

The Intelligent Enterprise and Knowledge Management¹

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0. ABSTRACT

Needs for improved performance places different demands on enterprises everywhere. They must provide knowledgeable, intelligent behavior that requires new capabilities. Enterprises have turned to explicit and systematic knowledge management practices to make available the intellectual capital needed to perform effectively, internally and relative to stakeholders. They emphasize creation of people-centric practices to build, apply, and deploy knowledge and understanding for support of innovative and effective knowledge-intensive work. Starting knowledge management practices can be achieved by modifying and implementing standard building blocks. Whereas knowledge management has become a valuable business tool, its complexity may be vexing, and successful practice requires appropriate competence by both practitioners and their managements. The knowledge economy has already led to significant changes in the workplace, and future changes may be greater. As for many other management directions, it is expected that in the intelligent enterprise, knowledge management will be integrated into the basket of effective management tools, and hence disappear as a separate effort.

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	Page
0. ABSTRACT	i
1. INTRODUCTION	1
2. THE INTELLIGENT ENTERPRISE	2
2.1. Four Areas of Emphasis for Intelligent Enterprises	3
2.2. Success Factors for Intelligent Behavior	4
2.3. It Is Important for the Enterprise to Be Intelligent!	5
2.4. Enterprise Success Requires that Everyone Acts Intelligently	7
2.5. Dimensions of Intelligent Behavior	9
2.6. Conditions that Prevent the Enterprise from Acting Intelligently	11
3. KNOWLEDGE MANAGEMENT SUPPORTS THE INTELLIGENT ENTERPRISE	12
3.1. Enterprise Success Rests upon Effective and Knowledgeable Behavior	14
3.2. Knowledge Required to Act Intelligently	15
3.3. The Changing Workplace	16
3.4. Knowledge Management Implementation Issues	18
3.5. A Taxonomy of Potential Knowledge Management Building Blocks	19
3.6. Job Descriptions and Service Paradigms	22
3.7. Charting Knowledge Management-Related Activities in the Enterprise	23
3.8. Mapping Knowledge Required for Desired Work	23
4. CONCLUDING PERSPECTIVES	24
5. REFERENCES	25

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1. INTRODUCTION

Intelligent enterprises have broad horizons with long-term perspectives. They are concerned about their long-term viability and success, and also about how well they serve their stakeholders and constituents. In addition, many manage to create highly effective enterprises with low friction, self energizing, and rewarding work environments that operate with little wasted efforts. To achieve such ambitious goals, people within these enterprises maintain broad horizons. Their situation awareness goes beyond immediate business areas, customer groups, market segments, and geographical regions. They consider the enterprise to be part of the world-at-large and as an open system with strong and widespread interactions that cannot be ignored or controlled, only influenced, if that.

The degree to which the enterprise can act intelligently depends on the competencies of its people and its operational capabilities, such as structure, systems, and policies and on driving forces, such as motivation. The competencies determine how effectively work is performed when dealing with internal and external routine and difficult challenges. Its competencies are directly (but not only) a function of the knowledge – understanding, expertise, and skills – that is available at the workplace or is embedded in the enterprise’s capabilities. The knowledge in the workplace consists of personal knowledge possessed by individuals and explicit and embedded structural knowledge in documents, technology, and practices, and in the enterprise’s systems, procedures, policies, organization, and work structures. Hence, making the enterprise intelligent becomes an issue of how well knowledge can be managed.

Ideally, all enterprises should carry out their daily work exceptionally well. When they succeed in the short term, they should also, to the fullest extent possible, change their goals and strategies to pursue longer-term opportunities and conquer or avoid threats. Such behavior will require considerable resources, infrastructures, and dedicated personnel. Implicit expectations are that their enterprise should act “intelligently” at all times. It is often anticipated that all employees – and in the aggregate, the enterprise itself – always will “do the right thing.” It should make sense of challenges, find the best approaches to handle situations, anticipate outcomes, inform all concerned, implement decisions effectively, and so on. Unfortunately, few employees and enterprises, if any, live up to such expectations. Worse yet, only rarely is there an explicit and shared understanding among any of the enterprise’s employees – or managers – of what “acting intelligently” might mean in practice. However, most would agree that such behavior would be highly beneficial. It also is difficult for most to determine what is required to make behavior more intelligent. In addition, enterprises are complex and it is not simple to manage the intangible and less visible functions associated with human intellectual work and application of structural intellectual capital. The complexity may be deceptive since the operational and structural patterns can only partially be seen and understood and it is tempting to focus only on what is readily apparent. Nonetheless, the interplay of individual factors cannot be reduced to the study of individual and separate elements.

The enterprise can be intelligent in two ways. It can behave intelligently, and it can utilize “intelligence,” that is, competitive information about its environment, targets, competitors, and so on, to achieve its goals. It is the combination of the two ways that makes it possible to achieve objectives exceptionally well. For the enterprise to be intelligent, it needs to maximize the extent and utility of its intellectual capital. Many commercial enterprises have market values several times the value of their

financial and tangible assets. This difference in valuation is a result of the market perception of the large value of its personnel capital, customer capital, and structural capital. Yet, most enterprises do not provide explicit management of, or know who is responsible for, this part of the total value of their enterprise.

The main objective of knowledge management is to enable organizations to be intelligent-acting. People must be provided with knowledge to be competent and with incentives to be motivated. They must be permitted to work consistently and continually make the enterprise capable of making excellent decisions, performing high-quality knowledge work, and act appropriately at all times within its own domain, *vis à vis* its customers, other individuals and organizations, society, and the environment. As a result, they must be given the knowledge resources to “work smarter,” the capability to keep their knowledge up to date, and the permission to use what they know. However, knowledge alone does not make it possible for the enterprise to behave intelligently. It is equally important to have information that is readily available accurate, timely, well organized, and relevant – good intelligence – about its own conditions and the world around it. Other resources may also be required.

Personal knowledge and other intellectual capital assets serve vital functions within the enterprise. They form the fundamental resources for effective functioning and provide valuable assets for sale or exchange. In spite of their importance, from business perspectives, explicit and systematic management of knowledge has not been of general concern until recently, and as a result, availability of competitive expertise has been haphazard. In proactive enterprises this is changing.

As enterprises become better at managing knowledge – and as their competitors improve their capabilities – they continue to develop their knowledge management practices. In these efforts, which become increasingly sophisticated and demanding, they build upon developments in technology and people-centric areas such as cognitive sciences. Implicit knowledge management has always been practices and many issues addressed in this article may be familiar. However, new perspectives emerge and must be considered when relying on systematic knowledge management to make the enterprise intelligent. Conventional perspectives focus on visible aspects of work such as work and information flows. Beyond that, knowledge management focuses systematically on what people must understand to deliver competent intellectual work. On the personal level, that requires explication of which knowledge needs to be created, obtained, organized, accessed, and made available to the workplace. Similarly, it requires that the enterprise must adopt or develop broader capabilities and structures to handle situations and challenges effectively.

2. THE INTELLIGENT ENTERPRISE

Several writers have addressed the issues of the intelligent enterprise. Among those are Friedman *et al.* (1997), Pinchot and Pinchot (1994), Quinn (1992), Stewart (1997), and Wiig (1994). The intelligent enterprise is an organization which acts effectively in the present and is capable to deal effectively with the challenges of the future. It meets its objectives by implementing its visions and strategies through the actions of individual employees and through its systems, policies, and organizational structure. It makes trade-offs between, and meets the objectives both of the enterprise itself and those of its stakeholders. Management teams of intelligent enterprises recognize that to be viable in the longer term, they must acknowledge that they have broad responsibilities. These surpass conventional and narrow operating perspectives to include concerns for environment, local and larger economies, the society-at-large, and other stakeholders that are directly or indirectly affected by the enterprise’s

actions. The breadth of responsibilities results from the understanding that the enterprise is an integrated element in the complex societal and environmental system and that the effects from its actions on other parts of the system, will directly influence its medium and longer term viability. All parties are affected – owners, employees, customers, suppliers, society as a whole, and its physical environment – and the enterprise itself.

The management teams express the conviction that knowledge is the principal force that enables the enterprise's ability to act intelligently. They work to sustain enterprise long-term viability by developing, cumulating, and deploying highly competitive knowledge assets to the points-of-action. They expect that intelligent behavior will lead to proper and effortless handling of routine and simple tasks and that nonroutine, complex, and unexpected tasks will be handled timely, competently, and in the best interest of all concerned with suitable balances between long-term and short-term objectives. They believe that consistent intelligent behavior secures competitive leadership and the ability to pursue opportunities and render services that could not be delivered in a different way. For these reasons they need to manage knowledge explicitly and systematically.

2.1. Four Areas of Emphasis for Intelligent Enterprises

Intelligent enterprise managements look beyond the specter of daily work. They pursue sustained performance over the long term by maintaining broad awareness. They emphasize that they, and their employees not only deliver the work products that are directly associated with their functions but that they also act responsibly and productively in other respects as well. In particular, intelligent enterprises expect that all employees, departments, and organizational functions, as part of their daily activities, will support a wider scope of work. They emphasize four areas of expectations:

1. Generate Job-Related Deliverables Reliably and Competently – That is, fulfill expectations for delivery of the basic work products of the unit.

- Conduct and deliver work competently and according to high professional and craft standards and in the enterprise's overall interest.
- Ascertain that deliverables consistently are of high quality.
- Ascertain that deliverables consistently are on time.
- Take responsibility for ascertaining that complex and unexpected worktasks are handled competently.
- Take responsibility for "completed staff work."
- Ascertain that best available knowledge is matched to the situation and that it is applied.
- Apply critical thinking.

2. Secure and Improve Customer Relationships and Internal Contexts – That is, fulfill expectations for maintaining or improving contexts and relationships within the work environment, between different departments and enterprise entities, between the enterprise and its customers and other stakeholders.

- Understand and satisfy customer needs and requirements while meeting enterprise strategic intents.
- Maintain and improve customer – enterprise contexts.
- Collaborate, help coworkers, build positive relationships, and network.
- Help curb and control improper behaviors.

3. Conserve Enterprise Resources – That is, fulfill expectations for dealing efficiently with enterprise resources, including time.

- Work effectively – on target, efficiently, and be engaged in work.
- Use opportunities such as slack time to improve work environment, capture knowledge, establish valuable internal and external contacts, and so on.
- Use every opportunity to learn, share, and embed knowledge – build intellectual capital.

4. Renew Enterprise Capabilities – That is, fulfill expectations for aiding in the renewal of the enterprise.

- Innovate to improve enterprise capabilities in work processes, work environment, and all other areas.
- Envision opportunities for, and pursue improvements of new products and services.

2.2. Success Factors for Intelligent Behavior

A basic requirement for intelligent operation is a management philosophy of practiced beliefs that people will act responsibly when given the chance and when understanding that it is in their interest. However, these perspective must be tempered with the realization that a few employees may have quite different personal agendas that are not in the enterprise's interest. These people must be managed differently. Also, a significant group of people – some organizations report 40% – are reluctant to assume responsibility and prefer to work in supportive roles. These also need to be acknowledged and allowed for when collaboration teams are structured and evaluated.

Still, most people are eager to take on broader responsibilities that allow them to use their versatility, be more flexible, and adjust their work to facilitate the situation at hand. They frequently report greater job satisfaction and feelings of personal rewards as a result. Greater customer satisfaction, lower costs, reduced error rates, and increased preventions of mishaps are reported by enterprises which support employees to build knowledge and accept increased responsibilities in areas of competence. More importantly, the increased innovation that produces new approaches for enterprise strategies, tactics, and services is significant and leads to considerable increase in structural intellectual capital.

However, allowing employees to act responsibly when given the chance is not enough. The management philosophy must work to change the enterprise culture, particularly through practices and incentives. The culture must be changed to approve and foster new behaviors. They must become “the way things are done around here.” To achieve that, four factors need to be fulfilled to facilitate and foster desired employee effectiveness and behavior:

1. Knowledge and Resources. Professional, craft, and navigational knowledge and metaknowledge, information, and other necessary resources must be made available for employees to deliver quality work products that satisfy the requirements of the situation and the general service paradigm. Employees must also possess requisite skills and attitudes (that is, personality traits). They must be supported by their ability to think critically and creatively by being provided with relevant metaknowledge.

2. Opportunities. Employees must be placed in situations where they have opportunity use their capabilities. Workflows must be organized to take advantage of people's capabilities and to exploit the potentials for innovation and application of diversity.

3. Permission. Employees must be provided safe environments in which to do their work. That means that they must be given permission to innovate, improvise, and “stretch” enterprise policies and practices beyond predetermined scopes to serve the enterprise’s – and the stakeholders’ – best interest.

4. Motivation. Employees must be motivated to act intelligently – to do the right thing – by being provided with understanding and emotional acceptance of how it will be of value to stakeholders, the enterprise, and most importantly, to themselves. This factor is most important, and difficult to effectuate. It requires approaches to effective and active communication that will be new to most.

The general relationships between these factors are indicated in Figure 1. The figure also indicates the differentiation between routine and nonroutine tasks. Routine and simple tasks can be handled effortlessly and efficiently with relatively standard knowledge. Complex and nonroutine tasks require broader and deeper knowledge to make it possible to handle them flexibly and competently in the best interest of all parties.

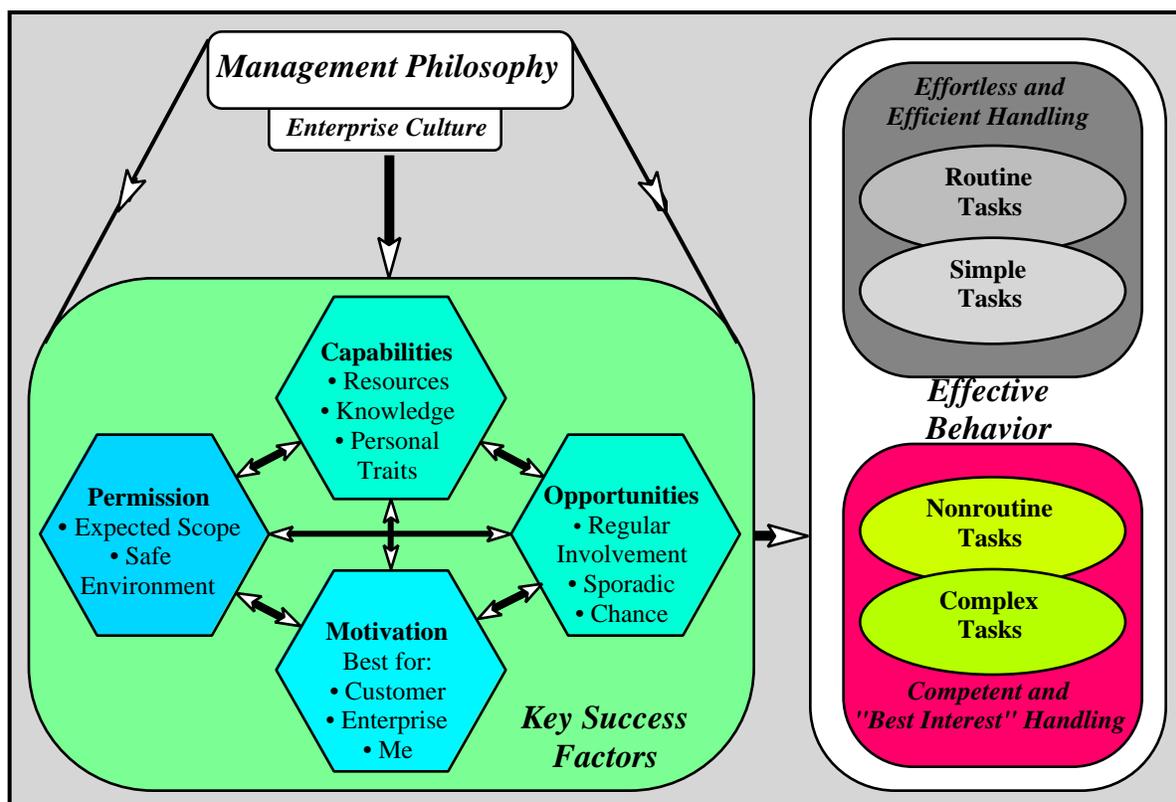


Figure 1. Management Philosophy and Enterprise Culture Drive Effective Behavior.

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2.3. It Is Important for the Enterprise to Be Intelligent!

“Why go to the trouble of making the enterprise act intelligently?” many ask, “What is the payback? We already are quite competitive and successful!” It is clear that making the enterprise intelligent requires management attention, effort, resources, and successful implementation of change. The results

must justify the investments and priority that is placed on such an effort. Apart from being intuitively “the right thing to do,” improved intelligent behavior provides tangible benefits. Depending on which direction the enterprise emphasizes, examples of benefits from intelligent behavior in the commercial sector include:

*When pursuing **Customer Intimacy**:*

- Increased orders and proposal acceptance with resulting revenue enhancement from having more knowledgeable sales and marketing people who learn about specific customer requirements and identify how they can be met while serving the enterprise’s intents – by transferring to all practitioners the mental models and perspectives that exceptional performers use.
- Higher customer satisfaction leading to greater customer loyalty, reduced cost of sales and marketing cost per dollar sold, and greater market penetration by providing better service to customers with individual requirements and made possible by pooling knowledge among collaborating team members and having instant access to expert networks.
- Greater market penetration and profit margins with individualized product specifications and customer service – achieved by obtaining and acting on in-depth knowledge of product use in customer environments and effects on customer profitability and success.

*When pursuing **Product Leadership**:*

- Higher quality products leading to higher value to customers and better market acceptance, which in turn provides greater profitability and enterprise viability – resulting from better transfer of knowledge from outside sources and new educational programs that provide wider horizons and general understanding among designers and marketing people.
- More innovative and advanced products that open up new market niches with increased sales to increase net income per share and share value – made possible by fostering personal innovation, increased sharing of knowledge between marketing, manufacturing, and product development, and a new research agenda.

*When pursuing **Operational Excellence**:*

- Less costly customer products and services producing higher net profit – resulting from increased benchmarking and greater sharing of best practices between different groups inside and outside the organization.
- More timely product deliveries, reduced inventories, less rework, and greater customer satisfaction – by increasing craftspeople’s and foremen’s knowledge of their own and adjacent processes.
- Greater product consistency leading to reduced operating costs – from increased knowledge by all employees about the effects of product variations on customer requirements, sales, and enterprise profitability.

The value to stakeholders of consistent intelligent behavior can be large. When employees – and the enterprise overall – always do the right thing, the enterprise can tackle challenges and render services that otherwise could not be delivered. Still, acting intelligently in all situations and particularly when facing difficult challenges is complex, difficult, and requires considerable planning and preparation – and may be nearly impossible to achieve. Nevertheless, it is a goal that all enterprises must strive towards to ensure quality and reliability for customers, to provide continued security for investors and employees and to serve its stakeholders well.

2.4. Enterprise Success Requires that Everyone Acts Intelligently

For government and non-government organizations and commercial corporations to conduct sustained operations effectively and successfully, they must consistently provide good products and services. They must have “customers” who continually are willing to seek out and obtain its deliverables. They must act intelligently in both large and small matters. By so doing, they position themselves relative to its competitors, respond appropriately to customers, understand the changes and requirements of markets, create the best deliverables, maintain and improve their resources, obtain the best performance from them, and prepare for the future while remaining solvent in the present.

Intelligent behavior is important in all knowledge work. People tend to think of such behavior as particularly important in “valuable” problem-solving or decision-making situations and other high-level tasks such as determining corporate strategy. However, contrary to that notion, intelligent behavior is equally – often more – important on the factory floor and in detailed work throughout the enterprise. Improving the quality of the myriad of “small” problem-solving situations that are part of every employee’s daily work cumulates into a significant improvement in knowledge worker performance for the whole enterprise and makes the difference between a high-performing organization and a well-intending, but stumbling organization. Enterprise strategy may be determined in the boardroom but it is mostly implemented by the individual actions of employees throughout the organization. De Bono (1992), Kao (1996), Klein (1998), Simon (1976), and Singley and Anderson (1989) provide deep insights into personal innovation, decision making, and other aspects of cognitive behavior pertinent to the intelligent-acting enterprise.

The very success of the enterprise is directly dependent upon how intelligent-acting it is possible to make it and everyone within it. Consistent intelligent behavior requires that both individuals and organizations: (a) Show behavioral traits that are effective and acceptable; (b) Prepare well; (c) Choose appropriate postures; (d) Provide excellent problem-solving; and (e) Make outstanding decisions and implement those decisions decisively – that is, *act intelligently!* An overview of factors needed for people and enterprises to be intelligent-acting are presented in Table 2.1.

Other perspectives on what is required to achieve intelligent behavior include suggestions by Kelley and Caplan (1993) of nine characteristics for knowledge workers who perform exceptionally well, the “star performers.” Based on their work at Bell Labs, they assembled a set of characteristics of an expert model for engineers listed in order of importance:

1. Take Initiative – Accept responsibility above and beyond stated job, volunteer for additional activities, and promote new ideas.

2. Network – Obtain direct and immediate access to coworkers with required expertise and share own knowledge with those who need it.

Exhibit effective personality traits:	
<ul style="list-style-type: none"> • Show initiative • Be willing to accept responsibility • Be willing to delegate • Adopt behavior suitable to the situation • Think before acting • Be flexible and responsive 	<ul style="list-style-type: none"> • Be persistent • Be a good listener • Think independently • Be idealistic • Be principled • Be willing to self-correct
<p style="text-align: center;">Be well prepared:</p> <ul style="list-style-type: none"> • Acquire knowledge from all sources and build it into an integrated and congruous whole • Be versatile • Be informed • Create new and important perspectives by integrating seemingly unrelated information • Understand the surrounding world 	<p style="text-align: center;">Choose appropriate tactics:</p> <ul style="list-style-type: none"> • Anticipate future developments and plan accordingly • Invest effort in proportion to the situation's importance • Coordinate with all relevant parties and build consensus when required • Take relevant actions when appropriate
<p style="text-align: center;">Provide excellent problem-solving:</p> <ul style="list-style-type: none"> • Use all relevant knowledge • Consider all readily accessible information –but use only what is relevant • Reframe the problem and consider different perspectives • Be imaginative, innovative, and creative • Analyze situations beyond what is apparent at the surface - beneath symptoms • Discriminate and categorize • Reason rationally and make very few errors 	<p style="text-align: center;">Make outstanding decisions:</p> <ul style="list-style-type: none"> • Accept the challenge and take charge • Identify the objectives behind a situation • Consider all relevant alternatives • Consider consequences • Set priorities • Check reality of the best alternatives • Select the best alternative considering all constraints, objectives, and uncertainties • Communicate decisions convincingly • Implement decisions effectively

Table 2.1. Examples of Representative Requirements for Acting Intelligently.

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3. Self-Manage – Regulate own work commitments, time, performance level, and career growth.

4. Teamwork – Assume joint responsibility for work activities, coordinate efforts, and accomplish shared goals with coworkers.

5. Leadership – Formulate, state, and build consensus on common goals and work to accomplish them.

6. Followership – Help the leader accomplish goals and think for yourself rather than rely solely on managerial direction.

7. Perspective – See your job in its larger context and take on other viewpoints like those of the customer, manager, and work team.

8. Show-and-tell – Present ideas persuasively in writing or oral form.

9. Organizational savvy – Navigate competing interests in an organization, be they individual or group, to promote cooperation, address conflicts, and get things done.

For century-old intelligent enterprises with proven track records de Geus (1997) identifies four dominant characteristics. They are:

1. Fiscal conservatism – the tradition of relying only on its own internal resources and avoiding borrowing capital which would place it in undesirable risk situations.

2. Adaptability – the ability to change focus from and abandon declining businesses and change enterprise direction to pursue new opportunities.

3. Broad societal involvement – the continued active participation and interest in local, national, and international societal and professional activities that place the enterprise in leadership positions and provides it with deep insights of the world-at-large.

4. Tolerance – the willingness to recognize and support people everywhere in the enterprise surface and test new ideas and business directions and when successful, to include them in the product and service portfolio.

The enterprise's effectiveness is a function of how it acts in whole or in parts and how each individual within it acts. The major enabling force behind people's and the enterprise's actions is the application of knowledge – what is known and understood by people and the embedded knowledge in the enterprise's intellectual capital. It consists of human capital, customer capital, and structural capital. Human capital consists of the professional and crafts knowledge, skills, and attitudes that the enterprise's employees possess. Structural capital consists of embedded knowledge assets in documents, technology, and practices, and in the enterprise's systems, procedures, policies, work flow order, and organization. Among others, Edvinson and Malone (1997), Sveiby (1997), and Stewart (1997) discuss these concepts further.

2.5. Dimensions of Intelligent Behavior

In general, intelligent behavior results from having available right assets at the point-of-action and to have the ability and motivation to apply them appropriately. The assets include appropriate characterization of the situation (information) and good knowledge (factual and deep understanding, judgment, procedural and manipulative know-how, and metaknowledge). Abilities include capabilities to make sense of the target situation, determine how to handle it, and implement the desired action successfully. In addition to information and knowledge, intelligent behavior also requires freedom and will to act, access to needed resources, and enterprise support for appropriate follow-up.

Many factors influence the organization's capability to act. These factors work together – each must be satisfied to a minimum level before people and the enterprise can act intelligently. Seven primary factors are listed in Figure 2. Together they provide operating conditions that allow employees and the enterprise to perform the work desired. To be sustained, the knowledge-related factors must be supported by active knowledge management. Figure 2 emphasizes some knowledge management-related activities to illustrate their role in strengthening the enterprise's ability. Other basic requirements also need to be met. They include:

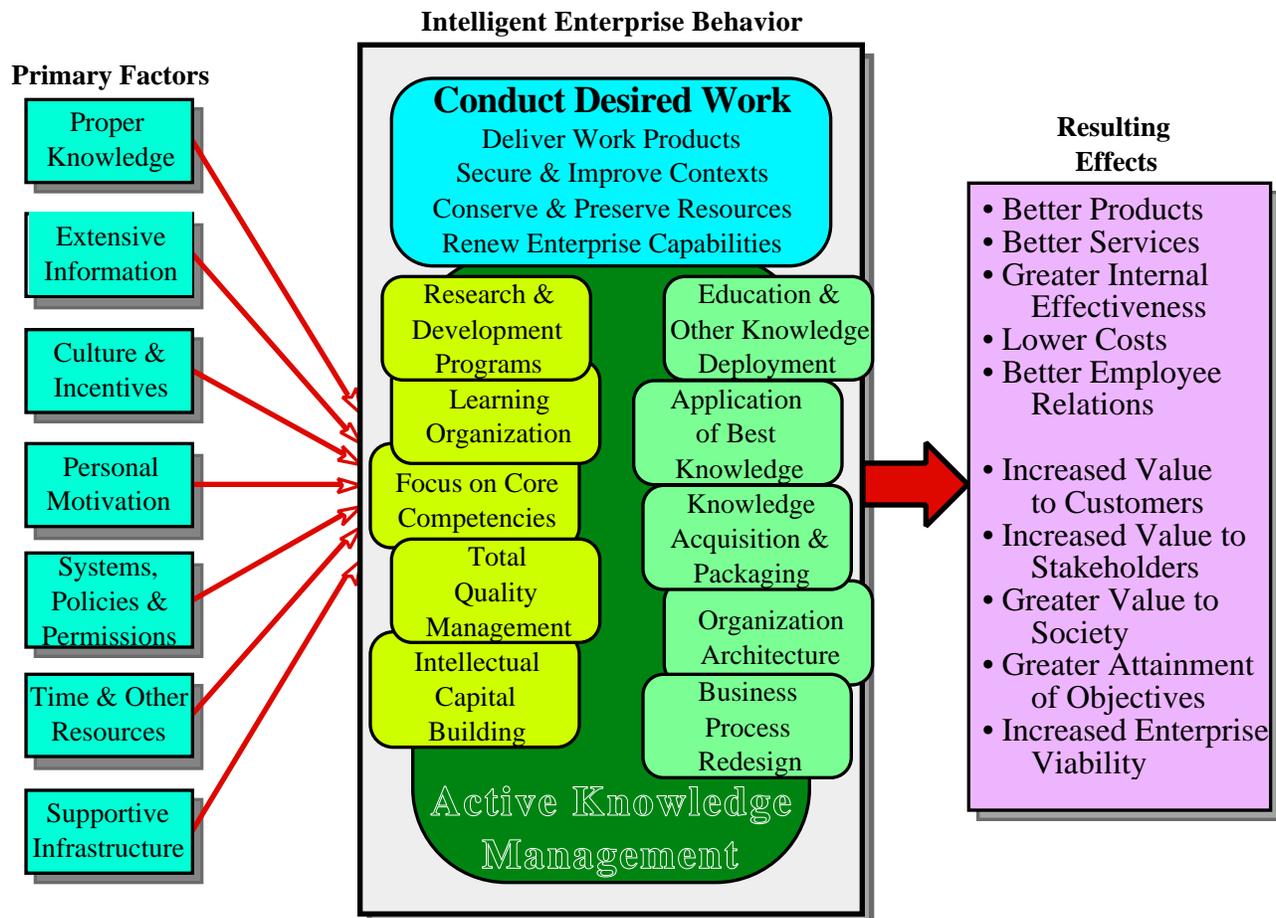


Figure 2. Intelligent Behavior Depends on the Combined Effects of Many Factors.
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- Reliable, comprehensive, timely, and appropriate **information** organized effectively for use
- Knowledgeable and motivated **employees** with good attitudes
- Motivational **culture and environment**
- Supportive and efficient **systems, procedures, and organizational structures**
- Dynamic, strategically proactive and operationally stable **work environments**
- Proactive and benevolent management and operations **practices and philosophies.**

Operationally, for the enterprise to act intelligently, it relies on the behavior of its employees and on the effectiveness of its structural capital including its systems and policies. The underlying premise is that knowledge is a fundamental factor behind all of the enterprise's activities. People need to be broadly knowledgeable to perform effectively, in particular they need to have pertinent expertise to:

- Provide **competent handling** of both well-known and less known tasks

- Provide **innovative approaches** to work and all other endeavors
- Evaluate the **consequences** of actions
- Manage **relationships** and **work environments**
- Conserve **resources**
- Support personal and enterprise **renewal**

2.6. Conditions that Prevent the Enterprise from Acting Intelligently

In practice, it is difficult to maintain an ideal environment that is without factors that inhibit intelligent behavior. In particular, limited resources, management attention, and understanding of how to perform important functions lead many enterprises to make important mistakes. Some of the more common problems include:

- Failing to make explicit and communicate **enterprise direction** – its intents, strategies, or objectives – to employees.
- Failing to inform every affected party about **operating situation** – enterprise and external operational requirements, performance, and expected changes.
- Failing to define and communicate **service paradigms** (see Section 3.4) as required for everyone to understand what they are expected to do and how they are expected to perform.
- Failing to provide **adequate knowledge** to deliver quality work.
- Failing to provide **sufficient resources** (people, funding, facilities, infrastructure, time, and so on) to permit work to be done properly.
- Failing to provide effective **infrastructure capabilities** ranging from information technology applications to mechanisms to support knowledge flows.
- Failing to capture, organize, and deploy **important knowledge** for continued organizational learning.
- Failing to provide necessary **incentives** and develop **motivated employees**.
- Inspecting and controlling work results and failing to **delegate authority** to knowledgeable employees for taking responsibility for the quality of their work.
- Failing to provide sufficiently **stable work condition** to allow work to be perfected and carried out predictably.
- Failing to provide and maintain **appropriate culture and environment** and to keep **proper order**.

- Failing to **holding employees accountable** for their actions.
- Using excessive **negative reinforcement** and placing employees in uncomfortable positions.
- Creating **bureaucracies** where none is needed.

Each of these problems can be avoided by implementing well-known, mostly knowledge-related activities or capabilities. For example, providing knowledge to deliver quality work can involve identifying the desired job description and service paradigm, the knowledge map (K-Map), and detailed knowledge that should be present at the workplace. Following identification of needed knowledge, a knowledge transfer program can be fashioned. Implementing such a program may involve education, learning on-the-job, or use of intelligent performance support systems, and so on. Another example is to avoid creating unneeded bureaucracies by delegating authority for complex tasks to collaborating teams with joint knowledge profiles appropriate for the challenges and providing these teams with accurate, timely, and properly organized information and other resources required.

3. KNOWLEDGE MANAGEMENT SUPPORTS THE INTELLIGENT ENTERPRISE

Many writers have addressed application of knowledge management to make the enterprise more effective. Among those are Allen (1998), Amidon (1997), Davenport and Prusak (1998), Drucker (1988), Liebowitz (1999), Myers (1998), Sveiby (1987) and (1997), and Wiig (1993), (1994), and (1995). Several directions are pursued for managing knowledge. Most enterprises tailor knowledge management practices to their needs and environments. Advanced enterprises pursue a central strategic thrust with four tactical foci as indicated in Figure 3. However, most have narrower perspectives. Some focus on knowledge sharing among individuals or on building elaborate educational and knowledge distribution capabilities. Some emphasize use of technology to capture, manipulate, and locate knowledge and initially, many focus on information management rather than KM. Others focus on better knowledge utilization to improve the enterprise's operational and overall effectiveness. Still others pursue building and exploiting intellectual capital to enhance the economic value of the enterprise. A small number of exceptional enterprises have created "knowledge-vigilant" environments. They realize that constant, widespread attention must be focused on ensuring that their intellectual capital always will be competitive and that they have the means to apply it effectively. Their presumption is that intellectual capital, properly utilized and exploited, is the central resource behind effective intelligent behavior.

For the intelligent enterprise, knowledge management needs to be broad and embrace all knowledge-related approaches and activities throughout the organization. In this view, knowledge management must be practical and directly aimed at supporting the enterprise's ultimate objectives. From the system point of view it is necessary to manage knowledge in ways that best support the processes that use it to conduct work – the human mind. That often leads to practices that can be quite sophisticated and rely on extensive understanding of cognitive processes. This is needed to support targeted efforts that are focused on the organization's needs and capabilities. These efforts will match acquisition, organization, and delivery of knowledge to the particular work to be conducted and to the needs and cognitive styles of knowledge workers. Many organizations implement systematic and explicit knowledge management practices over time to create enterprise-wide and people-centric environments that promotes continual personal focus on knowledge-related matters. Such practices tend to become comprehensive, yet, they are highly contextual and adapt well to local needs and to the changes that always take place.

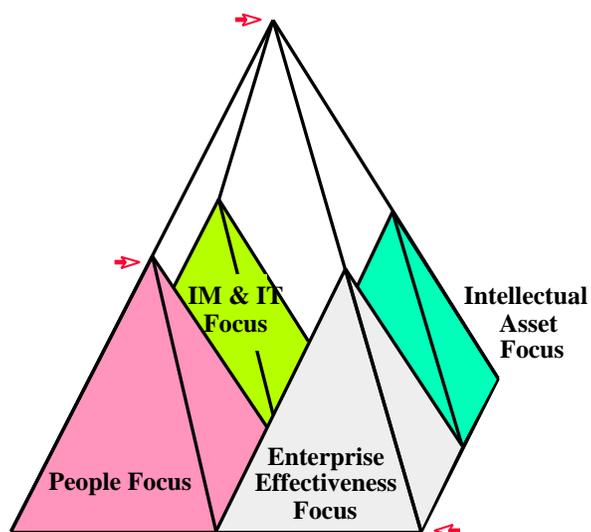


Figure 3. Comprehensive Knowledge Management Strategy Focus Areas.

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An important requirement, for intelligent enterprises and for effective knowledge management, is to deal explicitly and systematically with the complexity of how people use their minds. There must be focus both on how people think consciously and how they use associations and tacit knowledge nonconsciously to make decisions and conduct work. It is necessary to consider what people need to understand and how they must possess certain areas of knowledge and have access to the various knowledge areas to act effectively in different situations. An example is which knowledge a service representative needs to keep in mind in the form of tacit automatic knowledge to conduct effective client conversations to elicit and evaluate client needs and intents and decide how to advice the client. For other purposes, the service representative may only need to have access through a computer system to these judgments associated with external data-driven conditions that may change from hour to hour. Similar considerations also hold on the organizational level and require totally new approaches to business process redesign.

A model of enterprise-wide intelligent behavior is presented in Figure 4. It outlines elements that fall under the auspices of KM, such as learning and innovating and the effective creation and utilization of structural knowledge assets of many types (“KAs”) in internal operations. It also points to the needs for individuals to act intelligently – by providing permission, motivations, opportunities, and capabilities.

As now, enterprises may continue to be motivated by several end-goals, such as securing short-term success and long-term viability. Public and non-governmental agencies may be concerned about their capability to serve particular societal needs. A particular knowledge management objective in support of whichever strategy the enterprise pursues, is to leverage the best available knowledge and other intellectual capitals to make people, and therefore the enterprise itself, act as effectively as possible to deal with operational, client, supplier, environmental, and all other challenges to implement the enterprise strategy. Proactive enterprises increasingly manage knowledge systematically and have often been able to incorporate many activities implicitly in each department’s and employee’s daily work and practice.

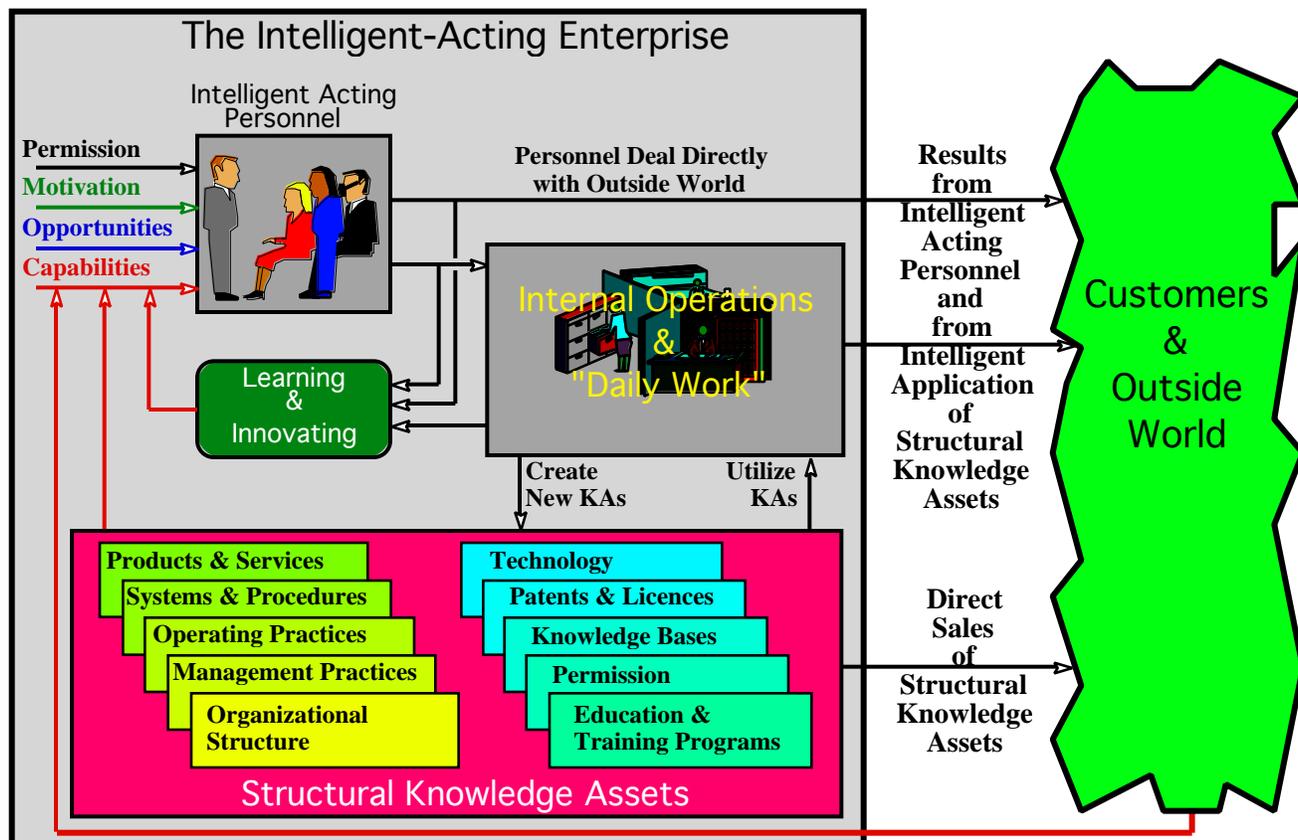


Figure 4. Individuals, Knowledge Assets, Learning and Innovation, and Internal Operations in the Effective Enterprise.

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3.1. Enterprise Success Rests upon Effective and Knowledgeable Behavior

Effective behavior is vital. Sustained success and viability require effective execution of internal functions and interactions with environment – that is, consistent intelligent behavior. When individuals act intelligently within an effective framework, the enterprise can act intelligently – operationally, tactically, strategically, and in competent support of its markets. In practice, intelligent behavior means that employees and the organization itself responds to adjust actions to the context by improvising around the given strategy, tactics, and policies. It also means to act creatively and responsibly in everybody’s interest to achieve the best results possible. Often that requires collaboration – in a collegial culture bypassing politics and bureaucracy. A major operational objective is to make the service recipients successful by customizing deliverables to satisfy individual needs while at the same time implementing the enterprise goals.

The success of an enterprise depends on the interplay of many conditions. Some are beyond influence or control by the enterprise while others are associated with the enterprise’s own actions. Still others – and these we consider here – are associated with how the enterprise arranges its internal affairs. Among these conditions we find:

- The ability to deliver desired service paradigms by individuals, departments and business units, and by the overall enterprise

- The ability to act in a timely fashion
- The capability of employees to deliver the workproducts for which they are responsible
- The effectiveness of interpersonal work (teaming and networking) through coordination, cooperation, and collaboration
- The degree to which work at all levels supports implementation of enterprise strategy and direction
- The ability to create, produce, and deliver superior products and services that match present and future market demands
- The effectiveness of outcome feedback on how well workproducts perform – in the marketplace as well as within the enterprise
- The degree to which innovations occur, are captured, communicated, and applied
- The ability of individuals, teams, units, and the enterprise itself to deal with unexpected events, opportunities, and threats
- The effectiveness of enterprise systems, procedures, and policies in terms of how well they deal with normal requirements and how versatile they are when dealing with unusual and dynamic challenges
- The degree to which undesirable and dysfunctional personal or systems behaviors are controlled and corrected

All of these factors depend to significant degrees on availability and application of good knowledge. Consequently, broad and systematic management of knowledge and intellectual assets becomes a key support activity to ensure enterprise success and viability.

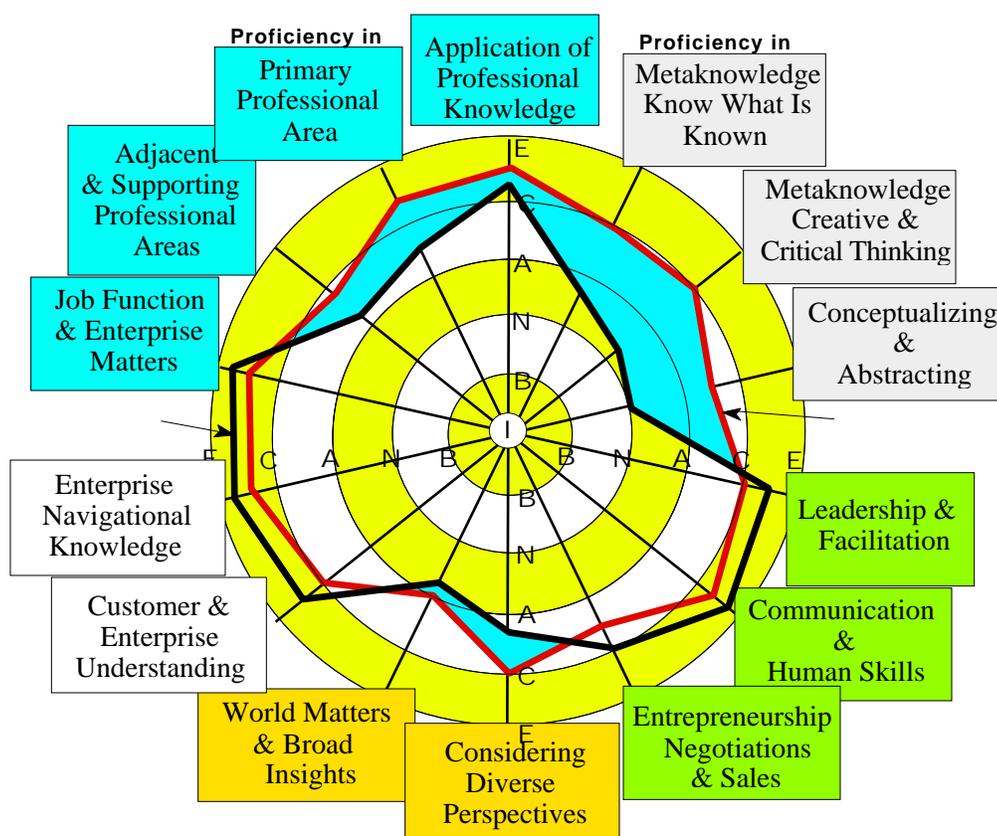
The leaders of the intelligent enterprise understand that all employees, at all levels, must be broadly knowledgeable. They must have professional and craft knowledge, organizational navigation knowledge, and understanding of enterprise goals, objectives, and functioning. And they must have practical and pertinent metaknowledge about critical thinking and about what is, and is not known. In addition to their intellectual understanding of their work and its effects on stakeholders, the enterprise, and themselves, they need to be emotionally engaged to conduct the work required.

3.2. Knowledge Required to Act Intelligently

Professional and crafts knowledge allow people to gather appropriate information, understand and evaluate the situation that the information describes, explore and innovate, decide how the situation should be handled, judge the acceptability of potential outcomes, and implement the selected approach effectively. While that includes knowledge of primary work functions, it is also important to possess a broad base of world knowledge and specific understandings of many different areas that are related to work in various ways. Innate personal capabilities – such as attitudes – clearly provide a basis for

acting intelligently, but without specific work knowledge and skills and general knowledge, people cannot attain the necessary practical and subject-specific proficiency that is desired to fulfill the broader expectations such as those presented below in the Section on Service Paradigms. Better knowledge normally improves the quality of work by supporting “smart working” rather than “hard working” – both for individuals and organizations.

With improved knowledge people know better what to do and how to do it. They must also be provided with knowledge of what they know and how to think critically and be innovative – that is, they need metaknowledge and engage in metacognitive reasoning. They will know *why* they can do it better and *why* it will serve themselves and the organizations well. These are basic reasons why the major purpose of knowledge management is to make the enterprise intelligent-acting by facilitating creation, cumulation, deployment, and use of quality knowledge. Figure 5 provides an example of the breadth of knowledge that assists employees in having wider perspectives and the ability to take on broader responsibilities.



Legend: B - Beginner; N - Novice; A - Apprentice; C - Competent; E - Expert

Figure 5. An Example of Broad Knowledge to Facilitate Intelligent Behavior.
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3.3. The Changing Workplace

Work will continually change and becomes more complex to satisfy the increasing requirements for improved effectiveness and to provide deliverables with new features and increased capabilities.

Enterprises prepare their workforces better, automate many routine functions, and organize work in ways that produce the new deliverables effectively. Work is expanding to take advantage of the new knowledge capabilities. The nature of shift towards more complex and valuable work is indicated in Figure 6. Intelligent automation systems perform routine tasks thus freeing people to apply greater understanding and expertise to more demanding work. Application of advanced technology and experiences by sophisticated organizations continue refinement of work in general.

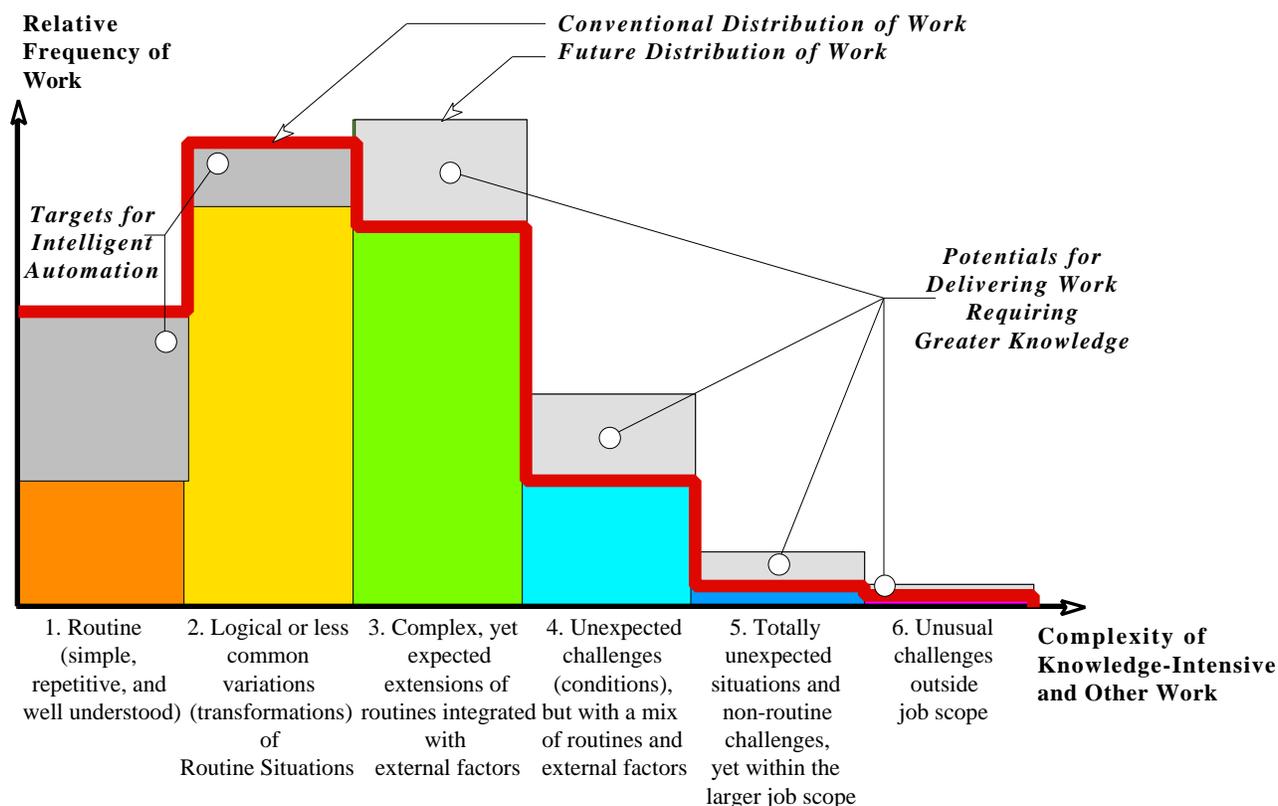


Figure 6. Increased Personal Knowledge and Capabilities Makes Work More Complex.
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When enterprises ask their personnel to engage in increasingly complex work they also change the job descriptions and service paradigms which become more complex. Even so, when working with increased responsibilities, knowledge workers report that they feel more confident and have better understanding of work to be done. Their job satisfaction is increased when they have better knowledge at the point-of-action, more jobs will be done right the first time, adding to confidence and job satisfaction inside the enterprise, and leading to better market acceptance on the outside. Placing improved capabilities and knowledge at the point-of-action, also leads to less costs and effort to deliver work according to conventional scopes. To obtain the desired effectiveness, personal job-related understanding must be increased by building better conceptual understanding in the forms of script and schema knowledge.

An example is found among oil refinery operators, many of whom now have changed roles. Advanced computer control has automated normal, and many abnormal operations leaving operators with new responsibilities to seek out better operating conditions, anticipate and prepare for operating changes to

compensate for upstream changes and disturbances, and to diagnose emerging problems. The operators have obtained and developed new knowledge to accept these responsibilities and have taken over some functions from process engineers and maintenance technicians, who now are free to pursue work that previously was not well covered. More importantly, products are closer to specifications, production rates are higher, energy consumption per ton of product are lower, and maintenance problems are reduced.

3.4. Knowledge Management Implementation Issues

The reasons why enterprises pursue systematic knowledge management are clear: They wish to make people – and the whole enterprise – act intelligently to operate more effectively and satisfy their stakeholders better. However, the practical issue is how to approach introducing or expanding the knowledge management practice.

To introduce knowledge management practice successfully in the enterprise, nine agenda items must be pursued up-front. In sequence of importance, these items are:

1. Create an **environment** of trust, ethical behavior, mutual respect, support, and open communication about individual employees' functions, roles, and importance of contribution – in part based upon individual responsibility and accountability.
2. Develop a **broad vision** of the knowledge management practice and obtain **buy-in** from management. Champions must have a flexible mental outline of how knowledge management might be conducted and organized to support the enterprise. This vision provides the guide for creating the needed capabilities and infrastructure and for setting priorities. It should be documented in brief discussion papers.
3. Pursue a **targeted knowledge management focus** determined from knowledge landscape mapping and other insights and based on priorities that align with enterprise objectives. Undertake small and sharply focused initiatives with clear benefit expectations. These initiatives should build cumulatively to implement the broader knowledge management vision over time.
4. Build a **professional team** and allow it to **focus full time** on knowledge management. Designate a few (maybe only one) highly competent employees to work dedicatedly with implementation. Avoid the common mistake of diverting their efforts by giving them additional responsibilities. This is difficult since these individuals tend to be some of the most valuable in the organization. The practitioners must have good understanding of “knowledge” (in contrast to “information”), its role in conducting knowledge intensive work in target situations, methods for eliciting, acquiring, transferring, and organizing knowledge; and so on. These are often new professional areas for the enterprise.
5. Install and agree on knowledge management **impact and benefit evaluation methods**: Impacts and benefits are often indirect and happen gradually over time. Dynamic event chain or other impact assessment approaches must be selected and serve as approved foundations for cost-effectiveness or E.V.A. (Economic Value Added) analyses that are acceptable for setting enterprise priorities.

6. Implement **incentives** to motivate individual employees to manage knowledge on personal and enterprise levels, collaborate broadly, and act intelligently – to innovate, capture, build, share, and use knowledge. The enterprise must express its support clearly. Employees on all levels must be helped to understand personal benefits resulting from active knowledge management. **Disincentives** must be removed.

7. Teach **metaknowledge** to everyone. When allowed to develop metaknowledge for creative and critical thinking and of knowing what is known, knowledge workers at all levels demonstrate significant increases in their effectiveness and ability to develop and take advantage of improved subject knowledge. Metaknowledge is important for areas as disparate as situation handling (including problem solving and decision making), systems theory, dealing with interpersonal situations, and technical work topics and may include techniques such as topic-, methodology-, and structure-related conceptual maps.

8. Select knowledge management activities that will support the critical success factors by providing **opportunities, capabilities, motivations, and permissions** for individuals and the enterprise to act intelligently. Realize the full value of personal knowledge and structured knowledge assets by utilizing these assets to deliver products and services effectively. Effective intelligent behavior can only be achieved when the conditions of opportunity, capability, motivation, and permission are satisfied.

9. Create supporting **infrastructure**. Build upon existing capabilities and gradually add new ones as required to facilitate effective knowledge management, particularly in the chosen target areas. Supporting infrastructure capabilities range widely – from information and communication systems to virtual corporate universities.

A common problem for many teams is that they do not have opportunities to acquire sufficient and working understanding of knowledge management theory and practical approaches. Practical work requires expertise at several levels. The team must have access to expertise to deal with central issues such as:

- **Providing insights to set knowledge management priorities and strategic direction.**
- **Understanding broad, enterprise-wide requirements** to determine needs for incentives, infrastructure, and other supports.
- **Working with knowledge-intensive functions** (that is, how people – and organizations – obtain, create, hold, share, and use and apply knowledge) to determine needs and opportunities.
- **Dealing with and manipulating knowledge itself** – elicit, organize, encode, deploy personal and structural knowledge for direct use or to build it into intellectual capital such as products, services, technology, or knowledge-based systems (KBS) applications.

3.5. A Taxonomy of Potential Knowledge Management Building Blocks

Examples of knowledge management building blocks – potential activities – for starting and sustaining the enterprise's practice are presented below. They can be pursued in series or parallel, iteratively or periodically. Different versions or new activities may be created to suit the situation. Approaches must

be flexible and will vary as functions of constraints, capabilities, and enterprise emphasis. Improvisation is required to reflect the real context. It will vary with people, work environments, management philosophies, and needs of the enterprise, its customers, its suppliers, and other stakeholders. As a result, detailed emphases and implementation solutions must be adapted to the situation.

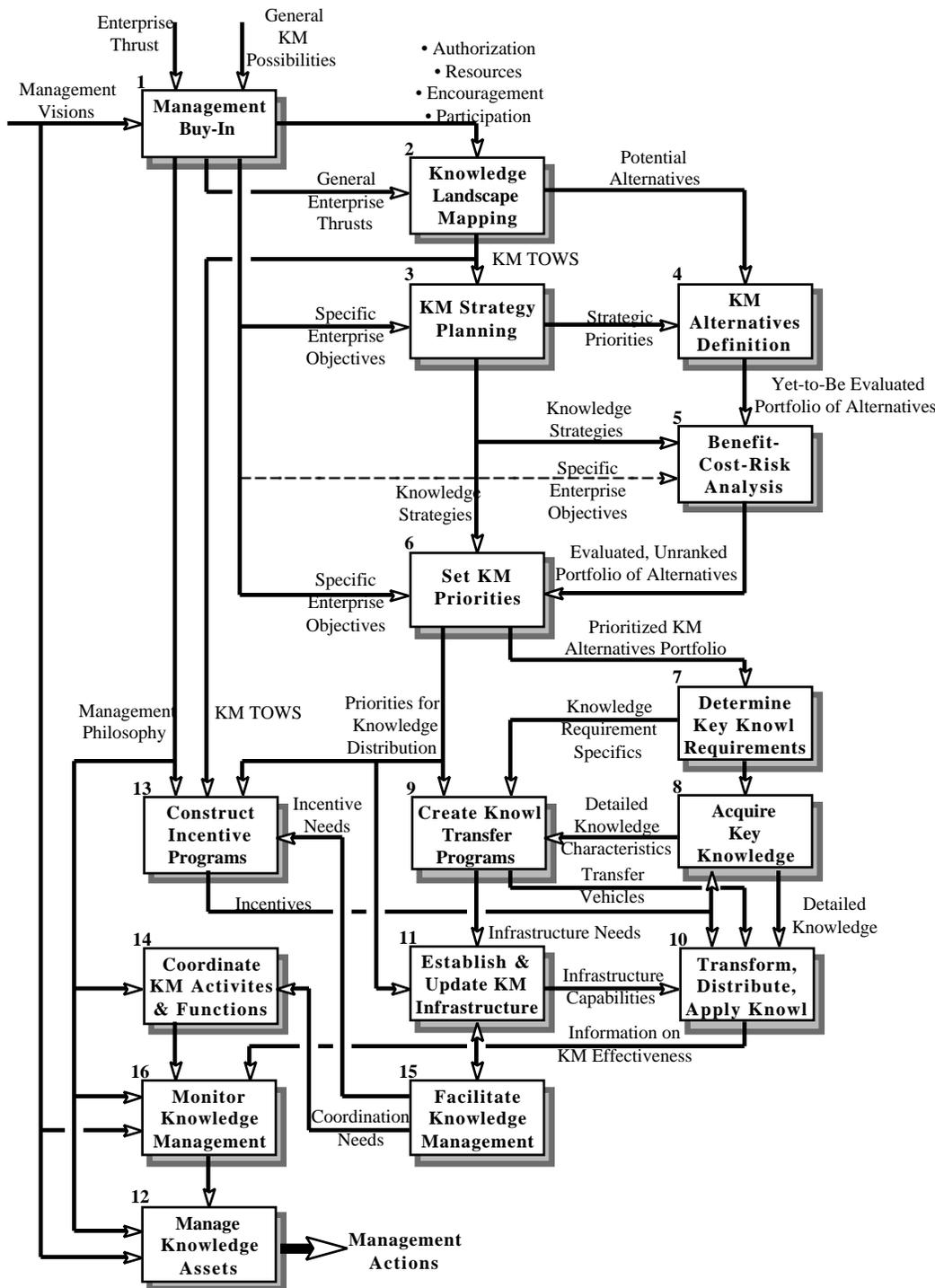


Figure 7. Illustrative Relationships Between knowledge management Building Blocks. (© Copyright 1998 by Karl M. Wiig. Reproduced with permission.)

Some of the basic relationships between the potential building blocks are illustrated in Figure 7. (See Liebowitz (1999) for further descriptions of these building blocks.) Major relationships are labeled. Broader relationships, such as those related to general management functions are not identified, nor are all their points of influence. It is implied in Figure 7 that a knowledge management introduction program may start with the first building block, “Obtain Management Buy-In,” and that other activities proceed from there. That may not always be the case. If sufficient insight already exists, the introduction effort can be focused directly on highly value-added efforts. Similarly, one or more of the building blocks may be omitted when there are sufficient reasons to proceed directly.

Together building blocks can form a coordinated and comprehensive knowledge management practice. However, the intent is not for the beginning practice to pursue all building blocks, but to select those that form a suitable approach for the particular situation that the enterprise faces. The major building blocks include:

1. Obtain management buy-in and commitment since it is essential for success of knowledge management efforts. This stems from the central position that knowledge occupies in the enterprise by being the primary enabler behind every person’s – and the enterprise’s – ability to act.
2. Survey and map the knowledge landscape. Identify the nature, threats, opportunities, weaknesses, and strengths (TOWS) of the enterprise knowledge assets, practices, and overall situation in view of enterprise direction and operations and market pressures and opportunities. Determine service paradigms, job descriptions, and build supporting knowledge maps. For key functions the chart of knowledge-related responsibility and activity areas might be created as in Figure 8. The knowledge map might also be created as in Figure 8.
3. Plan the knowledge strategy. Determine how knowledge management will support the enterprise or business unit strategy and make a preliminary draft document of the envisioned thrusts and expected priorities.
4. Define and describe knowledge-related alternatives and potential initiatives. Identify opportunities for improvements such as opportunities for revenue enhancement, creation of new products and services, relief of knowledge-bottlenecks and other knowledge-related actions with the support of department and enterprise-level priority setting and outline their expected impacts and benefits.
5. Portray benefit expectations from the primary knowledge management initiatives to prioritize, guide implementation, and monitor the effectiveness of efforts.
6. Set priorities based on enterprise and knowledge management strategy, expectations for net benefits, needs, and availability of capabilities.
7. Determine key knowledge requirements. Identify knowledge – in greater detail than that outlined in knowledge maps – required to deliver quality work in key or complex key critical knowledge functions (CKFs) for the breadth of complexities that are expected to be served.
8. Acquire key knowledge. Examples are: capture knowledge from departing personnel, lessons learned systems, and expert knowledge required for key critical knowledge functions.

9. Deploy knowledge to points of use by creating integrated knowledge transfer programs – for example by coordinating training programs, creating expert networks, or communicating expert knowledge such as concept hierarchies and mental strategies to practitioners (such as content knowledge as subject knowledge and methodologies as metaknowledge).
10. Transform, distribute, and apply knowledge assets. Organize and transfer expert knowledge to practitioners. Reconfigure, deploy, and exploit knowledge through effective use of “best” knowledge in all daily work.
11. Establish and update knowledge management infrastructure. Build and maintain generic capabilities, some of which are specific to knowledge management while most are shared with other activities and functions.
12. Manage knowledge assets from top-down perspectives. Create, renew, build, and organize specific knowledge assets such as patents, technologies, and practices to address priority knowledge opportunities.
13. Construct incentive programs. Motivate employees to act intelligently, that is, be innovative, collaborate, share knowledge, expend effort to capture knowledge (such as lessons-learned), ask for assistance when meeting unfamiliar or difficult situations, and so on.
14. Coordinate knowledge management activities and functions enterprise-wide. Identify knowledge management – related activities and assist them to coordinate, cooperate, and collaborate to build valuable capabilities and practices.
15. Facilitate knowledge-focused management: Provide high level activities to change the enterprise’s service paradigm, culture, work environment, management philosophy and practices, operating practices, decision rights, work flows and “opportunities to act intelligently,” and personal motivators.
16. Monitor the knowledge management practice: Provide feedback on progress and performance of programs and activities.

3.6. Job Descriptions and Service Paradigms

Within the enterprise, each operating entity – unit, department, team, and individual employees – is expected to deliver “business services” in the form of work products that support the enterprise’s purpose. The desired business services can be defined explicitly in considerable detail such as in procedures manual for a function or job description for a position, or they can be general and broad. For particular positions and functions, job descriptions often specify the expected work deliverables and which professional or crafts knowledge and tools may be used.

Service paradigms define what often has been implied but never has been explicit. They outline the broad nature of the entity’s services defined from the perspectives of service recipients and the parent enterprise. They describe what and how products and services should be delivered and how employees are expected to act and perform. Service paradigms serve several purposes. 1. They delineate what each operating unit is expected to deliver from strategic and tactical perspectives. 2. They define

expectations against which general unit performance may be judged qualitatively. 3. Indirectly, they indicate expectations and outline requirements for knowledge and other resources and conditions needed. Service paradigms tend to outline the expected performance according to the four emphasize areas outlined in Section 2.2

3.7. Charting Knowledge Management-Related Activities in the Enterprise

Knowledge management perspectives and considerations are embedded in many regular activities throughout the enterprise. It is important to obtain overview of these efforts to coordinate similar efforts and to provide support. An example of how broadly knowledge management-related activities and functions may be distributed in an organization is indicated in Figure 8. It highlights separate and shared responsibilities for KM-related activities within business and professional units, human resources (HR), information management and technology, and the enterprise-wide knowledge management function.

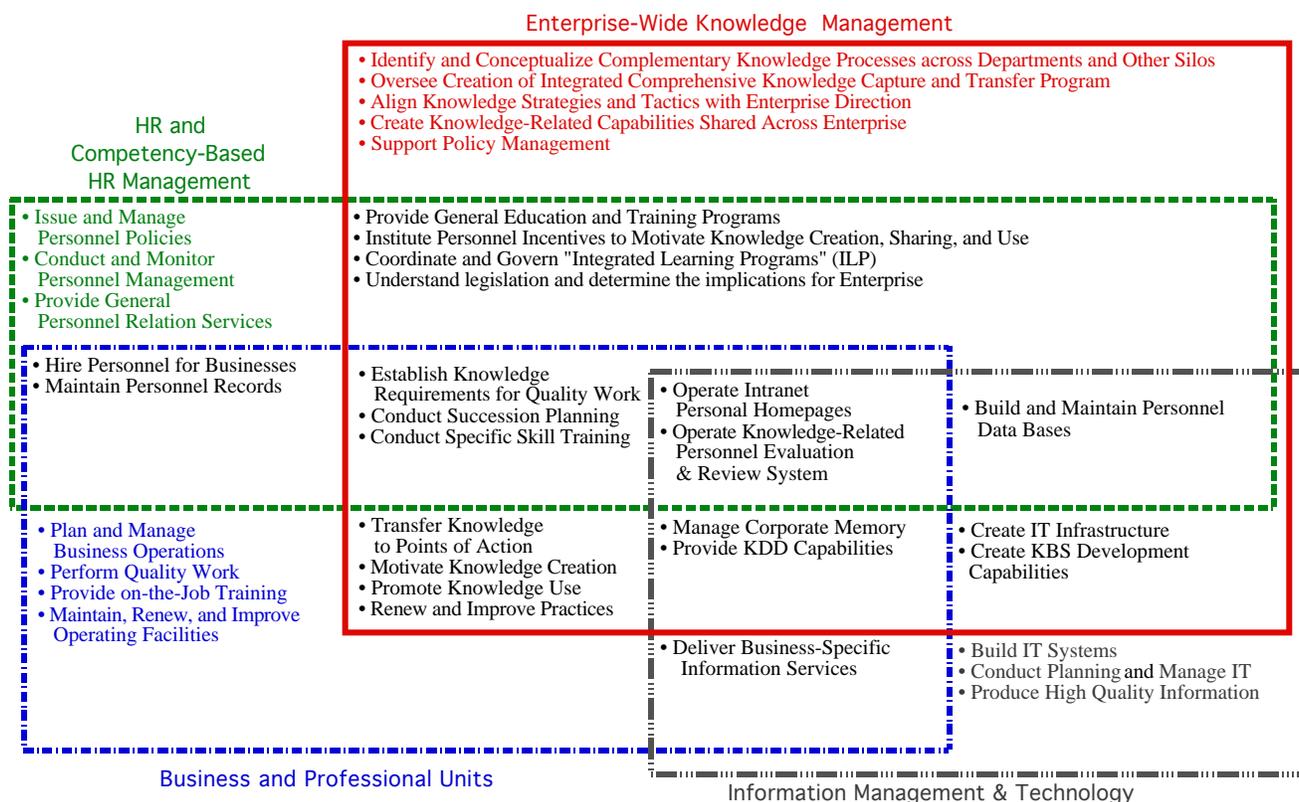


Figure 8. Examples of Sole and Shared Responsibility Knowledge Management Activities.
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3.8. Mapping Knowledge Required for Desired Work

Knowledge maps (K-Maps) are developed in team settings through extensive discussions that include the manager of the function with direct participation of the core staff. Whereas the documented K-Maps are of considerable value and importance in obtaining an overview of the status of knowledge within the enterprise, the major value of these efforts lies in the personal participation by the team members in the process. Often for the first time – they have the opportunity to focus on issues of work

to be delivered, knowledge needed, and how to build expertise to provide a successful and competitive operation. They explore what their peers consider important and obtain agreements on many priorities and specific needs that must be addressed.

K-Maps is a first pass of working documents to be revised at periodic intervals as part of the knowledge management practice. As experience with the K-Maps increases, the methods to develop them are refined further. The mapping process increases in value from repeated updating discussions and from the inclusion of knowledge-related issues in people's thinking.

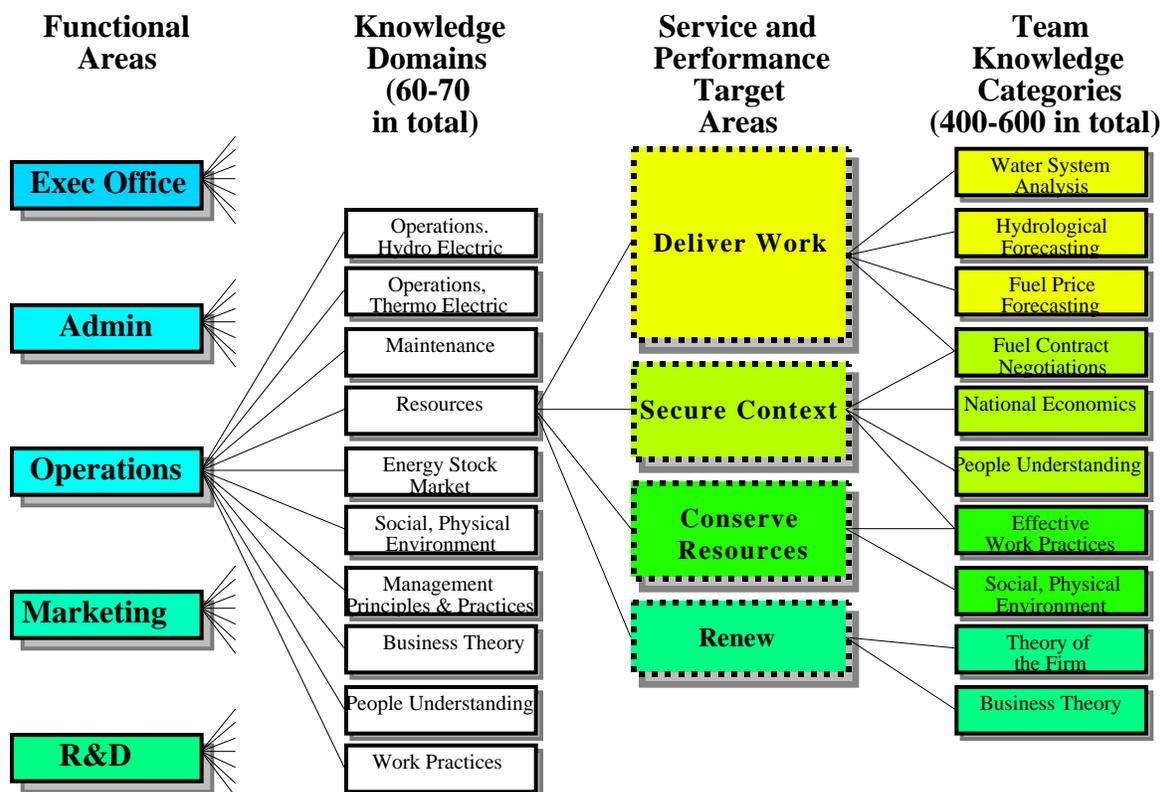


Figure 9. Example of a Knowledge Map Section.
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4. CONCLUDING PERSPECTIVES

Enterprises of all kinds are expected to improve over time to serve their stakeholders and constituents better. Most often, these improvements require increased intelligent behavior. The basic enabler is the quality of knowledge available at the point-of-action while the employees' motivation provides the major driving force. The intelligent enterprise pursues explicit and systematic knowledge management to maximize the quality, readiness, and use of knowledge. By providing better knowledge and motivation at the point-of-action, enterprises are able to tackle challenges and render services that could not be delivered in the past.

For the enterprise to act intelligently, it needs to adopt people-centric perspectives of knowledge. Constant learning is needed – led by constant innovation. For this purpose technology only goes so far. It can only provide rudimentary reasoning devoid of innovation with concrete analyses of the past

through approaches such as knowledge discovery in databases. People are the intelligent agents that create and act on new opportunities. It is taking advantage of those opportunities that brings the world forward.

Implementing knowledge management practices is not simple. Several conditions must be met to create the desired effectiveness. On one side, knowledge management may be introduced quickly to gain early bottom-line results by targeting the most promising opportunities. It may make available the most capable people to ensure the best possible approaches and yields from the efforts. On the other side, introducing knowledge management should ideally create minimum disturbances and distractions from daily work and other efforts, consume minimum resources, be able to utilize people who are not urgently needed elsewhere, and expose the enterprise to minimum risks. Most senior managers would also prefer that approaches to knowledge management introduction would be sufficiently well understood to allow delegation of its implementation and management and thereby reducing the need for their own involvement and attention. These ideal conditions are rarely possible.

Advanced management teams ascertain that knowledge-related activities are managed systematically and explicitly. Numerous options are available and many different approaches are pursued. The practice of knowledge management will continue to evolve and draw upon support from many theoretical and methodological areas. Practical experiences by enterprises will result in innovations and understandings of which approaches work and which do not. Management sciences will provide methods for managing intellectual capital renewal, priorities, and investments. Advances in cognitive sciences will increase understanding of effective decision making, methods to support intellectual work, approaches to learning, and processes to transfer skills. Research on the nature of intellectual work will explicate how different kinds of knowledge is used, should be possessed, and accessed in different work situations. Artificial intelligence (AI) and advanced information technology will increase abilities to automate and support complex work tasks. Nevertheless, the knowledge management approaches that are available are very valuable in practice regardless of the needs to develop them further.

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