Location-Based Knowledge Management Spectrum with an Updated Binney's Approach

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Location-Based Knowledge Management Spectrum  
with an Updated Binney’s Approach

1- Abstract

Mapping Knowledge Management to organizational activities means satisfying organizational members with the right knowledge at the right time, place, and form. Organizational activities differ in type, complexity, and importance depending on their level of strategic involvement in accomplishing the organizational mission and goals.

Derek Binney has proposed a matrix like framework that assigns business functions to the corresponding knowledge cycle phase. Knox Haggie and John Kingston have revised Binney’s spectrum to include an additional business function, that is Asset Improvement, in an attempt to foster intellectual asset management and operational excellence.

The current research covered a wider range of Knowledge Management cycles, presented by various contemporary authors, and incorporated them into Binney’s spectrum.

The revised Binney’s KM spectrum was significantly updated with new perspectives and methods and a totally new business Knowledge Management cycle is proposed from a Location-Based perspective. The Location-Based Knowledge Management Spectrum is a five stage cycle comprising the
following knowledge-based location levels within the organization:

1- Operations
2- Group
3- Mind
4- Knowledge Base
5- Organization

This paper’s objective is three fold:

1- To review the latest Knowledge Management cycles.
2- To update Binney’s Knowledge Management spectrum.
3- To define a new approach to Knowledge Management: The Location-Based Knowledge Management Spectrum.

2- Introduction

Knowledge constitutes today’s most valuable asset to knowledge based organizations. New strategies must be followed for effective and efficient use of this new intellectual asset. Kimiz Dalkir, in [1:2], stated some of the knowledge characteristics as follows:

1- Knowledge can be used more than once, so knowledge consumption does not render it obsolete.
2- Knowledge sharing and transfer don’t deprive the sender from the knowledge value he/she owns.
3- Knowledge can be found everywhere but the problem is how to acquire it, use it, and apply it.
4- Knowledge is mostly tacit, residing in the heads of the employees, and organizations are urged to keep it by all means.

In the 21st century, knowledge is becoming the competitive factor in all organizations. The Information and Communication Technology (ICT) evolution has changed the way people live, think, and act. It has shifted organizational dynamics and processes and even changed the product shape, type, and use. Knowledge is changing the way we explain the existence of firms. [2]

The 21st Century is now a breakthrough to a new Age that we call the
Knowledge Age where organizations ought to “learn, remember, and act on the best available information, knowledge, and know-how” [1:2].

Knowledge Management is still considered a young discipline despite the large amount of academic and commercial research. The reason behind this is the various perspectives the word “knowledge” is approached: technological, cultural, societal, organizational, individual, and many others.

Kenneth et al., in [15], proposed that Knowledge and Knowledge Management have evolved through four stages:

1- Knowledge as the domain of philosophers and scientists (for more than two millennia).
2- Precursors to knowledge as a management issue (mid 20th century).
3- The emergence of Knowledge Management as a discipline and First Generation Knowledge Management (1990’s).
4- Next Generation Knowledge Management (early 2000’s).

Kenneth et al. argued that next generation of Knowledge Management focuses on the following themes:

1- Strategy Involvement
2- ICT Factors
3- Knowledge Modeling
4- Innovation & Creativity
5- Personal and Social Factors
6- Intellectual Asset

Andre Saito et al., [14], “argue that knowledge comprises three different aspects: it can be […] a product, a process, or power”. They defined knowledge as a product when it takes a tangible form (e.g. manifest, model, theories), and as process when it is understood and developed through learning (e.g. explanations, descriptions of methods) and as power when it has a “capacity to cause change or action” (e.g. skills, abilities, goals).

The organizational structure adds further complexities to Knowledge Management for it considers knowledge to take more than one aspect at a given time and place. This paper’s objective is three fold:

1- To review the latest Knowledge Management cycles.
2- To update Binney’s Knowledge Management spectrum.
3- To define a new approach to Knowledge Management: The Location-Based Knowledge Management Spectrum.
3-Knowledge Management Cycles

Knowledge is produced, shared, and then used by people. The knowledge cycle is therefore about people both in terms of knowledge creation and knowledge content. Technology plays an enabling and supportive role when managing knowledge activities.

There is a three-core combination that constitutes the infrastructure of Knowledge Management [3] (see Figure 4-1):

1- People: they are the experts, specialists, customers, suppliers, and knowledge workers.
2- Content: it is the knowledge residing in the heads, documents, or created through sharing, meetings, team work, and so on.
3- Technology: refers to the information and communication technologies and to the technical human resources required to enable knowledge.

Figure 4-1: Knowledge Management Infrastructure

Many authors involved in Knowledge Management practices found it imperative to define a concrete Knowledge Management cycle for a proper implementation of a Knowledge Management project within organizations. The following sections describe some of those authors’ prospects in this regard. A synthesized approach is then presented to merge various approaches
into a single classification spectrum initially prepared by Derek Binney and rationally modified by the author.

3.1 The Zack’s Knowledge Management Cycle

Meyer and Zack (1996), [1:26], suggested that the production management model is the best example to describe the Knowledge Management cycle. The production involves necessary technologies, facilities, and processes. The research and knowledge involved in the production process would follow similar transformation paces and accumulate in a knowledge repository where further indexing, linking, and cross-referencing are applied to assure knowledge integrity throughout the organization as a whole. The Zack’s Knowledge Management Cycle is as follows (see Figure 4-2):

1- Knowledge Acquisition: looks for the knowledge scope, breadth, depth, credibility, accuracy, timeliness, relevance, cost, control, and exclusivity.

2- Knowledge Refinement: performs necessary modification and enhancement for efficient knowledge use.

3- Knowledge Storage and Retrieval: physical or digital.

4- Knowledge Distribution: by selecting appropriate access medium, timing, frequency, form, and language.

5- Presentation and Use: finds the proper context or subject matter for user interactivity.

Zack’s Knowledge Management cycle uses a structured knowledge repository that “forms the first kernel of an Organizational Memory or corporate memory”

![Figure 4-2: The Zack's Knowledge Management Cycle](image-url)
3-2 The Bukowitz and Williams Knowledge Management Cycle

Bukowitz and Williams (2000) perspective of knowledge is a set of knowledge repositories, information and communication technologies, functional skills, environmental influences, human and organizational intelligence, and process know-how.

The Knowledge Management cycle consists of two stages: the first is tactical where knowledge is acquired and used on a day to day basis depending on the market and organizational demands and the second is strategic initiated by the external environment movements (see Figure 4-3):

In the **tactical stage**, knowledge goes through four phases:

1- Get: where knowledge is assimilated from various sources.

2- Use: focuses on best combining information creatively to foster organizational innovation.

3- Learn: an Organizational Memory is created to promote organizational learning both on the individual and group levels. Organizational learning is essential for knowledge creation based on practices and lessons.

4- Contribute: it is the knowledge transfer from employees’ heads to the Organizational Memory. It is at this phase where individual knowledge is disseminated and shared across the organization through a properly managed organizational memory that maintains knowledge attribution, authorization, and tracking.

The **strategic stage** reveals a group and organizational interference on the total individual contributions:

1- Assess: it is a general evaluation of the impact of knowledge assets on organizational performance. Knowledge is represented by four general forms of capitals: human capital (i.e. competencies, skills, and experiences), customer capital (i.e. relationships, support, and customizations), organizational capital (culture, values, processes, and technology), and intellectual capital (thinking methods, human thoughts, and personal relationships).

2- Build and Sustain: stresses a selective and stiff allocation of knowledge to ensure a competitive and innovative organizational performance.

3- Divest: is to eliminate obsolete knowledge in all forms whenever found of lesser value or not having a competitive use.

The Bukowitz and Williams Knowledge Management cycle brings about the learning organization.
3-3 The McElroy Knowledge Management Cycle

The McElroy (1999) Knowledge Management cycle considers organizational learning as the corner stone for building and maintaining the Organizational Memory. The cycle consists of three main stages (see Figure 4-4):

Distributed Organizational Knowledge Base: it is the Organizational Memory that holds organizational knowledge in all its forms (tacit and explicit).

1- Business-Processing Environment: using single-loop learning, it draws knowledge from the knowledge base, necessary for routine problem solving and decision making.

2- Knowledge Processing Environment: unmatched knowledge claims necessitate a double-loop learning that initiates the knowledge processing environment to produce and integrate new knowledge.

The fundamental strength that characterizes the McElroy cycle is the double-loop learning that introduces new knowledge claims into the Organizational Memory via knowledge integration that McElroy considered as the process of all knowledge broadcasting processes such as teaching, sharing, and communication.
3-4 The Wiig Knowledge Management Cycle

The Wiig (1993) Knowledge Management cycle consists of four major stages:

1- Building knowledge: it is the central knowledge creation phase where research, surveys, experimentation, reasoning, and observations are some activities that trigger the knowledge building process. Further sub-processes are as follows (see Figure 4-5):

a- Knowledge Analysis: starts with forming a model or a theory and identifying knowledge fragments which verify it and then explaining relations between them.

b- Knowledge Synthesis: this is a knowledge reconstruction process that generalizes analyzed knowledge into a broader hypothesis that explains observations.

c- Knowledge Modeling: by creating mental models that help represent the new knowledge in a coherent model either in our minds or in documents.

d- Knowledge Organization: using several methods that range from standardization, categorization, conceptual modeling (ontology), and classification rules (taxonomy).

2- Holding Knowledge: it is the knowledge capturing phase and consists of
the following:

a- Remembering Knowledge: it is the internalizing of knowledge within the individual’s own thoughts and mental models.

b- **Accumulating Knowledge**: storing the knowledge within the Organizational Memory system.

c- Embedding Knowledge: it is integrating knowledge with the organizational processes, policies, and procedures.

d- Archiving Knowledge: backing up knowledge after divesting irrelevant or out-of-date knowledge from the active repository.

3- Knowledge Pooling: entails retrieving and accessing activities as follows:

a- Coordinating Knowledge: it builds a network of knowers that facilitate communication and collaboration to reach the right knowledge at the right time and in the right place.

b- **Assembling Knowledge**: background references of knowledge sources are then assembled for later access and retrieval.

c- **Accessing and Retrieving Knowledge**: this is the direct contact that can be established with knowledgeable people, experts, or the knowledge repository for discussion or decision making reasons.

4- Applying Knowledge: knowledge is now ready for direct use and application in any problem solving situation and to resolve activities such as situation description, handling, analyzing, synthesizing and evaluating alternative solutions, and deciding and implementing the potentially best alternative.

The characterizing factor of Wiig Knowledge Management Cycle is the detailed description of the creation, capturing, and use of knowledge within individuals, groups, and organizations. It illustrates with a high degree of accuracy, how an Organizational Memory can be managed and maintained while providing correct knowledge for use and application.
Koeing and Srikantaiah proposed a different definition to data that comprise all types of content - published information, stories, meetings, and group discussions, best practices and so on - and thus narrowing the gap between data and knowledge concepts and considering information and knowledge identical.

Also they proposed a six step Knowledge Management cycle that includes (see Figure 4-6):

1- Knowledge Creation and Acquisition: it consists of activities such as knowledge selection reviewing, editing, translating, transforming, and so on.

2- Knowledge Organization and Metadata Creation: this helps establish a definition structure for the knowledge content including indexing, abstracting, classification, and categorization.

3- Knowledge Repository Management: it deals with the Organizational Memory setup in terms of registration and storage of all kinds of knowledge, implicit and explicit.

4- Knowledge Use and Rights Management: comprise a set of security rules and policies that control knowledge use, copyright, disclosure, and other security parameters.
5- Knowledge Integration and Discovery: this requires an ontology model that provides an integrated semantic search and navigational structure.

6- Knowledge Distribution and Promotion: includes knowledge aggregation, sharing, communication, association, and so on.

Koeing and Srikantaiah, in [4:220], have attributed a four level taxonomic structure (flat, hierarchical, network, and faceted) for each of the Knowledge Management processes. This taxonomic consideration identifies the kind of knowledge and process and strongly contributes to the design of organizational Ontology and further organizational memory system management.

![Knowledge Management Cycle](image_url)

**Figure 4-6: Koeing and Srikantaiah Knowledge Management Cycle**

4-6 Nonaka & Takeuchi’s Knowledge Spiral Model

Nonaka & Takeuchi, in their paper ‘The Knowledge-Creating Company” [5], considered that the differentiating factor of a knowledge creating company is not processing formal information, but instead relies primarily on tapping tacit knowledge, that is, personal insights, beliefs, and values.

Nonaka and Takeuchi have introduced a new cognitive activity into management through building a conceptual link between work and mind. And this recommends a new culture for knowledge sharing, a higher commitment to the organizational mission, and an environment of trust and integrity between members.

The primary concern for a knowledge creating company is therefore making knowledge available through four major consecutive knowledge conversion
methods (see Figure 4-7):

1- Tacit to Tacit (**Socialization** = learning tacit from experts): it is an apprenticeship phase between the master and the learner of the same work domain through observation and practice. Therefore, knowledge creation is limited; the master’s skills are only learned, observed, and familiarized through a social communication that cannot be leveraged into an explicit form available for the organization as a whole.

2- Tacit to Explicit (**Articulation, Externalization** = explaining, clarifying, and translating learned material into understandable figures): where personal knowledge is expressed using figurative language that can translate intuitions, beliefs, and insights into explicitly defined and understandable meanings. This begins with linking two different ideas, concepts, views, or thoughts by metaphor, then resolving differences by analogy, and finally crystallizing the created concepts and representing them into the knowledge model.

3- Explicit to Explicit (**Combination, Re-contextualization** = standardizing and integrating figures within knowledge repository): it is a simple repurposing activity for the explicit knowledge to take other explicit forms either synthetically or analytically. It is more or less combining, reorganizing, categorizing, and sorting different bodies of explicit knowledge to lead to new knowledge.

4- Explicit to Tacit (**Internalization** = transferring knowledge to new knowledge domains): this knowledge activity widens, expands, and restructures own tacit knowledge by converting explicitly represented knowledge into personal mental models to form the background knowledge for many on the job tools and resources.

Nonaka and Takeuchi pointed to the critical roles of the articulation and internalization phases of the Knowledge Management model because people are brought into “active involvement of the self commitment.” They argued that “Japanese firms are successful because they are innovative” [7]. The Knowledge Spiral Model represents a knowledge construction factory at the individual level where creativity and innovation are crystallized at the Internalization phase.
Boisot’s I-Space Model

Boisot, (1998), drew a Knowledge Management cycle similar to the Knowledge Spiral model of Nonaka and Takeuchi but he introduced a new dimension: Abstraction. Boisot’s model, also called the I-Space model, sets the main course for a social learning cycle in six phases as follows [6] (see Figure 4-8):

Scanning: diffused data is learned conferring new insights to learners.

Problem-Solving: learners structure their insights into an explicit problem-solving framework.

Abstraction: the framework is generalized to cover a broad range of situations.

Diffusion: the new knowledge is disseminated across the organization in both forms: codified and abstracted.

Absorption: applications of the new knowledge in various domains promote organizational learning and encourage creativity.

Impacting: generalized knowledge is now embedded in actual practices, artifacts, rules, or behavioral models.
The Boisot I-Space Knowledge Management cycle aims to maximize knowledge usefulness by pushing for highly abstracted, highly codified, and undiffused knowledge that would be available for diverse situations and thus create new tacit knowledge ready for a new knowledge cycle.

**Figure 4-8: Boisot’s I-Space Model**

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4-8 Sallis and Jones Knowledge Management Model

Sallis and Jones, in [8], proposed their own model framework for the management of knowledge. The model consists of eight phases as follows (see Figure 4-9):

1- Understand the knowledge available to the institution: knowledge assets, sources, use, and relevance.

2- Analyze the process of knowledge creation: what, who, where, how, and why.

3- Evaluation of the organization’s knowledge base: value, value added, gaps.

4- Introduce new systems to capture and use knowledge: technology, validity, reliability, accessibility.

5- Establish effective management of new knowledge systems: teamwork, communication channels, expertise, training, development.

...
6- Develop the motivation to share and use knowledge: culture, working practices, obstacles, motivation, rewards.

7- Make new knowledge available and simple to use: communication structures, work talk, knowledge communities.

8- Maintain the currency of the organization’s knowledge: criteria, review, clearing.

![Figure 4-9: Sallis and Jones Knowledge Management Model](image)

**4-9 Knowledge Value Chain Model**

Sandy Staples et al., in [9], have proposed a model for a Knowledge Management cycle based on considering knowledge from three broad perspectives (see Figure 4-10):

1- Orientation: toward the organizational learning concept where knowledge is continuously learned and experimented.

2- Actionability: that emphasizes knowledgeable workers possessing declarative, procedural, and conditional knowledge and acting upon it.

3- Social Construction: of knowledge through individuals own actions.

The Knowledge Value Chain model addresses six knowledge activities:

1- Acquisition and Generation: it is the exploration and exploitation phase of internal and external knowledge (codification and personalization).
2- Capture and Storage: they are at the heart of creating an Organizational Memory.

3- Diffusion and Transfer: at the departmental and organizational levels

![Knowledge Value Chain Model](image)

**Figure 4-10: Knowledge Value Chain Model**

### 4.10 Serban & Luan Knowledge Management Cycle

To Serban and Luan, in [10:11], the Knowledge Management cycle is an iterative and interacting set of processes linking people to knowledge content that continuously renew the organizational functions to anticipate internal and external changes. They proposed a Knowledge Management framework that projects Knowledge Management processes to people processes. The framework includes the following major processes (see Figure 4-11):

1. **Knowledge Management Processes**
   
   a. *Create*
   
   b. *Capture*
   
   c. *Organize*
   
   d. *Access*
   
   e. *Use*
2- People Processes
   a- Collaborate
   b- Find
   c- Mediate
   d- Facilitate
   e- Augment
   f- Share
   g- Align

4.11 Probst Knowledge Management Model

Probst has defined a structure for Knowledge Management, called the ‘building blocks’ of Knowledge Management. The cycle is as follows (see Figure 4-12):

1- Knowledge Goals
2- Knowledge Identification
3- Knowledge Acquisition
4- Knowledge Development
5- Knowledge Distribution
6- Knowledge Preservation
7- Knowledge Use
8- Knowledge Measurement
4.12 Awad & Ghaziri Knowledge Management Model

Awad & Ghaziri, in [3], elaborated on dissecting the bits and cells of an ideal Knowledge Management cycle that would fit all organizational domains: industrial, academic, services, social, and so on. The cycle has six phases as follows (see Figure 4-13):

Figure 4-13: Awad & Ghaziri Knowledge Management Model
4.12.1 Knowledge Creation

Knowledge creation is an activity that updates people’s knowledge through experiences in a particular area. There are several methods for creating knowledge:

1. Sharing knowledge which creates a learning culture (class education, conferences, seminars, discussion forums, research).
2. Teamwork where experiences are translated into knowledge (laboratory works, internship, multidisciplinary teams).

From an intellectual property perspective, the “Creator (inventor, author) is an individual or group of individuals who make, conceive, reduce to practice, author, or otherwise make a substantive intellectual contribution to the creation of intellectual property. [12]”

4.12.2 Knowledge Capture

The second phase in the Knowledge Management cycle is capturing knowledge. “Knowledge capture is defined as the process by which the expert’s thoughts and experiences are captured” [3:123]. Knowledge capture is the transfer of expert’s knowledge and expertise to a knowledge repository. It is the process by which knowledge developer discover expert’s skills, perceptions, insights, and other tacit knowledge required for a given task.

Capturing knowledge usually applies the following processes:

1. Interviewing the expert in a problem case.
2. Understanding the problem domain.
3. Interpreting the information.
4. Inferring the underlying knowledge and reasoning process.
5. Building procedural and conditional rules.
7. Representing captured knowledge using tools such as flowcharts, decision trees, decision tables, and other graphical representations.

4.12.3 Knowledge Codification

Codification is the process of converting tacit knowledge into explicit and
well-organized knowledge. Knowledge that resides in the head of experts, once codified, becomes visible and accessible to authorized personnel. Its use varies depending on the problem case. Some important areas where codified knowledge is essential:

1. Diagnosis: identifies symptoms of specific causal factors.
2. Instruction/Training: enables students to learn by exploration.
3. Interpretation: compares aspects of an operation to preset standards.
4. Planning/Scheduling: creates detailed lists of sequential tasks necessary to achieve specific goals.
5. Prediction: infers the likely outcome of a given situation.

Knowledge codification methods differ from one organization to another depending on many organizational factors such as goals to achieve, available existing knowledge, and knowledge readiness for codification. In general, most knowledge that is vital for codification is tacit because it is complex, personal, and more an art than a science.

Therefore, there is more than one tool or procedure to codify knowledge: encoding facts and relationships, categorizing, description, modeling, mapping, embedding, and so on.

Codification methods that are frequently used are as follows:

1. Knowledge Maps: knowledge maps use visual representations to guide people to the right expert or knowledge source.

2. Decision Tables: it is a codification scheme that represents knowledge using conditional knowledge type in a form of condition-conclusion statements.

3. Decision Trees: it is another form of decision tables that uses a graphical visualization of conditions-conclusions rules.

4. Frames: A Frame is a knowledge representation scheme that describes the world using entity-slot structure which allows codification of declarative and procedural (operational) knowledge. The Frame structure is composed of:

   • Entity Name: a unique name that refers to a real object of the world.
   • Entity Type: defines the nature of the object.
   • Entity Slots: are the features that characterize the entity, also called attri-
butes, values of which are called facets. Slots are governed by range and domain scopes and may have restricting rules for value attribution.

Instantiation is the process of creating a real-world entity with a name and attribute value. The frame-based problem solving technique builds on matching instances or finding their occurrences in the knowledge base. The hierarchical structure of the frames enables analogical reasoning and inferencing across entities relationships.

5. Production Rules: it is a tacit knowledge codification method that rules a specific action under certain conditions. It builds causal-effect relationship structures between elements where the antecedent is called premise (hypothesis, condition, or test) and the consequent is called action (effect or result). It is similar to the traditional if-then programming statements; however, it allows heuristical, experiential, subjective, and uncertain reasoning to occur.

6. Case-Based Reasoning: in some cases, production rules are difficult, if not impossible, to formulate for they must declare complex reasoning analogies embedded in historical experiences, stories, and past organizational events. Case-Based Reasoning (CBR) is an episodic knowledge codification scheme that is useful for the operational level where past cases are compared to present ones and conclusions are drawn when similarity search finds matches.

4.12.4 Testing and Deployment

Knowledge codification is not the last phase in the Knowledge Management system. The most critical and challenging phase is the testing and deployment where the knowledge base system is put to work in a real environment, to deal with live cases, and support problem solving and decision making processes.

System Testing

System testing is considered to “control performance, efficiency, and quality of the knowledge.” Two major approaches for knowledge system testing are proposed:

1. Logical Testing: specifies the goodness of the system intrinsic properties; that is, the structural aspects, principles, specifications, and sequences on which the system was developed (see Figure 4-14). Logical testing addresses two validation criteria:

   a- Knowledge Base Formation: where knowledge anomalies such as circular rules and redundancies are verified. It also verifies for knowledge content,
completeness, consistency, and correctness.

b- Knowledge Base Functionality. Where confidence level and reliability degree are measured.

2. User Acceptance Testing: while logical testing focuses on the pieces of knowledge formation and functionality, the user acceptance testing considers the system behavior in a realistic environment. It focuses on the meanings of the results and it measures reliability, consistency, and correctness from an operational perspective. The knowledge system deals with subjective and tacit knowledge which renders user acceptance criteria a complex task for testing system accuracy, adaptability, adequacy, robustness, and so on.

![Figure 4-14: Approaches to Logical Testing](image)

**System Deployment**

The physical transfer of the Knowledge Management system follows the system testing and verification. Successful system deployment reflects many factors:

1. Organizational acceptance and commitment to the new communication, sharing, and decision making processes suggested by the new system.

2. Technical integration and adjustment for the new technological side brought in by the knowledge-based expert system.

3. Procedural modification to the employees’ tasks.

4. Behavioral adaptation for sharing employees’ skills, uncovering their personal insights, and creating a trust atmosphere throughout the organization.

5. Economical feasibility for entering the arena of a highly competitive advantage, performance, and profitability.
4.12.5 Knowledge Transfer

Now that the Knowledge Management system is successfully tested and deployed, the turn comes for the employees to prove functionality, not to the new system, but to the goals set behind it. The new system is an enabler for knowledge transfer and knowledge sharing between organizational members and not a target by itself.

Knowledge transfer has three major goals:

1. Transferring knowledge in the right format, at the right time, and to the right people makes knowledge actionable and innovative.

2. Knowledge in action constructs new knowledge and thus promotes individual and organizational learning.

3. Knowledge transfer builds an atmosphere of trust and thus encourages knowledge sharing.

Knowledge is transferred from a sender to a receiver through the appropriate media. The sender, or knowledge source could be knowledge repository, lessons learned, experts, documents, innovations, or else. The receiver is the apprentice, user, team, manager, or consultant. Finally, knowledge is transferred through group work, apprenticing, discussion, mentoring, and so on.

4.12.6 Knowledge Sharing

Knowledge transfer is a prerequisite for knowledge sharing. People are not satisfied only with the fact that they receive knowledge properly. Knowledge sharing is an indicator of full knowledge absorption which narrows the gap between what people know and what they do. To make the employees devoted to share their knowledge “is one of the toughest nuts organizations have to crack (Bukowitz and Williams, 1999)” [10:12].

Knowledge sharing can only be realized when people are ready to:

1. Adapt to a new culture: share, trust, communicate, and exchange.

2. Modify their attitudes toward what they intellectually own and promote their personal learning to organizational learning.

3. Change their job characteristics to conform with the new organizational knowledge oriented strategies.
5- Synthesized Approach

5.1 Binney’s Knowledge Management Spectrum

Derek Binney, (2001), has presented an unprecedented approach for classifying the Knowledge Management activities across several KM theories and strategies. Binney considers Knowledge Management as “the coordinated effort to create and leverage an organization’s know-how. [13]”

Originally, Binney’s Knowledge Management approach consisted of six distinct elements that map organization wide applications. Knox Haggie and John Kingston, however, have introduced one additional feature that contributes to the knowledge evaluation process. The framework, also called Binney’s KM Spectrum, identifies seven major Knowledge Management activities as follows [6] & [13]:

1. Transactional: focuses on the operational knowledge flow in and out of the organization on a daily basis. It is problem solving based procedural knowledge that carries out functions like case-based reasoning, help desk, customer service, order entry, and agent support.

2. Analytical: knowledge is scanned, abstracted, and analyzed in order to identify customer needs and realize customer intimacy. A new knowledge is then created. Supporting applications are: data warehousing, data mining, business intelligence, management information systems, decision support systems, and customer relationship management.

3. Asset Improvement: aims at reaching operational excellence through effective intellectual asset management: knowledge refinement, rights management, knowledge measurement, and knowledge evaluation.

4. Asset Management: at this stage, knowledge is codified, stored, and preserved in a knowledge repository where functions as intellectual property management, document management, knowledge repositories, and content management are achieved.

5- Process-based: domain knowledge is used and applied in various business functions: total quality management, benchmarking, best practices, business process re-engineering, process automation, lessons learned, methodology, and six sigma.

6- Developmental: focuses on promoting skills development, staff competencies, learning, teaching, and training.

7- Innovation/Creation: it fosters innovations and knowledge creation through communities of practices, collaboration, discussion forums,
networking, virtual teams, R&D, and multi-disciplined teams.

The Binney’s Knowledge Management Spectrum is presented in Table 5-1. The original spectrum included five approaches for Knowledge Management. The author has appended to the list ten additional approaches which enhances the framework classification strength and emphasizes its completeness. Italicized and highlighted KM models have been incorporated by the author.

Another improvement, made by the author, to Binney’s KM Spectrum is the addition of materials and applications that match the framework classifications. Table 5-2 presents some major materials used and applications that require a Knowledge Management approach.
<table>
<thead>
<tr>
<th>Business Perspective</th>
<th>Transactional</th>
<th>Analytical</th>
<th>Asset Improvement</th>
<th>Asset Management</th>
<th>Process-Based</th>
<th>Developmental</th>
<th>Innovation and Creation</th>
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<td>Absorption</td>
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<tr>
<td>KM Strategies &amp; KMC</td>
<td>Knowledge Transfer</td>
<td>Customer Focused Knowledge</td>
<td>Intellectual Asset Management</td>
<td>Intellectual Asset Management</td>
<td>Knowledge Transfer</td>
<td>Personal Knowledge Asset Responsibility</td>
<td>Knowledge Creation</td>
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<td>(Wiig)</td>
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<tr>
<td>KM Strategy</td>
<td>Building knowledge</td>
<td>Holding Knowledge</td>
<td>Applying Knowledge</td>
<td>Knowledge Pooling</td>
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<td>(Zack)</td>
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<tr>
<td>KMC (Koenig and Srikanthia)</td>
<td>Knowledge Organization and Metadata Creation</td>
<td>Knowledge Use and Rights Management</td>
<td>Knowledge Repository Management</td>
<td>Knowledge Integration and Discovery</td>
<td>Knowledge Distribution and Promotion</td>
<td>Knowledge Creation and Acquisition</td>
<td>Knowledge Creation</td>
</tr>
<tr>
<td>KM (Bukowitiz and Williams)</td>
<td>Tactical Stage</td>
<td>Strategic Phase</td>
<td>Tactical Stage</td>
<td>Get</td>
<td>Use</td>
<td>Divest</td>
<td>Build &amp; Sustain</td>
</tr>
<tr>
<td>KMC (McElroy)</td>
<td>Business-Processing Environment</td>
<td>Distributed Organizational Knowledge Base</td>
<td>Knowledge Processing Environment</td>
<td>Knowledge Acquisition</td>
<td>Knowledge Refinement</td>
<td>Knowledge Storage and Retrieval</td>
<td>Presentation and Use</td>
</tr>
<tr>
<td>KMC (Awad &amp; Ghaziri)</td>
<td>Knowledge Transfer</td>
<td>Knowledge Capture</td>
<td>Knowledge Codification and Storage</td>
<td>Knowledge Testing and Deployment</td>
<td>Knowledge Sharing</td>
<td>Knowledge Creation</td>
<td>Knowledge Creation</td>
</tr>
<tr>
<td>KM Framework (Sallis and Jones)</td>
<td>Combining, Reorganizing, Categorizing, Sorting</td>
<td>Explaining Via Analogies, Models, Metaphors</td>
<td>Knowledge Maintenance</td>
<td>Knowledge Understanding</td>
<td>Knowledge Sharing</td>
<td>Knowledge Creation</td>
<td>Knowledge Creation</td>
</tr>
<tr>
<td>KM cycle (Serban and Luan)</td>
<td>Knowledge Transfer</td>
<td>Knowledge Analysis</td>
<td>Knowledge Evaluation</td>
<td>Effective Knowledge Management</td>
<td>Knowledge Understanding</td>
<td>Knowledge Sharing</td>
<td>Knowledge Creation</td>
</tr>
<tr>
<td>KM cycle (Probst)</td>
<td>KM Access</td>
<td>Capture</td>
<td>Organize</td>
<td>Use</td>
<td>Create</td>
<td></td>
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<tr>
<td>Knowledge Value Chain (Sandy Staples et al)</td>
<td>Acquisition</td>
<td>Goals Identification</td>
<td>Measurement</td>
<td>Preservation</td>
<td>Use</td>
<td>Distribution</td>
<td>Development</td>
</tr>
<tr>
<td>Actionability</td>
<td>Orientation</td>
<td>Social Construction</td>
<td>Creation, Personalization, and Fusion</td>
<td></td>
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</tr>
</tbody>
</table>

Table 5-1: Revised and Modified Binney’s Spectrum Mapped to Knowledge Management Classifications
(modified by the author - highlighted and italicized)
<table>
<thead>
<tr>
<th>Transactional</th>
<th>Analytical</th>
<th>Asset Improvement</th>
<th>Asset Management</th>
<th>Process-based</th>
<th>Developmental</th>
<th>Innovation/Creation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Based Reasoning</td>
<td>Data Warehousing</td>
<td>Timetabling</td>
<td>Intellectual Property</td>
<td>TQM</td>
<td>Skills Development</td>
<td>Communities</td>
</tr>
<tr>
<td>Help Desk Applications</td>
<td>Data Mining</td>
<td>Scheduling</td>
<td>Document Management</td>
<td>Benchmarking</td>
<td>Staff Competencies</td>
<td>Collaborative Learning</td>
</tr>
<tr>
<td>Customer Service Applications, E-Learning Applications</td>
<td>Business Intelligence</td>
<td>Configuring Layouts</td>
<td>Knowledge Valuation</td>
<td>Best Practices</td>
<td>Learning, Action Learning</td>
<td>Discussion Forums</td>
</tr>
<tr>
<td>.Technical Papers</td>
<td>Management Information Systems</td>
<td>Time &amp; Motion Studies</td>
<td>Knowledge Repositories</td>
<td>Quality Management</td>
<td>Teaching</td>
<td>Networking</td>
</tr>
<tr>
<td>Plans, Charts, Lectures, Published Papers</td>
<td>Decision Support Systems</td>
<td>Supply Chain Management</td>
<td>Content Management</td>
<td>Business Process (Re) Engineering</td>
<td>CBT, Online Training</td>
<td>Virtual Teams</td>
</tr>
<tr>
<td>Manuals, Policies, Reports, Course Catalogs, Online Textbooks</td>
<td>Customer Relationship Management</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Cognitive Technologies</td>
<td>Competitive Intelligence, Strategic Planning, Trend Scans</td>
<td>Allocation of Resources</td>
<td>,Digitization, Documentation Extraction, Representation, Storage, Repository of Pedagogy &amp; Assessment Techniques, Research Outcomes, Preformatted Proposals</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Probability Networks</td>
<td>Neural Computing</td>
<td></td>
<td></td>
<td>ISO, Six Sigma</td>
<td></td>
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</tr>
<tr>
<td>Decision Trees</td>
<td>Web Crawlers</td>
<td></td>
<td></td>
<td>Search Engines, Knowledge Maps, Library Systems</td>
<td>Workflow, Process Modeling Tools</td>
<td></td>
</tr>
<tr>
<td>Table 5-2: Knowledge Management Materials and Applications</td>
<td></td>
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</tbody>
</table>

(modified by the author - italicized)
5.2 Location-Based Knowledge Management Spectrum

The Knowledge Management cycles, discussed previously, had many factors in common since they all tackle the same ingredient: Knowledge.

In an attempt to observe how actionable knowledge is processed organization-wide, a Location-based Knowledge Management Spectrum is derived to map knowledge based activities across all organizational levels.

Table 5-3 shows Knowledge Management activities through a five stage cycle:

1- **Operations**: Explicit knowledge is generated at the Business Operations level. Knowledge processes, such as acquisition, identification, scanning, and many others, are used to perform different business daily tasks.

2- **Group**: Once knowledge is explicit, it is ready to be transferred, shared, diffused, and learned. It becomes tacit and stored in the memory of organizational groups.

3- **Mind**: At the individual level, the human mind starts to absorb diffused knowledge and personally develop new innovative and creative knowledge in different contexts depending on the individual domain knowledge. The knowledge is purely tacit and resides in the Minds of the organizational members.

4- **Knowledge Base**: It is at this stage where the knowledge engineer’s job is primarily focused. Experts are contacted and interviewed. Meetings’ sessions are recorded. Conferences, seminars, and discussions are evaluated. The outcome is a codified, modeled, and standardized purely explicit knowledge that is stored and maintained in a Knowledge Base or Knowledge Repository.

5- **Organization**: Explicit and preserved knowledge is now made available for all organizational members to understand, test, collaborate with, and use, preparing to start a new Knowledge Management Cycle.

5.3 The Knowledge Management Wheel

In an attempt to merge between Binney’s and Location-Based spectrums, we identified common concepts that appear in the Knowledge Management cycle and adhere to the two spectrums. The result is an attractive combination that we called the Knowledge Management Wheel (see Figure 5-1) where knowledge states can now be precisely identified from many perspectives: organizational, functional, and human.
The Knowledge Management Wheel presents new perspectives for knowledge concentration in the technology applications, human behavior, and business operations.

<table>
<thead>
<tr>
<th>KM Cycle Stage</th>
<th>Operations</th>
<th>Group</th>
<th>Mind</th>
<th>Knowledge Base</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Stage 2</td>
<td>Stage 3</td>
<td>Stage 4</td>
<td>Stage 5</td>
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</table>

<table>
<thead>
<tr>
<th>Knowledge Type</th>
<th>Explicit</th>
<th>Tacit</th>
<th>Tacit</th>
<th>Explicit</th>
<th>Explicit</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>KM Activities</th>
<th>Combine</th>
<th>Build</th>
<th>Acquire</th>
<th>Use</th>
<th>Get</th>
<th>Process</th>
<th>Access</th>
<th>Identify</th>
<th>Solve</th>
<th>Scan</th>
<th>Abstract</th>
<th>Develop</th>
<th>Focus</th>
<th>Categorize</th>
<th>Organize</th>
<th>Sort</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM Activities</td>
<td>Internalize</td>
<td>Diffuse</td>
<td>Transfer</td>
<td>Pool</td>
<td>Distribute</td>
<td>Promote</td>
<td>Contribute</td>
<td>Process</td>
<td>Share</td>
<td>Learn</td>
<td>Use</td>
<td>Explore</td>
<td>Observe</td>
<td>Measure</td>
<td>Socialize</td>
<td>Absorb</td>
</tr>
<tr>
<td>KM Activities</td>
<td>Internalize</td>
<td>Diffuse</td>
<td>Transfer</td>
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<td>Use</td>
<td>Explore</td>
<td>Observe</td>
<td>Measure</td>
<td>Socialize</td>
<td>Absorb</td>
</tr>
</tbody>
</table>

Table 5-3: Location Based Knowledge Management Spectrum
6. Discussion and Conclusion

In the previous sections, we have discussed some of the emerging Knowledge Management cycles. We then mapped these stages to the seven organizational elements presented by the revised Binney’s Knowledge Management spectrum.

We found a general agreement on the concept of Knowledge Management and its applications in the organizational structure. This agreement has many implications on the theory of Knowledge Management:

1. Knowledge Management is a well established and agreed upon theory and it is taking its disciplinary act within all other disciplines as a necessary condition for multidisciplinary links and therefore sharing communities of practice.

2. Knowledge Management is getting acceptance organization wide (people, process, and product). What is still needed is a tighter integration
among organizational components.

3. Knowledge Management major functions are almost identical despite the discrepancies in:

a. Understanding the word knowledge: product, process, and power.

b. Domain disciplines: business, education, and industry.

c. Knowledge Management approach: social, cultural, technological, organizational, and structural.

Binney’s’ approach presents an organizational map for Knowledge Management. It describes the various states of knowledge through a complete Knowledge Management cycle. The Location-Based Spectrum complements Binney’s work. It suggests, for each knowledge state, the appropriate or expected knowledge location, and therefore the necessary material, tool, or behavior (human or technological) required for effective Knowledge Management.

7. References


14- Andre Saito & Katsuhiro Umemoto, Graduate School of Knowledge Science, Japan Advanced Institute of Science and Technology (2005): Linking Knowledge Management Technologies To StraTEGY, Annual Information Technology Congress, CAT1 2005, June 29th -July 1st, S3o Paulo, Brazil