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- to assist academicians from local and foreign universities, business and industrial sectors, government departments and academic institutions, on publishing research results and studies in the areas of information management, records and archives management, library management and knowledge management through scholarly publications.

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KNOWLEDGE MAPPING AS A TECHNIQUE TO SUPPORT KNOWLEDGE MANAGEMENT IN LARGE ORGANISATIONS

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Abstract: *Knowledge is recognized as the most important asset of companies and other organizations. However, the potentials of this commodity have not been fully utilized in line with the growing needs of the k-economy. Knowledge resides in an individual's mind and brain in addition to the explicit knowledge distributed all over the organizations. The need to move towards knowledge management is inevitable and not an option anymore. It is crucial for organizations to be able to tap and map the knowledge within their organizations and this call for the process of defining the knowledge flows and how it could affect the whole range of activities involved in the business and administrative transactions as the basis from which knowledge mapping can be conducted. Knowledge Mapping processes require a team specifically responsible in conducting the mapping procedures. It can be carried out through the whole spectrum of identifying the organizational objectives, addressing the establishment of the experts, documents and the relationship between the various processes. The process of knowledge mapping would then be followed by the capturing of knowledge in the organizations with the ultimate goal of developing the knowledge management program which emphasizes on the culture of knowledge sharing within the organizations. The growth and diversity of knowledge has made the process of knowledge mapping and management a dynamic one.*

Keywords: *Knowledge Mapping, Knowledge Management, Knowledge Culture, Tacit, Explicit, Knowledge Flows, Knowledge Sharing, Competitive Intelligence, Knowledge Assets.*

INTRODUCTION

Generation and utilization of knowledge resources is vital in the creation of wealth in a knowledge economy (Pabloz-Mendez, 2006). However, although the relevant knowledge is available, a gap remains between what is known and the utilization of that knowledge in the workplace and decision-makings. (Pablos, 2005). There is a growing awareness of the need to harness the organizations' knowledge assets in order to meet the current k-economy. One of the dynamic processes involved in knowledge management is the mapping of knowledge that is the proper handling of knowledge with the goal of allowing it to be applied and transferred within and between organizations with the growing diversity of knowledge. Based on this awareness is the recognition that in order to reach the sustainable knowledge base a real foundation of knowledge culture is required. Continuous and maximum sharing of knowledge resources between policy-makers, public and private sectors, and the civil society leads to the development of effective change process towards a resilient economics.

(Malhotra, 1998). Knowledge mapping and its use have been a research issue for some time. Companies have also adopted knowledge-mapping tools to support and stimulate knowledge sharing in their organizations and to help employees find the expertise they are looking for. (Driessen, 2007).

Knowledge Spectrum: Evolution from Data to Wisdom

Knowledge, generated from the data has now become an essential commodity for all pursuits. However, numerous stages have to be followed in order that the knowledge will eventually be turned into the wisdom stage and subsequently provides efficient results, also know as the knowledge management landscape. As shown in figure 1, data are symbols representing events which could be formulated into information. Information is something that can be read, understood and learned, well understood as tangible and intangible. Information that has is analyzed and applied information and repackaged developed into knowledge into knowledge. Knowledge is distinct from information in that it is the understanding of the relationship of information inputs and outputs to key business processes, such as product development, such as marketing, advertising, sales and customer management. It is the process of having a business process to harness the information inputs and outputs for these overall processes. This knowledge can develop one into the level of wisdom because it constitutes one's ability and willingness to apply knowledge is that what that makes one wise. It is just like making a wise choice between something, allowing one to move forward successfully or otherwise holds one back. As such it demands an ability to take information, reflect, make decisions about using information and understand why the decision is made. People need to be self-aware and open to information, whether it is good or bad news. An organization can stand strong and build a collective wisdom if the staffs are willing to share and learn and this is a vital culture that should be applied in KM organizations. Subsequently, this can lead to another significant level of achievement, which is enlightenment. A person with the enlightenment attribute is reflected by his/her leadership quality while consistently applying the wisdom derived from the acquired knowledge to inform, influence, manage and make quality decisions, leading to optimum outcomes. It is imperative that the information professionals be the front and center and play an active and pivotal role.

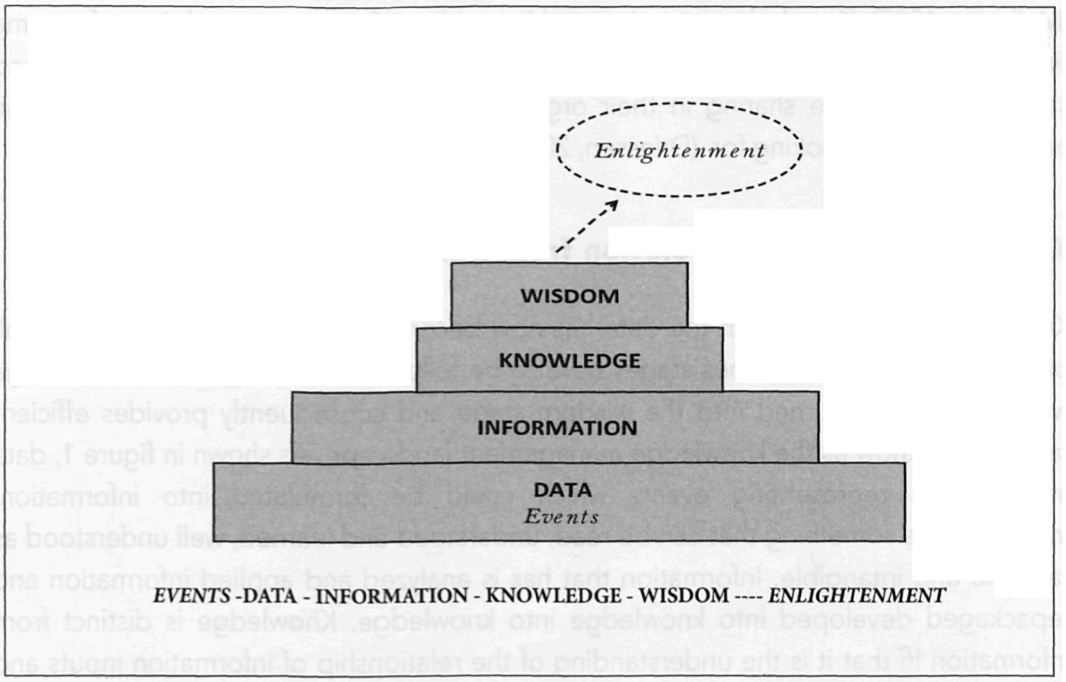

Figure 1: *Knowledge Spectrum*

The exponential growth and the proliferation of information and the diversity of knowledge resources produced have made it impossible to adequately disseminate or access the essential knowledge. It is observed that there is:

i. an escalating rate in the growth and diversity of information and knowledge resources;
ii. the fractionation of the disciplines into narrow specialty fields, thereby augmenting a trend towards depth rather than breadth;
iii. an increase in professional mobility, leading to a discontinuity of focus and experience within an individual's career, and ultimately fewer real experts;
iv. increasing demand for the secularization of knowledge to enable democratic processes, and presumably, more appropriate application of knowledge; and
v. the lack of any formal framework which represents the collective knowledge base and problem solving processes, in order to enable meaningful dialogue and action irrespective of expertise.

ESSENTIAL KNOWLEDGE

Knowledge is regarded as the skill applied by the learner. The ability of experts to synthesize and apply essential knowledge would make them valuable and add value to

the specific discourse. While new knowledge is created and developed by individuals, it is the organizations that play a critical role in articulating and amplifying that knowledge which facilitate the dynamic creation of appropriate organizational knowledge. (Nonaka, 1994). The essential framework or the knowledge mapping would, not only provides opportunity to solve difficult problems but also helps in democratization of the understanding of trans disciplinary processes. Knowledge has been categorized into the tacit and the explicit knowledge. Tacit knowledge is in the mind of the workers, derived through the subsequence processes of learning and experience both at the formal and the informal context. It makes the explicit knowledge relevant to the workers in their roles by applying the explicit knowledge to their work objectives and goals and activities. What constitutes the explicit knowledge are relevant information from documents which are written or published, reflecting the methodologies, expertise and other specifications relevant to the work. The external knowledge could be utilized for competitive intelligence while the internal knowledge refers to the research reports, product-oriented marketing materials, and techniques and methods. As described by Ron Miskie, "knowledge is a personal ability when it is achieved; it is a corporate asset when it is shared. It is a collection of insights that, when applied, make the organization more effective and profitable. Unlike data and information, which tell us what happened and what exists, knowledge tells us what matters, what we should trust, where things go wrong and how we can fix them. In the context of business, there must be a definite result from an investment in knowledge management---a demonstrable and measurable increase in employees' skills levels." (Miskie, 1998).

GLOBAL BACKGROUND: KNOWLEDGE-BASED ECONOMY

In the current k- economy, the balance between knowledge and resources has shifted so far towards the former that knowledge has become perhaps the most important factor determining standard of living more than land, than tools, than labor. Today's most technologically advanced economies are truly knowledge-based. The 1998-99 World Development Report states that knowledge, not capital, is the key to sustained economic growth and improvements in human well-being. It discusses the importance of knowledge to development and the three critical steps that developing countries must take to narrow knowledge gaps: acquiring knowledge, absorbing knowledge, and communicating knowledge. (World Bank Group, 2000). Business that insists on processing economy of yesterday is soon going to find themselves unproductive. For the past twenty years, competition has occupied the center of strategic thinking. Indeed, one hardly speaks of strategy without drawing on the vocabulary of competition — competitive strategy, competitive benchmarking, competitive advantages, outperforming the competition (Chan and Mauborgne, 1999)

RATIONALE

Companies and organizations around the world have now turned to knowledge management because the trend and the demand for such an approach is very overwhelming due to the success seen for conglomerate as well as giant companies, such as Microsoft, Skandia, Accenture, Ernst and Young, BP Amoco and so on. There are also several reasons on why knowledge management has become the order of the day in doing business because of the current development that take place in economic activities. Some of the rationales are:

- Products and services are increasingly knowledge intensive and customized.
- More organization's value resides in people in the form of knowledge and the knowledge they create – but these knowledge workers are more mobile than ever.
- The impact of innovations in processes, organizations, financing and cooperation (besides technology) is increasing.
- Strategic partnership and alliances are growing sources of competitive advantage.
- E-business and service businesses are the major business transformations, that offer huge competitive advantage, if the learning from "internal KM" are applied successfully on knowledge communities and KM processes with customers/suppliers/other partners.
- Global, decentralized, process-oriented and team based organizations make it harder to effectively transfer knowledge – but Knowledge Communities are becoming a third organizational form across borders of business and functions.
- Individuals are confronted with an accelerating volume of information - but must make increasingly rapid decisions.
- Technology enables "knowledge partnerships" without being "here, now and together" - but must be embedded in a "knowledge environment".
- New ways of collaboration and management - "the orchestration of global knowledge networks" - are becoming the crucial competitive advantage.

More of an organization's core competencies will center on managing knowledge and knowledge workers. Industrial growth and productivity gains will depend heavily on improvements in knowledge work. (Davenport, Jarvenpaa, and Beers, 1996).

KNOWLEDGE NEEDS OF ORGANIZATIONS

In the current knowledge management era, organizations are actively engaged with information and knowledge. They are not only expected to deliver new and innovative products and services but more importantly are innovative in how they are being

delivered. It is inevitable that companies and organizations have to be continuously learning and increasingly interested in improving information literacy. The dramatic growth in further education and courses is a testimony of the new for knowledge.

There has been logical evolution of variety of relevant facts into information which is fundamental knowledge that may subsequently developed into products. Knowledge is built up from the analysis of information and the application of this information, developing the processes and contents at the same time. Finally, the wisdom stage is regarded as crucial in that organizations should be willing to apply knowledge and making use of the new knowledge is what makes one wiser. In order to survive in the current competitive globalised business, organizations inevitably have to build knowledge by applying and capturing the most needed information.

Only few local companies in Malaysia are trying to implement Knowledge Management namely:

- MIMOS
- Malaysian Development Corporation (MDC)
- Telekom Multimedia Division
- Sapura Holdings Sun Bhd, as well as some internationally known consultant companies in Malaysia like:
- Ernst and Young
- Anderson Consulting
- Price Waterhouse
- KPMG Peat Warwick
- PETRONAS
- Sunway Construction Sdn Bhd.

The profound shift in the ways the capitalist economists work requires the full exploitation of new sources of value-added information, taking advantage of new opportunities of ICT support. Attention has now been given to the knowledge available in corporations and on the ways that it can be nurtured and utilized most effectively. The creation of intellectual capital or the knowledge that is valuable to the organizations involves the effort of human capital, structural capital and the customer capital. The process of creating, capturing, and using knowledge to enhance organizational productivity and activities must be addressed. It is therefore necessary for organizations to focus on the synergy of data and information processing capacity of information technologies, and the creative and innovative capacity of the people.

Information faculty is at the critical juncture because it is realized that the sustainable organizational competence depends upon the organization's capacity for creating new knowledge through an ongoing and continuous process of learning and unlearning.

Even though information is everywhere, the pertinent sources of information, including libraries and/information centers, electronics information resources, organizations and people should be made known so they could be utilized accordingly. Samuel Johnson (1975), knowledge is of two kinds - we know a subject ourselves or we know where we can find information upon it. Therefore, finding and researching for information is necessary and the skill for it must be taught and learnt by all. It is within the above context that the curriculum should be focused along the line of the knowledge management and the inculcation of the knowledge culture, so that they will be well prepared in information and knowledge literacy.

Tacit knowledge that is the knowledge that resides in the minds of the people in organizations needs to be transferred into a repository. A community-based electronic discussion may be employed as part and parcel in the knowledge management process. The access to knowledge or facilitating its transfer among the workers should be given priority. Activities leading to the dynamic transfer of knowledge to and among staff involve connectivity, access, and transfer. In short, in a business environment, information needs to be exploited in order to increase profitability and maintain a competitive edge.

TOWARDS KNOWLEDGE MANAGEMENT

Within the organization's structure, data represents facts or values of results, and it is the relations between data and other relations that result in the degree of information value, the capacity to represent knowledge. For the representation to be of any utility it must be understood, and when understood the representation is information or knowledge to the one that understands. Knowledge management is the conversion of intellectual assets of workers and staff members in an organization into more productive assets that can form into forces for competition, power and added value. It requires linkages between information and information, information and activities, and information and people. The effectiveness with which the managed knowledge enables the members of the organization to deal with present situations while envisaging for the future development entails the value of KM. Knowledge travels through a process that would transform the tacit into the explicit knowledge, back to the tacit where it can be learned and used by other personnel throughout the organizations. The success of the knowledge management support is dependent apon

the link to the economic performance or industry value; the technical and organizational infrastructures, a knowledge friendly culture; clear language and variety of communication channels and dissemination; and higher management support, understanding and appreciation. The new business environment, characterized by dynamically discontinuous change, requires a re-conceptualization of knowledge management as it has been understood in information systems practice and research. (Malhotra, 2000).

NEW KNOWLEDGE WORKERS

The orientation of the workforce has drawn the need for new attributes that focus around the utilization of knowledge as linkages to the innovation changes. Workers should create knowledge repositories, improve knowledge access, enhance cultural support for knowledge use, and managing knowledge assets. What is expected of the workers in the current era is the transformation from mere followers to thinking innovators. This requires them to keep on learning, relearning, and unlearning.

KNOWLEDGE SHARING

Sharing of knowledge is crucial in knowledge-economy and this can be highlighted in the market the intellectual property in terms of dealing with problems. It is an interactive process to ensure the right information can be made available to people at the right time, not only to enrich their knowledge base and also to allow them to act judiciously. Knowledge can be shared at numerous levels: internationally, among countries, within countries, between members of the societies and among individuals.

There is a need to correct the skew between the knowledge haves and the have-nots so that there is a better understanding of the causal loop of poverty and marginalize communities in the change process. If in the information society the people take advantage of the application of IT, in the knowledge society there should be an efficient transfer of knowledge with the goal that that knowledge can be utilized effectively for better ends and that it can reduce inequality and poverty.

KNOWLEDGE MAP

A knowledge map is an association of items of information (e.g. process, network, policy, geography), preferably visual, where the association itself creates new, actionable information" (adapted from Vail). Organizations that strive for knowledge management must be able to identify the key drivers that bring up revenue and profit.

Understanding the market trends, key operational drivers, the inputs and outputs as well as the processes and procedures will help for successful knowledge management initiatives. It is essential to start with specific business objectives and identifies specific problems within organization in order to generate map of knowledge. This is to ensure getting the right information, to the right people at the right time is achieved. By understanding the specific objectives or problems within enterprise, department, workgroups or division will allow focus on the knowledge management project without losing the big picture. Knowledge mapping is the process of creating a knowledge map. Therefore, knowledge mapping is continuous team quest to discover the constraints, assumptions, location, ownership, value and use of knowledge assets, artifacts, people and their expertise, uncover barriers to knowledge creation, sharing and find opportunities to leverage existing knowledge. This process consists of five steps, as shown in Figure 2.

The objective for mapping the knowledge in organization is to visualize the company's knowledge. From that, assigning responsibilities can be done to people who maintain different kind of knowledge. This process will involve various types of knowledge based on its complexity. However, starting with the knowledge mapping will help in identifying knowledge spots that resides within organization and people. Tapping these knowledge is a lot easier when we know what knowledge we want in doing the tasks as well as in producing the product or giving services. It will also ensure which resources to focus in order to capture and maximize the use of knowledge (content). Deliberately, the delivery of knowledge and content at exact point required throughout the organization along business cycles will improve the efficiency and effectiveness of the operations.

It can be identified that, knowledge mapping processes will involve three different activities in organization that will complement to each other namely:

- Identifying knowledge content such as product, sales and marketing and employees resources.
- Knowledge content support such as product documentation, training, customer support and feedbacks.
- Assigning knowledge ownership such as individuals that have expertise develop over time and who are held responsible for the accuracy and consistency of the operations, or business cycles.

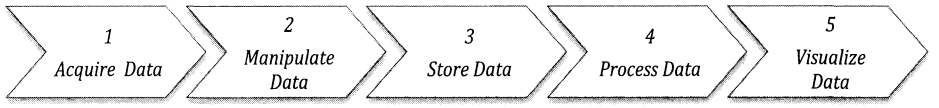

Figure 2: *The Knowledge-Mapping Process*

1. Acquire Data

Raw data are acquired from one or more sources through a survey for example

2. Manipulate Data

The raw data are manipulated through basic analysis, to produce first-order data that are suitable for generating knowledge maps.

3. Store Data

The first order data are then stored in a central database, which is often referred to as the knowledge mapping database (KMDM)

4. Process Data

Although the first-order data may be interesting in themselves, most higher-level insights are gained by applying higher-order processing (analysis, aggregation, and contextualization), resulting in higher-order data

5. Visualize Data

By visualizing first and higher-order data in specific ways, and taking into account different preferences, knowledge maps can be produced that provide insights into the knowledge that is available within the organization or a particular domain of work.

Figure 2 depicts the process involved in knowledge mapping, allowing the identification of the location of knowledge resources and assets an how they move within the organization or in the workplace, where they are created and where and when they are needed for utilization.

According to Burkhard, four perspectives, known as the visual framework are required to create an effective knowledge map. (Burkhard, 2005). They are:

i. the function of the map (including coordination, motivation and elaboration);

ii. the knowledge type (know what, know how, know why, know where, know who);

iii. The recipients (individual, group, organization, network); and

iv. the visualization type (sketch, diagram, image or map).

To ensure success in the knowledge mapping process its requires knowledge workers who are able to apply and engage and able interpret in the mapping process, and subsequently able to integrate all the four perspectives in the visual framework, in addition to the tools used to produce the map. The outcome of this process will result in the sharing of the large body of information and knowledge of the organization that could otherwise be lost or not captured for utilization, such as the identification of hubs relating to the person who is most often consulted.

IDENTIFYING KNOWLEDGE CONTENT

The purpose of identifying knowledge content is to build organizational framework for capturing and delivering information and knowledge. This content will later on help employees to act and respond to the jobs and demands within the business processes. Knowledge content can be identified as for example, product knowledge, customer knowledge, market trends and human resources. All these are considered as part of human capital, structural, customer and competitor's capital formulation, which forms the basis for knowledge management implementation. They are also the basis for building necessary processes for capturing and delivering knowledge content everywhere in organization.

Evaluation and analysis will be done to each knowledge content to determine and prioritize its use, by considering how it works to the company, partners, customers, products and employees. Addressing this will lead to a solution of which knowledge is of upmost importance. For example, knowledge content for sales is what information and knowledge, useful for sales person who includes necessary information on the product itself as well as customer details or customer background and bargaining power.

SUPPORT KNOWLEDGE

Having identified each of the knowledge content and it's relation with each other, it is necessary to break down knowledge content into further details. Breaking down knowledge contents means getting value added supplementary or support information and knowledge for the existing knowledge content. Support knowledge on existing

products, which can be acquired from research and development activities will enhance product capability. Such support knowledge can be ISO 9000 standards, scientific research, regulatory information, parts lists, documentations, and troubleshooting measures. All these sources of support knowledge can be developed into enterprise software, which can be shared, criticized and improved to affect product enhancement as well as making critical decision.

KNOWLEDGE OWNERSHIP

The final step of mapping the knowledge takes place when knowledge ownership is determined. Knowledge ownership is based on the knowledge content that has been identified. Having assigned to each of the knowledge content, it could be assured that the quality of data, information, and knowledge is developed and constantly updated by the owner. The availability in the most updated and current one will reflect the quality of the processes, products and services provided by the organization. Hence, the delivery of information, which is crucial in the business cycles and processes, will be efficient and effective.

Knowledge ownership normally belongs to individuals who hold the know-how of particular knowledge content. Combined with information technology platform such as extranet, LAN, WAN and intranet, by which knowledge sharing can occur across the board, it will generate the exchange of information between the owners. Knowledge delivered or shared would be more accurate, timely and can further be refined by each of the knowledge owner that suits with particular demands and processes at one time.

More importantly, knowledge ownership will hold people accountable to the knowledge itself, and deliberately connecting people of diverse background on particular knowledge content. When online sharing is possible, other users can always check for contents, verify information as well as making necessary adjustment to fit the problems and determine its accuracy, responds to it or even improving on it. Knowledge mapping will thus ensure that there is a cooperative relationship between knowledge content, support knowledge and people. When they collaborate, knowledge flow within organization is possible. New inventions of knowledge can be created due to sharing of knowledge within organization.

KNOWLEDGE AUDIT

Developing knowledge map begins with a knowledge audit project. The purpose is to identify the knowledge, information and data that will add the greatest value to

organization. The result would be a knowledge map and knowledge flow with emphasis on intellectual capital, its user and consumers. The knowledge map will explain the relationships among people, processes and knowledge. The basic four steps in knowledge audit are:

Step 1: Determine a process, its cycle and relationship with other processes.
Step 2: Segregate the process into each independent point and find the involvement of people.
Step 3: Identify the person who uses the knowledge and information at each point.
Step 4: Select the required information and knowledge to each point.

The knowledge map will show the relationship between each process and determine who needs what and when they need it. All these steps are important because they help in building a framework for understanding how information and knowledge is used within a cycle or process. Thus, knowledge audit project will get the workers involved and learned how the business cycle works through interviewing people and finding out the knowledge spots as well as asking the inefficiencies along the business process.

The specific business cycle like sales, manufacturing, or distribution processes for a single product can be a focus point for knowledge audit. Other areas of important are research and development, quality and employee cycles that can add value to the knowledge based on the specific business objectives.

For example, if the research and development processes are the cores for an organization then the organization will depend on innovative products for generating revenue. The focus of the knowledge audit is to understand the cycle of R&D. A number of questions can be asked:

a. How will a company conduct its research?
b. How does the knowledge and intellectual capital is gathered to support research?
c. How does research based knowledge be transformed into product development plans?
d. How does learning process is done and the quality and productivity is improved?
e. How sharing of information and knowledge is done across the board?

Answering all these questions could help define the specific areas in which successful knowledge management project is built.

The knowledge mapping model is based on Professor Robert Wright (2001), who proposed the schematic model of the knowledge mapping process and he acknowledged that the process reflects a continuing evolution. His model is illustrated in Figure 3 from which he focused on four (4) contiguous spaces. Wright believes that a knowledge mapping cycle should involve the following spaces. Much depends on the nature of the knowledge mapping process, whether it is intra or multidisciplinary in nature. It should ideally results in the records of all the interactions to enable independent validation.

i. *The Dialogue Space*
It represents the medium used by the people to communicate among themselves, either with the aid of IT or through verbal communication, or other array of methods. The main objective of the dialogue space in any knowledge mapping situation is the sharing role which is significant in the providing the awareness on issues and problems among the workers. This information that has been identified can be collated and resolved subsequently.

ii. *The Construct Space*
In this space, the rationale to support the intent of the a resolution to a problem or issue. It refers to how the used information is assembled in establishing the measures of, and perspectives of the problem and issues. These processes may involve both quantitative and qualitative measures in order to foster understanding. The bigger number of constructs the more likely the complex problems could be resolved. This is especially true in the current issues relating to the environmental or the green house effect.

iii. *The Operational Space*
This space looks into the constructs and manipulates them with the objective of resolving the problem or issue. The process may involve the use of digital system such as the computer simulation models, or analog processes related to policy development and legislation.

iv. *The synthetic Space*
It synthesizes extent of the solution given to a problem or issue with regards to its intent, rationale and operational approach. According to Wright, the better the fit of a resolution with reality, the more likely the resolution strategy is to be

employed again under similar circumstances. (Kesik, 1996). The synthetic space will essential involve dialogue with the experts. This implicit interaction may have the potential to develop into explicit knowledge which may subsequently Be made accessible to all knowledge mapping spaces.

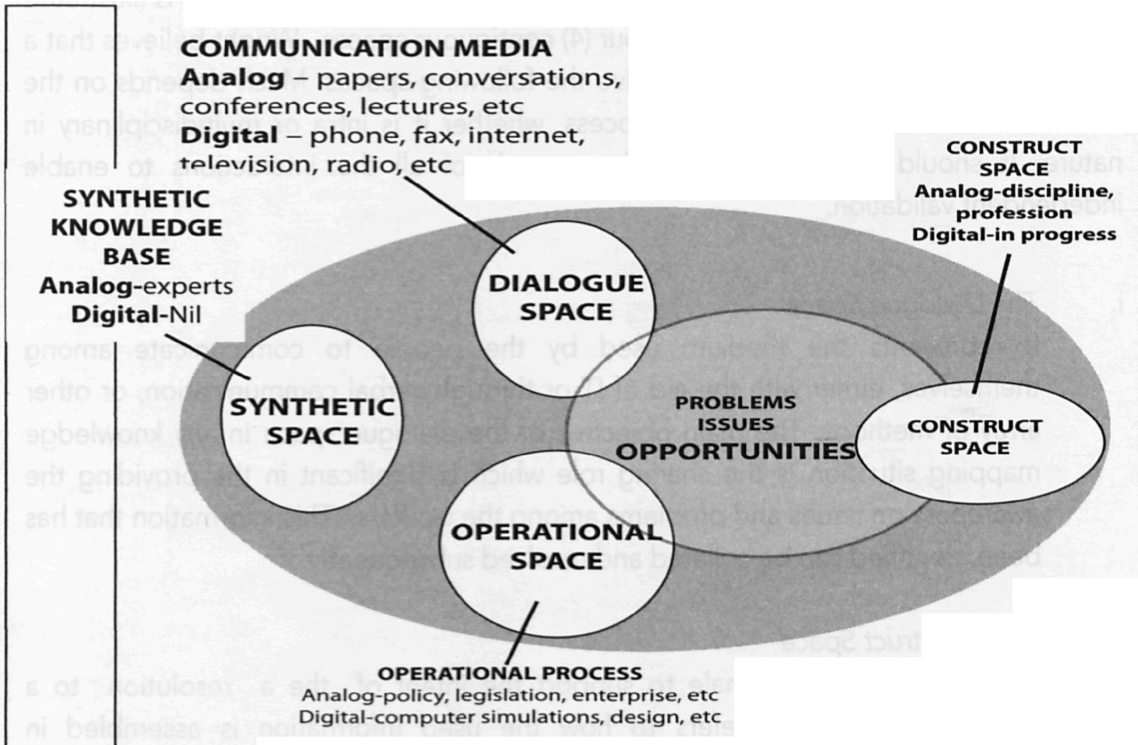

Figure 3: A Knowledge Mapping Model

Source: Kesik, Ted. (1996)

KNOWLEDGE MAPPING DRIVERS

The primary drivers should be the access to a broader and more equitable marketplace of knowledge and information.

Knowledge mapping can be identified along two modes:

i. document-centric knowledge mapping, and
ii. user-centric knowledge mapping

Document-centric drivers refer to the knowledge mapping which is formulated, based on the documentations and records available in the organization. It is where the explicit knowledge is derived through reports, strategic planning, market evaluation, statistical information and track records.

The user-centric drivers are focused on the extrapolation of tacit knowledge of the workers in organization. This is done first through mapping of processes and identifying the required knowledge along the processes. Individuals involved in each of the processes are then recognized, and their expertise and knowledge are identified for the processes to move along efficiently and effectively. Hence, knowledge spots can be identified through the mapping of these process.

CASE STUDIES

The Universiti Teknologi MARA (UiTM) undertook a joint venture project with Sapura System Sdn. Bhd known as 'UiTM-Sapura Project 2000' which focused on the change management on capability development program. The objective of the project was to develop internal capabilities within UiTM in the areas of change management and process improvements through a 'Learn by Doing' program. It took about one year to accomplish this project where the main concern was the transfer of technology to technology recipients identified by UiTM. This project involved various participating faculties in UiTM with the cooperation of several key units that moved the technology transfer process.

Steps of Implementation

The transfer of technology took place through lectures, guided discussions, productive conversations, reading and reflecting on the knowledge itself. Participation in a given programme, and activities with follow-up discussions, maintenance of learning logs and peer groups presentations will be the main sources of knowledge and information for the projects. It began at grassroots level of change in culture from concepts to completion with the aid of specific tools and techniques for technology transfer.

This project began with the identification of knowledge spots and knowledge processes that was likely to occur in the transfer of technology within UiTM. The knowledge map was then devised to look at several critical areas along the process (Figure 4).

It involved a key unit that set the direction of the program known as Sponsorship and Direction Unit, which involved Programme Owners, Vice Chancellor of UiTM, Executive Committees as well as the Deans of Faculties. The transfer of technology was handled by Chief Knowledge Officer and Learning, Leadership and Change Center which received the knowledge and diffusion of knowledge and technology supported by all faculties as technology recipients in UiTM.

The role of departments within faculties were in the implementation and refinement of the technology transfer so that it suited well with the demand of the market and the structure of the courses offered in each and every faculty for various level of academic programmes. The knowledge and technology received are directed by Programme Managers, Head of CTQE (Center For Total Quality Education) and Core Technology Recipients that managed the coordination and development of the knowledge and technology transfer.

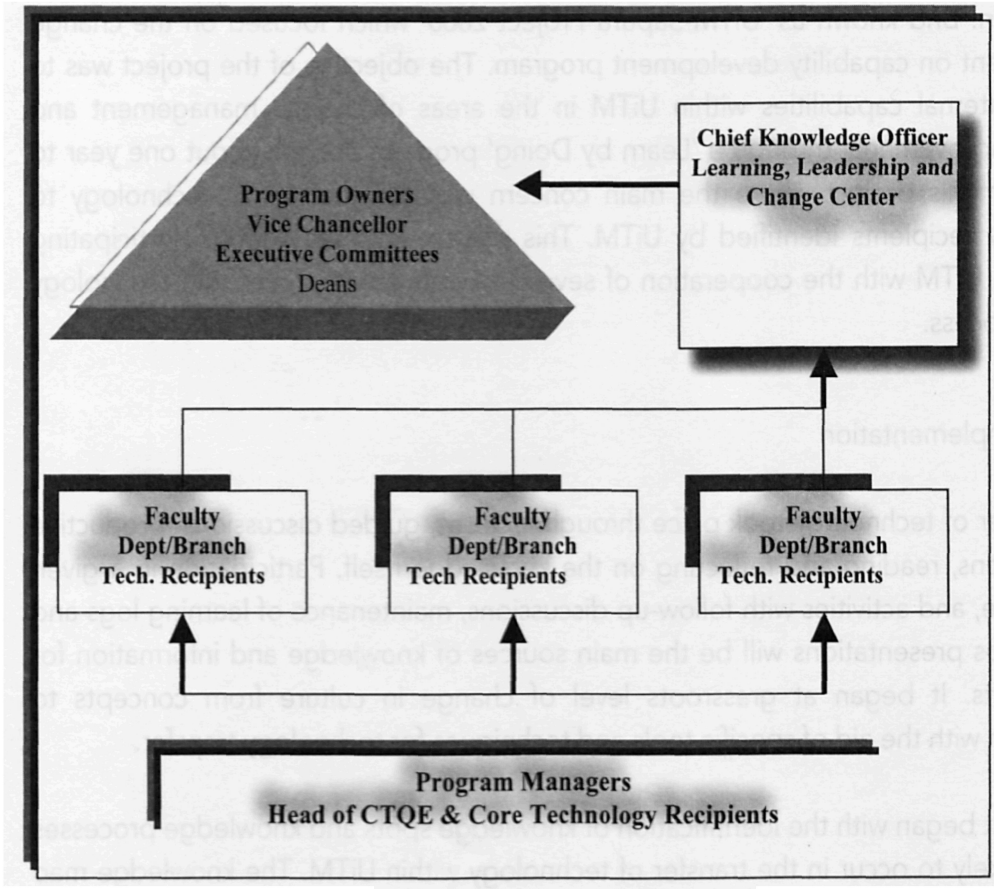

Figure 4: *Process Mapping*

Source: Subramanyam, Vasu (2001). *UiTM-Sapura Project 2001: Change management practice.* Shah Alam: Sapura.

IDENTIFYING KNOWLEDGE CAPITAL

The UiTM-Sapura Project 2001 has identified several key knowledge capitals within its structures and departments involved in the transfer of technology to the technology recipients. These knowledge capitals were basically focused on four strategic levels of activities namely, learning, leadership and change through guided discussion, workshops and tryouts.

The key knowledge capitals could be in the form of structural capital, human capital and intellectual capitals, which are identified as:

a. The technology based on the needs of each of the technology recipients.
b. Individuals involve in the transfer of technology.
c. Faculty's pilot projects and its lessons learned.
d. 'Learn by doing' program and its result.
e. Functional project office.
f. Faculty and departmental technology recipients.
g. Project documentation.
h. Process workshops and roundtables.
i. After-action reviews.

RESULTS

The end result of the UiTM-Sapura Project 2001 has to be an achieved with the targeted end result of this project has been as follows:

a. to develop internal capabilities within UiTM on the areas of Change Management and Process Improvement.
b. to facilitate transfer of technology process.

KNOWLEDGE MAPPING TECHNOLOGIES

There are a large number of tools that can help in formulating and designing a diagram on knowledge mapping which are commonly computer-based technologies, like groupware, document management, knowledge management suites and intranets as infrastructure. For the purpose of discovering and gathering knowledge, technology

tools such as search engines, data mining, and artificial intelligence can be used. And to organize knowledge and information, technology tools like data warehousing, online analytical processing (OLAP), metadata and extended markup language (XML) are needed along the process. While case- based reasoning, decision support, workflow, community support, simulations are tools for supporting knowledge workers in doing their jobs.

Using several collaborative technologies, which will assist in identifying knowledge spots in organizations, can assist the implementation of knowledge mapping. Groupware, or better known as computer supported collaborative network, which uses Lotus Notes platform. This technology helps in identifying documents, which can produce 'artifact documents' that is a document authored by many people. Another technology is geographic information systems (GIS) which can change and digitize images and uses a software that allows the superimposition and manipulation of various kinds of data such as demographic, organizational and corporate information on the map. The use of metadata, meta-information, (document) profile information, (subject) classification, key words and attributes can be an analog way of mapping the knowledge within organization.

RECOMMENDATIONS

The general risks of managing knowledge include inappropriate corporate information policies, employee turnover, and lack of data transferability. Additional risks unique to knowledge-products organizations (KPOs) include the short life span (shelf-life) of knowledge products, the challenging nature of knowledge experts, and the vulnerability of intellectual property. (Elias, and Wright, 2006). In building a successful knowledge management projects, especially during its transition from concept to practice a number of factors are inherent to ensure the success of the organizational objectives through the structuring of the people, technology and knowledge content. This includes the development of a number of projects, such as; knowledge repositories; knowledge access; knowledge environment; and knowledge assets. These projects attempt to inculcate a knowledge-friendly culture, improve knowledge access which eventually facilitates the capturing of both tacit and explicit, (structured and unstructured) knowledge, development of an expert network and finally the creation of internal document repositories and unstructured lessons learned knowledge bases. To ensure the success of the process the following factors may be adopted:

- organization should identify their business problems and priority is given to the most important one;

- staff with knowledge on information management and handling can be an asset to the program;
- there must be alignment between knowledge and information needs of the staff;
- knowledge map should be intuitive and improved when needed.

Based on David Skryme and Associates studies, (2001), several critical success factors to the implementation of knowledge mapping in particular and knowledge management in general can be identified. They are:

a. Knowledge leadership - a compelling vision actively promoted by senior management
b. Clear business benefits - tracking success and developing new measures
c. Systematic processes - including knowledge mapping
d. Knowledge sharing culture - teams that work across boundaries
e. Continuous learning - though pilots and learning networks
f. An effective information and communications infrastructure - groupware and other collaborative technologies, such as an intranet

According to Alan Brompton, European Knowledge Manager of DMR Consulting, there are critical factors that contribute to the failure of knowledge management program and implementation, which should be addressed by the organization. Among them are:

a. Failure of Sponsorship
b. Failure to provide sufficient time
c. Failure to address the four dimension of KM (People, Process, Organization and Technology).
d. Failure to measure and demonstrate benefit.
e. Failure to manage a program.
f. Failure to address the four key knowledge transformation (tacit to explicit, explicit to explicit, tacit to tacit and explicit to tacit).
g. Failure to address the knowledge users' needs
h. Failure to deal with culture.
i. Failure to properly address content.
j. Failure to recognize failures.

It is hoped that organization would be actively involved in mapping their individuals and group knowledge through surveying, assessing and linking their information, knowledge, competencies and proficiencies

CONCLUSION

Knowledge management is a new field in business organization. It involves knowledge mapping,and the skill required to make use of the knowledge map. There is a growing interest in knowledge management in companies and other organizations. Their workers are expected to be knowledge workers who are innovative, responsive, productive, and competent. Knowledge management is a strategy and culture. Building the knowledge management programs involves complex, time-consuming and expensive effort. Well mapping of knowledge in organizations will result in voluminous amounts of intellectual capital that can be made available and utilized at the optimum level. More importantly, individuals must be willing to share or bring to the market their intellectual property when dealing with problems, issues and opportunities. This combined with broad based participation across analog and digital cultures would enable the development of a viable knowledge mapping process.

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