways. They cannot successfully project an image of superior customer service while at the same time trying to lock customers in by building barriers to switching - unless: a) their customers are stupid enough to let them get away with it, or b) their government fails to enforce the antitrust laws effectively. (See also Ambur, 1996, May, and Ambur, 1999, May.)

As Savage notes, "We are putting powerful new technology in traditional, industrial-era steep hierarchies." He asserts, "Either we learn to adapt to this new technology and leverage its capabilities, or we may find our companies imploding as they choke on complexity and their inability to sort out multiple interrelated variables." (p. 159) In short, both people as well as organizations thrive on "elegant simplicity." The necessary complexity must be built into "open-systems" standards supporting a virtual worldwide business information and knowledge repository, and the myriad relationships must be embodied in massively scalable relational database technology.

In fact, as Savage says, "Aristotle's vision is being realized ... routine processes are handled by hardware and software, not people." (p. 177)⁽³¹⁾ Many tasks once thought to be honest and decent labor when the means of life were dear are now considered beneath the dignity of human beings. Having to contend with proprietary information systems is a plague with which we are still afflicted, but as Savage notes:

There is ... tremendous pressure from users to establish open systems, including industry-approved user interfaces. These technological developments will make it much easier for enterprises to work in parallel ... (p. 155)

In the 1970s [efforts] to develop ... the "Great Database in the Sky" ... failed because of two unforeseen problems: first, the available hardware and software were not flexible enough; and second, they tripped over naming conventions... traditional flat data files ... did not provide the flexibility to interrelate multiple operations. Each functional group in the organization had its own naming conventions. They underestimated the difficulty of achieving agreement across the organization regarding definition of key terms... Two lessons stand out ... First, simplify operations ... Second, standardize terms across the organization. (pp. 156 & 157)

Many people are working on standards so that there will be well-defined protocols ... so that equipment from different vendors will fit into one structure... These efforts will continue to grow in importance as connectivity and interoperability become central issues. (p. 182)

Standards and "interoperability" are not merely "central" issues; they are *the* issue. Standards make knowledge of common requirements explicit, both in terms of functional processes as well as the documents and data to be processed. Moreover, standards specify and enable the embedding of knowledge as design principles in working products. Savage observes:

... data [is] central to any integration effort. Data [should] be common and shareable across functions... [It is important to be] able to identify the key information items (data entries) that should be captured, architected, and managed in an integrated manner. (pp. 184 & 185)

Yet, in and of itself, data is meaningless. Data must be given context to be meaningful to human beings. One definition of "document" is "data in context." Documents are the universal human interface to knowledge, and in order to share knowledge effectively, without the artificial and counterproductive constraints of needless bureaucratic hierarchy, Savage notes:

Peer-to-peer knowledge networking has three aspects: technology, information, and people... technology ... allows each node to communicate directly with every other node, without having to filter through a hierarchical arrangement... [However,] peer-to-peer information access is a major challenge. (p. 199)

... applications may use different words to mean the same thing, the same words to mean different things, or different shades of meaning for the same words. (p. 200)

Thus, a common language must apply. However, Savage also points out:

In dynamic teaming we evolve the rules as we go, the roles are fluid, and the task is to collaborate with other teams... There cannot be clear rules for creativity because it lives at

the intersection of the expected and the unexpected ... although the insights from [the past] can be codified and serve as resources to be drawn upon as needed. (p. 201)

... knowledge networking does not homogenize people into bland commonality... it sharpens our perceptions of one another's talents and abilities. We learn to value differences [as] strengths... multiple teams ... seek out and build upon one another's competencies.⁽³²⁾ (p. 202)

[Again, though] there has to be some commonality of context. (p. 203) ... In fact, seeing the significant patterns together as teams is the challenge of any enterprise. (p. 204)

At the same time, Savage highlights an observation that is contrary to the common wisdom:

... teams do not need to be co-located. Research studies indicate that geographically dispersed teams can often work as effectively as co-located teams, if not more so. A dispersed group might communicate more explicitly, requiring clarity of thought, whereas co-located groups often tend to communicate haphazardly. (p. 231)

He suggests that virtual teams should be established regardless of the location of individual people. (p. 270) And in order to support and capitalize on the knowledge of widely dispersed networking teams, Savage cites an important movement and a resulting trend:

... virtual enterprising ... is an evolution of what some have called "open organizations" [and] there [is] much interest in the International Standards Organization's Open Systems Interconnection (OSI) networking model and X/Open, an industry coalition dedicated to stimulating the development of portable software... to create a common core, extending it as the need arises. (pp. 231 & 232)

... studies in neural networking and chaos are helping to move us beyond the machine model of organizations ... A new generation of professionals is growing up with the technology of networking. Natural clusters of interest arise spontaneously ... People are networking not because they are told to, but because of natural interests. (p. 237)

Savage notes that "[n]etworking enterprises are ... held together ... by shared visions and common knowledge resources, the most valuable of which are in people's heads..." He acknowledges that relational and object-oriented database technology make it easier to dynamically reconfigure computer-based memory, but suggests that such technology is limited. On the other hand, he concedes:

... if an enterprise *captures* 30 percent of its core *knowledge in a consistent and shareable manner* and in an understandable data architecture, then a partnership between people and processors can be *quite powerful*. (p. 279, emphases added)

As individual and team learning is *codified* in engineering standards, classification and coding systems, operating techniques, applications, data dictionaries, and customer profiles, an *invaluable* resource is developed... (p. 280, emphases added)

In order to capture, codify, and share such invaluable resources, Savage suggests: "... task teams should be expected not only to solve the tasks at hand, but also to contribute to the knowledge base and to augment the shared business vision." (p. 280) In addition, to capture and make explicit the essential elements of tacit knowledge, he proposes to "... invite individuals to keep a reference description of their backgrounds, interests, and capabilities in an accessible database..." (p. 270)

Having devoted many words of praise to the primacy of tacit knowledge, Savage concludes with a tacit admission of the shortcomings of such knowledge - in the eight words of the following plea: "Please keep a log that you can share ..." (p. 283) Indeed, the inadequacies of implicit knowledge are themselves implicit in the minds of all of us, literally and figuratively. We know the frailties of our own minds even as we glorify them. While tacit knowledge is perfectly adequate for many purposes, for the reasons specified by Norman, more is needed for precise behavior, important business transactions, and advancements in knowledge.

Indeed, more is needed than is commonly recognized in the wisdom of most of the evangelists for knowledge management. Balla (1999) characterizes and challenges six myths that are implicit in the minds of many of the proponents of KM:

1. *The corporate repository exploits the reuse of quality knowledge* ... Unfortunately, most corporate repositories have no way of ensuring the quality of the knowledge that is added to them...
2. *KM is about capturing tacit knowledge* ... It is not realistic to expect software ... to translate and capture [subtle forms] of tacit knowledge. People have to do the translating and digesting... don't expect anyone to be able to reduce the capabilities of human cognition into a series of mathematical equations...
3. *KM addresses the needs of the knowledge worker* ... KM will have the biggest payoff for folks who work in a certain amount of chaos, perform tasks in an ad hoc fashion and have few rules to which to adhere... KM can provide enough structure to help employees find what they need, while maintaining their freedom, in large part, to do what they want...
4. *KM can only be realized through technology* ... Up until a few years ago, the biggest problem with knowledge seemed to be that so much of it was inaccessible to so many people - knowledge was reserved for the elite. All that has changed... certain technologies ... have opened the floodgates of mass information consumption... People spend so much time trying to decipher the good information from the bad ... that they have relatively little time to actually consume information and refine it into something useful...
5. *The KM technology vendor dictates the KM solution* ... True KM solutions should be customer-driven, not vendor-driven...
6. *The KM market was created by customer demand* ... Many view KM to be an industry buzzword invented and promoted by the vendor and analyst communities. Today, there is little agreement about what KM actually is, but we're getting there... [\(33\)](#)

Presumably, Balla is at least 80 percent right in exposing these myths and pointing toward more realistic objectives, but his characterization of the truth behind the fourth myth is at least 20 percent wrong. In reality, knowledge is still largely reserved for the elite. Balla downplays the role of technology in contributing further to the solution, but in truth, technology is the only hope

- not only for those who are still deprived of information but also those who are inundated with it. Nevertheless, his point is well taken with respect to the second myth: People will still have to do much of the translation of information into knowledge. In addition to rendering knowledge in explicit form, largely in textual documents, human beings will also need to provide much of the codification. Codification is the only way that knowledge can truly be made accessible, and that its quality and pertinence can be made readily *assessable* by those who need it.

Davenport and Prusak (p. xv) assert: "The core message ... is that the only sustainable advantage a firm has comes from what it collectively knows, how efficiently it uses what it knows, and how readily it acquires and uses new knowledge." There appears to be widespread consensus that people will continue to play not only a central but a vital role in that regard. However, Beckman (in Liebowitz, pp. 1-5) has proffered a several principles that human beings who wish to be part of successful organizations would be well advised to observe:

- Shared, formal knowledge and expertise are the key to superior organizational performance, agility, and success.
- Knowledge must be formalized, or made explicit, to have significant value to an organization.
- Only formalized knowledge can be represented electronically, and be stored, shared, and effectively applied.

Davenport and Prusak conclude (p. 178) with a note of caution:

... we must be careful not to spend too much time acquiring and managing knowledge for its own sake. Knowledge and learning must always serve the broader aim of the organization. Otherwise it becomes at worst a liability and at best a distraction. Just as we shouldn't undertake any action without examining what can be learned from it, we shouldn't learn anything without relating it to practice. A health tension between knowledge and action is the key to organizational (and probably individual) success.

However, for knowledge workers whose output is data, information, and knowledge recorded in documents, Davenport and Prusak are posing a false "either/or" choice. For those people as well as the organizations that employ them, the issue is *not* to balance a tradeoff *between* knowledge and action. Instead, the key is to use systems and processes that are *self-documenting*. The value proposition involves *both* action *and* knowledge, simultaneously and continuously. Expert knowledge should be captured and managed *automatically*, as a by-product of the knowledge work processes. Records should be managed as corporate assets throughout their full life cycles, from conception to destruction, in electronic repositories.

Performance measures should be implicit in the system so that the results are automatically made explicit, in which case they will speak for themselves. Relational database management systems should be used to capture and manage important relationships among textual documents as well as other kinds of electronic records. As soon as each record is signed, approved, or otherwise finalized, it should be stored securely in inalterable form accessible via a file management system. Each record should be maintained for as long as it continues to have value in the business process, including the need to offset unforeseen risk subsequently arising from

individual and corporate actions. Records should be stored together on inalterable media in accord with their projected destruction dates, so that all records on a particular physical storage medium may be destroyed at the same time.

Electronic repositories containing documents recording explicit knowledge should be based upon international standards for interoperability. Such standards should encompass both technical interoperability as well as semantic meaning, which is essential for the sharing of knowledge among human beings. To make important relationships explicit among explicit elements of knowledge documented in electronic records, the appropriate elements of metadata should be associated with each document. Multilingual thesauri should be provided to facilitate automated discovery of such relationships.

Finally, to the greatest degree possible, knowledge should be embedded in working tools and other products so that human beings are free to devote their unique but finite information processing capabilities to the discovery of that which is as yet unknown.⁽³⁴⁾

Such are the means by which the vision of sixth-generation management will be realized in the working knowledge of the new millennium.

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End Notes

1. See Liebowitz, pp. iii and 1-3.

2. See Liebowitz, p. 1-6.

3. In the interim since Norman wrote these words in 1988, Windows has become the de facto standard on the desktop. More recently, Microsoft is succeeding in wresting from Netscape the supremacy in delivering "browser" capabilities to the desktop as users' window on the world that is the Internet and particularly the World Wide Web. There can be little doubt of the truth of Norman's words with respect to the benefits of standardization in terms of usability. The questions are whether Microsoft's de facto monopoly: a) extracts excessive profits from users, b) dictates applications and standards that would not prevail individually in the marketplace based

upon their own merits, and c) discourages better, more open and freely usable applications and standards in the interest of everyone other than the employees and stockholders of Microsoft.

4. With respect the need to share information, Liebowitz (p. iv) notes:

From a recent benchmarking of 150 companies, most people were not concerned about keeping their knowledge close to heart to maintain their own competitive edge. Rather, [they] didn't want to use other people's knowledge because they couldn't put their own thumbprint on [it].

In other words, the NIH (not invented here) problem of pride in authorship may be a bigger impediment than unwillingness to share knowledge within organizations.

5. In her book, *The Power of Logical Thinking*, Vos Savant (p. 90) observed:

... when I began to pay attention to all the misinformation, disinformation, and flagrant abuse of the general public's lack of education in logic and elementary mathematical skills ... I found it everywhere ... but most especially from ... our government. This phenomenon isn't the exception. It's the rule.

Zimmerman (Liebowitz, p. 16-1) cites the following special KM challenges in government:

- Sheer Volume of Records
- Necessity to Keep over Long Period of Time
- Mandate to Provide Public Access
- Need to Keep Documents Secure
- Many Documents in Paper Form

6. Systems that have been deliberately overloaded by hackers (crackers) with meaningless volumes of information are euphemistically said to have suffered "denial of service" attacks, since valid users are thereby denied access. It is no more euphemistic to suggest that individuals and organizations that allow themselves to be inundated with uncoded information are likewise subjecting themselves and their customers to denial of service in the knowledge value chain.

7. Savage lists ten practical considerations for 5th generation management: 1) envisioning capabilities so that the context is readily visible; 2) functional centers of excellence; 3) technical networking infrastructure; 4) data-integration strategy; 5) ability to identify and track multiple task-focusing teams; 6) learning, relearning, and unlearning; 7) norms, values, rewards, and measurements; 8) ability to support the teamwork of teams; 9) knowledge base; and 10) include suppliers, partners, distributors, and customers (p. 266)

8. A commonly heard platitude is, "Our people are our most important asset." But how is the worth of the human "asset" to be measured? By head count? By person-hours expended? By educational degrees earned? *Webster's New Collegiate Dictionary* (1975) defines "asset" as:

- 1 a. the property of a deceased person ... b. the entire property of all sorts of a person, association, corporation, or estate applicable or subject to payment of his or its debts. 2.

advantage, resources. 3. the items on a balance sheet showing the book value of property owned.

Isn't it somewhat demeaning to suggest that human beings are "assets" owned by corporations, agencies, and organizations?

9. We could do more than just "talk" about "customer empowerment." If we have the understanding and will, we could actually empower customers. (For further discussion of this issue, see Ambur, 1999, May.)

10. Annette Simmons says that "deep dialog" is the key to overcoming fear and distrust in order to create a "safe place for dangerous truths" in the workplace. While acknowledging that small lies are the grease and social grace of polite interchange, she characterizes "dangerous truths" as those that are important. She outlines five stages of dialog:

- politeness and pretending;
- chaos and dissension;
- discovery and redefining, which she calls the "groan zone," where people need to reconsider their false assumptions (tacit knowledge);
- resolution, characterized by a "new composite of reality"; and
- closure, at which time the group returns to its routine, hopefully, enriched by a new and mutual understanding of deep truths.

She notes that dialog is "thinking, not doing" and that workgroups should not dialog too often. In response to a question from the author, she indicated that once a month or once a quarter may be appropriate. Thus, it is clear that her definition of deep dialog is different than what Savage has in mind for the interaction among companies and their customers. Savage suggests:

We can flounder in the separation of thinking and doing or engage in the integrative process of continual creativity. We can remain isolated ... or seek out the capabilities and aspirations of one another ... (p. 281)

However, to a large degree the distinction appears to be grounded in the practical limitations on the means by which Simmons suggests that the dialog be conducted - meetings in which groups of people gather together in the same room for a period of about two hours. Such gatherings may indeed be necessary and appropriate for the kind of deep dialog that, as she says, "changes everything." However, they are a highly inefficient means for establishing "moments of truth" among suppliers and customers in an ongoing business process.

Simmons offers several other observations that are highly applicable to the dynamics of KM:

- If people remain silent, they are able to maintain their belief in their own truth as the Truth, with a capital T. That is, the validity of their tacit knowledge is unchallenged. When they engage in open dialog, they may discover the flaws in their personally held beliefs. Of course, the same is true when their knowledge is made explicit in the form of documentation.

- Truth is unpredictable, so it generates fear of the unknown.
- In knowledge work, lack of candor diminishes productivity.
- Social research has demonstrated that groups perform less well on tasks than their most knowledgeable members perform individually, but if a bunch of smart people work together efficiently and effectively, surely they can do better together than alone.
- Dialog is a means to "change our realities." It is much easier to change our beliefs while they are merely thoughts in our heads (tacit) than after they have been documented in hard-copy, much less embedded in products (made increasingly more explicit).

However, countervailing against the latter point are the constraints of time and access. Such limitations suggest that the most efficient and effective means of "changing realities" is through authoritative documentation.

Ms. Simmons is the author of *A Safe Place For Dangerous Truths; Using Dialogue To Overcome Fear & Distrust At Work*. (May 1999) These notes were compiled by the author from a seminar she conducted at the Department of the Interior on July 16, 1999.

11. Savage says:

In the knowledge era, trust and integrity are critical... people [are expected] to "push back" until the truth is known [and] to "do the right thing." [However,] A few key people can torpedo a climate of trust and integrity without even realizing what they have done.

Integration efforts are delicate and easily disrupted. (p. 258)

The need for truth and trust suggests the need for identification and authentication of users and records, e.g., via X.500 directory services, digital signatures, and X.509 digital certificates.

12. Skill is needed when tasks are difficult. As an alternative, tasks can be simplified and facilitated, e.g., through the use of tools and standards.

13. Peters teaches that "... the purpose of a business is to create a customer." (in Savage, p. 175)

14. Being "open" to "discovering" one another's capabilities and aspirations suggests the need to use a technical standard for directory services, e.g., X.500. Anything else implies that the potential alliance is not truly "open" but based upon a proprietary sandbox in which one or the other player is expected to pay homage to the other.

15. For further discussion of customer focus and the need for an international directory standard like X.500, see Ambur, 1999, May.

16. Two of the emerging standards for the Internet are: 1) Web Distributed Authoring and Versioning (WebDAV), and 2) WebDAV Searching and Locating (DASL). For further information on WebDAV and DASL, see Ambur, 1999, April.

17. For further discussion of the need for metadata standards for the management of documents, records, and knowledge, see Ambur, 1999, April; Ambur, 1997, September; Ambur, 1996, November; and the Fourth Wave Group's event report entitled "Using Metadata for Knowledge Management: A Seminar Review," which is available at: <http://www.fourthwavegroup.com/>

18. In effect, the Workflow Management Coalition (WfMC) is developing an open-systems technical standard for teamwork.

19. No doubt, mistrust impedes communication. However, more mundane logistical issues related to the number of people and volume of information involved, together with time constraints, would seem to be larger factors in most cases. Trustworthiness cannot offset the problems of information overload and technical complexity - except to the degree that one can opt out of participating in the "team" based upon trust that someone else has sufficient information and expertise to address the issue at hand and to do so in a fashion that uphold the interests of the organization (as well as the individual opting out).

To that degree, trust is not so much an issue for teamwork as it is for delegation. In effect, teamwork is the converse of delegation. One participates in the team because no one else can be trusted to uphold one's position or fulfill one's role except the individual him/herself. Reliance on tacit knowledge increases the imperative for participation because more explicit means of ensuring trust are lacking.

20. Data without context is not "knowledge." Databases contain data, not knowledge. Contrary the contentions of some, data warehouses are not "knowledge repositories." In plain language, they are repositories of data. The distinction is critical to an understanding of the requirements for knowledge management.

21. Despite the inefficiencies, Liebowitz (p. iii) notes: "Some people ... believe that 70% to 80% of what's learned is through informal means versus formal methods like reading books, brochures, documents, etc." Regardless of the precise number, the relative magnitude of the ratio can be taken in two ways: 1) as a simple observation of fact about what currently seems to work best, or 2) as an expression of the potential to enhance the efficiency of learning through more formal means of classifying and sharing explicit knowledge. To the degree that time is the critical constraint, it seems unlikely that a case for greater efficiency could be made by relying to a still further on less formal, "tacit" means to "transfer" knowledge.

22. In addition to speaking a common language (i.e., using the same terms, with exactly the same meanings), we empower each other by using tools that are based upon open-systems technical

standards for interoperability (e.g., X.509, SQL, HTML, XML, WebDAV, DASL, Z39.50, ODMA and DMA).

23. One of the criticisms of the international X.500 directory standard that has been raised by the apologists for proprietary systems is that it is too complex. However, X.500 or something very much like it is exactly what is needed to foster an "elegantly simple" virtual knowledge management organization for enterprise earth.

24. Without apology for it, perhaps the X.500 standard may be needlessly complex. In point of fact, it has thus far failed to achieve broad market acceptance. However, the likelihood is that those who took the time and effort to gain the knowledge to understand the underlying requirements have simply raced too far ahead of the rest of us. Be that as it may, trying to deny the need and to impose proprietary alternatives is no substitute for implementing and using whatever components of the standard that can be sustained with current understanding and expertise. The emergence and widespread use of LDAP (Lightweight Directory Access Protocol) is a hopeful step in the right direction toward sixth-generation management.

25. Many people would like to think that Microsoft, for example, does not have the capability to "command external resources" but it might be difficult to convince them that is so. On the other hand, Savage himself suggests that "internal resources" - at least those of the human variety - should not be "commanded" either. It might be said that the "fine art of alliance building between peers" is equally applicable within organizations as "without" them. (Pun intended. Both meanings apply.) Thus, the real underlying issue is the value of the organization itself. If it somehow facilitates the "art" of creating value, its existence may be justified. If not, it is a drag on the realization of value to its stakeholders, which is to say individual human beings. The rub is that the degree to which companies create value for some of their stakeholders (e.g., managers and owners) may not be balanced by the values created for their customers and suppliers, as well as society at large. Antitrust laws are a primitive instrument by which to balance the "competing" interests involved. Data, networks, technology, documentation, and records offer a far greater potential to make the essential factors "visible" and, thus, self-enforceable.

26. Davenport and Prusak report that some companies are pursuing projects aimed at "... finding the person with the knowledge one needs ..." (p. 139) And they assert "... the codification process for the richest tacit knowledge in the organization is generally limited to locating someone with the knowledge, pointing the seeker to it, and encouraging them to interact." (p. 71) To the degree that one may know the name or some other personal attribute of that person, the X.500 White Pages might be a suitable means of locating him or her. However, the more likely scenario is that the individual will be unknown. Often, in the case of massive bureaucratic organizations like that which comprises "we the people of the United States of America," neither the office nor its location will be known. Thus, the best means of connecting people with those who have the necessary functional expertise is an international directory service like the X.500 Blue Pages. (See Ambur, 1997, December.)

27. Under the auspices of the Association for Information and Image Management (AIIM), the Document Management Alliance (DMA) is establishing standards for interoperability among electronic document management systems. Such standards are necessary to avoid reliving the

mistakes of the past in building information silos that lead inevitably and simultaneously to two outcomes: 1) proprietary IT dead ends for organizations, and 2) needlessly restricted access to "captured" (recorded) knowledge in the form of documents and (as the techies would say) document-like "objects".

28. For a somewhat more complete and clearer discussion of the critical success factors (CSFs) for "discussion databases," see Ambur, 1996, May.

29. Savage provides several metrics demonstrating the potential for efficiency gains:

- ... three-fourths of a typical company's resources are used to transform information about products and processes and one-fourth to transform raw materials into finished goods... (p. 191)
- ... 70 to 90 percent of the knowledge needed to run the enterprise ... is still in our heads. (p. 194)
- Depending upon the industry, the typical cost of direct labor is now 2 to 15 percent of total costs... organizations are overstaffed ... layer upon layer of paper pushers and report expeditors make the organization sluggish and unresponsive ... Suppose, instead, we were to think of ourselves and our position within the organization not as fixed little empires, but as resources available to others... as knowledge contributors and decision points ... (p. 195)

Larry English, author of *Improving Data Warehousing and Business Information Quality, Methods for Reducing Costs and Increasing Profits*, argues:

Data residing in a single database has more than 43 times the value of the same data in 43 redundant databases. The redundancy actually diminishes its value because of the costs to capture [and] interface it 43 times coupled with the costs of inconsistent data that will occur in unmanaged information environments.

[English quote taken from "Architecture Program" on the General Services Administration's Web site, at <http://www.itpolicy.gsa.gov/mke/archplus/policyplace.htm>]

30. Ambur (1998, July 8) made a similar argument in a paper entitled "Persistence, Parallelism, and RISC: What Smart, Enterprising People and Organizations Can Learn from the Architecture of Dumb Machines," which is available at: <http://www.erols.com/ambur/Persist.html>

31. What could be more routine than "pattern recognition"? "Pattern" is a synonym for "routine."

32. In order to uncover "dangerous truths," Simmons suggests that we should "befriend polarization."

33. Balla concludes:

With every release of Microsoft Office, Windows NT and Exchange, Microsoft is moving closer and closer to providing a platform that organizations can use as an infrastructure for their KM initiative. Microsoft has even announced a major focus on

KM for its upcoming product versions... thanks to Microsoft's marketing muscle, the KM industry will become legitimized overnight.

34. Evaluating KM products from nine vendors, Balla, Harty, and Andrews (1999) identify the "functional areas of KM" as: gather, contribute, distribute/deliver, collaborate, and refine.