UNIT V Knowledge Management – Future Trends & Case Studies

UNIT 5 FUTURE TRENDS AND CASE STUDIES **9**
Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life - cycles of an organization.

Challenges of KM Today

The major challenges facing KM include focusing on people or cultural issues, overemphasizing technology, conducting KM in isolation from business goals, ignoring the dynamic aspects of content, and opting for quantity of content over quality. Although this is not an exhaustive list, there does appear to be a fairly good consensus on the most important challenges that are facing KM. These can be found as recurring themes in KM discussion groups, conferences, and publications (e.g., Firestone and McElroy, 2003; Tannenbaum and Alliger, 2000).

The major problems that occur in KM usually result because companies ignore the people and cultural issues. In an environment where an individual's knowledge is valued and rewarded, establishing a culture that recognizes tacit knowledge and encourages employees to share it is critical. The need to sell the KM concept to employees should not be underestimated; after all, in many cases employees are being asked to surrender their knowledge and experience—the very traits that make them valuable as individuals. One way companies motivate employees to participate in KM is by creating an incentive program. However, there is the danger that employees will participate solely to earn incentives, without regard to the quality or relevance of the information they contribute. The best KM efforts are as transparent to employees' workflow as possible. Ideally, participation in KM should be its own reward. If KM does not make life easier for employees, it will fail. This is why the role of organizational culture is so important, together with any cultural change that needs to take place in order to better accommodate any KM initiatives.

KM is not a technology-based concept. All-inclusive KM solutions, despite any vendor claims to the contrary, simply do not exist. Companies that implement a centralized database system, electronic message board, web portal, or any other collaborative tool in the hope that they have established a KM program are wasting both their time and money. Although technology

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KM Strategies to be followed

can support KM, it is not the starting point of a KM program. KM decisions should be based on who (people), what (knowledge), and why (business objectives), and you should save the how (technology) for last. In other words, successful KM begins with a sound KM strategy combined with a fostering organizational culture that enables and rewards the sharing of valuable knowledge.

A KM program should never be divorced from a business goal. For example, whereas sharing best practices is a commendable idea, there must be an underlying business reason to do so. Without a solid business case, KM is a futile exercise. Knowledge is also not static. Since knowledge can get stale fast, the content in a KM program should be constantly updated, amended, and deleted. What is more, the relevance of knowledge at any given time changes, as do the skills of employees. Therefore, a KM program has no end point. Like product development, marketing, and R&D, KM is a constantly evolving business practice. Finally, companies need to be vigilant for information overload. Quantity rarely equals quality, and KM is no exception. Indeed, the point of a KM program is to identify and disseminate knowledge gems from a sea of information.

Future Challenges to KM

FUTURE CHALLENGES FOR KM

What lies ahead for KM? One camp predicts no future for KM, citing a number of KM failures to deliver. This gloomy forecast can be mitigated somewhat: it is true that, as with all innovation, initial expectations were on the unrealistic side, partly because the people component of KM was underestimated at the same time that the role of KM technology in KM solutions was overemphasized. According to Pollard (2003), this failure was the result of the unrealistic expectation that human organizational behavior could be easily and rapidly changed. Of course, behavioral change at the individual level and cultural change at the organizational level are two very difficult and lengthy processes. The KM "quick fix" was therefore vastly misleading.

The return on KM investments should not be perceived exclusively as short-term gains but rather should be seen as long-term process, people, and organizational improvements. Unfortunately, people change their behavior only when there is an overwhelmingly compelling argument to do so (there is no "leap of faith" on which much of KM was predicated), or where there is simply no alternative. Skyrme (2002), for example, discusses some of the cornerstones of KM as summarized in Table 11-1.

KM Corner Stones

no alternative. Skyrme (2002), for example, discusses some of the cornerstones of KM as summarized in Table 11-1.

Before KM, the way in which people shared knowledge was person-to-person, just-in-time, and in the context of solving a specific business problem. With the increasingly widespread adoption of KM, knowledge management processes such as knowledge creation/capture, knowledge sharing/dissemination, and knowledge acquisition/application have begun to form part and parcel of how organizations conduct their core business and how knowledge workers conduct their work activities in an efficient and effective manner.

Another way of looking at what lies ahead for KM is to inventory the types of research that are being conducted on KM issues.

TABLE II-I
SUMMARY OF KM CORNERSTONES

1. Steady and pervasive growth—into almost every business function and geographic location.
2. The holistic perspective of people, processes, and technology—as many organizations still find out to their cost, you cannot simply put in KM technical solutions and leave the realization of business benefits to chance.
3. The knowledge cycle—from creation to identifying, gathering, classifying, storing, accessing, exploiting, protecting (and many activities in between).
4. Conducting of information audits and development of knowledge maps.
5. The classification of intellectual capital into customer capital, structural (organizational) capital, and human capital.
6. The need for KM to demonstrate its value to the organization's "bottom line."
7. Communities of practice, and the importance of nurturing, and not trying to manage or control them.
8. The Internet as an infrastructure for communication, collaboration, and information sharing.
9. The need to root knowledge into its environment and context.

KM Trends

ogy. The empirical evidence gathered for one study shows that KM involves human/soft and technical/hard aspects (Hlupic, Pouloudi, and Rzevski, 2002). KM seems to comprise various organizational practices requiring changes in policies, work routines, and organizational structures. More specifically, these authors found the following general principles:

1. Knowledge, in practice, is most often defined as tacit knowledge in spite of the conceptual problems mentioned above. Explicit knowledge was included only in those initiatives where the focus was on converting tacit knowledge into explicit knowledge.
2. Knowledge management, as it is practiced, really means facilitating the sharing of tacit knowledge. Despite the fact that other processes were part of the KM projects, sharing was the primary emphasis of all case studies.
3. There are slight differences in the practices between private- and public-sector knowledge management. Private-sector organizations use KM for internal knowledge sharing, targeted in specific areas of the organization, and the KM initiatives are most often concerned with managing business and administrative knowledge. Public-sector organizations use KM for both internal and external knowledge sharing throughout the organization, and the KM initiatives are most often concerned with managing product-related knowledge.
4. Finally, KM practices could benefit from the skills already held by information professionals. These skills include identification of knowledge needs and helping to distinguish between information and knowledge, and will facilitate a broader and more inclusive KM initiative.

KM Research Topics

Finally, a growing number of doctoral theses address KM themes. Some sample KM research topics include:

- What are the exact mechanisms by which knowledge and learning are institutionalized and embedded in the corporate memory?
- How can communities of practice support and enhance professional education?
- When do stories work best and why? Is there a best practice for creating and telling stories?
- What drives employees to share their knowledge with each other or, conversely, to hoard it? What can management do to increase knowledge sharing among employees?
- How can weblogs be used in KM research? What types of data can be collected, and how can they be analyzed?
- Is there a gap between theory and implementation of knowledge management systems and principles?

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<u>KM Strategy</u>

A KM strategy enables an organization to act proactively (acting before the problem occurs) rather than reactively (acting after a crisis has arisen). This means trying to anticipate potential problems, potential areas of resistance to organizational change, the lack of incentives for knowledge sharing, and the very thorny ethical issues associated with KM applications. Some good practices and lessons learned from an organization's experiences with KM to date can help guide us in being proactive, namely:

1. Improve access to information and knowledge—covering the availability, accessibility, and affordability of information (especially of scientific information in developing countries).
2. Promote knowledge sharing through learning circles and vertical/horizontal coalitions, peer-to-peer technology, communities of practice, infomediaries, help desks, e-learning, and better interaction/mutual learning with target groups (the poor).
3. Network: international and regional cooperation—covering networking models, "digital solidarity," collaboration tools such as portals and common terminology (thesaurus), network effectiveness, strengthening existing structures, and resource centers.
4. Develop local content in local languages and dissemination channels besides the Internet, capacity building, and quality control/standards.
5. Avoid weak incentives—incentives that do not encourage maximization of an objective because they are ambiguous or satisficing. For example, payment of weekly wages is a weak incentive because by construction it does not encourage maximum production, but rather the minimal performance of showing up every workday. This can be the best kind of incentive in a contract if the buyer does not know exactly what he wants or if output is not straightforwardly measurable.

CASE Studies – NASA

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BUILDING THE GODDARD LEARNING ORGANIZATION
A Knowledge Management Architecture of Learning Practices to Help Goddard Function More Like a Learning Organization

This paper was prepared by Dr. Edward W. Rogers
Chief Knowledge Management Officer at NASA Goddard Space Flight Center

The Challenge to Learn

A learning organization knows how to process knowledge, appreciates the value of shared collective knowledge and grows stronger and more knowledgeable with each activity it performs. The Goddard Space Flight Center (GSFC) is facing knowledge management challenges similar to other organizations involved in complex technical work. In order to meet the challenges, take advantage of the new NASA exploration opportunities and to best utilize our available resources, Goddard needs to make a strong commitment to becoming the best learning organization it can be. To do so, all members of the Goddard organization need to be committed to building an organizational system and support structure that promote and facilitate continuous

The U.S. Army has been working to reapply knowledge in the digital age during the current campaigns. In *Company Command* Nancy Dixon explains some early concepts the Army realized:

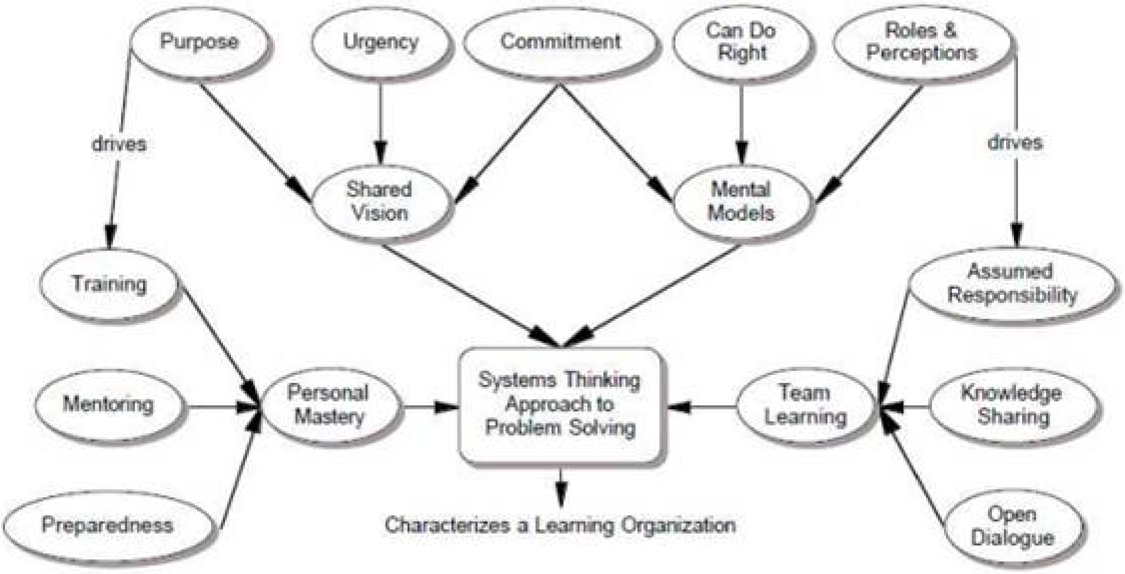
1. The knowledge of the Army profession resides primarily in the minds of its members.
2. Connecting members allows the knowledge of the profession to flow from those who know to those who need to know, from those with specific experience to those who need that experience right now.
3. Person-to-person connections and conversation allow context and trust to emerge and additional knowledge to flow.
4. Relationships, trust, and a sense of professional community are critical factors that set the conditions for effective connections and convesations.

From Company Command by Nancy Dixon, et.al. (2005). Center for Advancement of Leader Development and Organizational Learning. p21.

This Goddard Plan is designed to overcome the previous Agency focus on IT as a KM driver with its over-emphasis on ***capturing knowledge from workers*** for the organization and instead focuses on ***facilitating knowledge sharing among workers***.

A learning organization is able to adapt and change and thereby address the challenges in its path towards the successful attainment of goals. It can do that because all of its members are learners who engage their full intellectual capabilities and have access to the collective organizational knowledge. Peter Senge (1990) laid out the need for an organization to not only be excellent at personal mastery, mental models, shared vision, and team learning but also to have a well developed systems thinking capability throughout the organization. He called systems thinking the 'Fifth Discipline' that was needed to truly make a learning organization.

FIGURE 1: THE SENGE LEARNING ORGANIZATION MODEL



Senge's model links the need for shared vision, mental models geared toward learning, personal mastery of required skills and team learning in order to truly achieve the level of systems thinking required to develop a learning organization. Clearly communication, culture (openness) and structure are also integral to building a learning organization. What is not discussed in the Senge model are the infrastructure support systems necessary to enable a learning organization to function and the organizational power and politics insight needed to keep the focus on learning enabled outcomes. In *Working Knowledge*[5] Davenport and Prusak define many of the parameters

Knowledge management then is helping the organization utilize its knowledge. The Goddard Plan for Building a Learning Organization being pursued here means that Goddard will seek to build systems, organize its work and workforce and lead by example in ways that enhance learning at every level of the organization. There are three goals of the plan for Goddard to become a better learning organization: 1) We Must Manage Our Knowledge Assets Effectively, 2) We Must Facilitate the Effective & Efficient Reapplication of Knowledge, and 3) We Must Continually Work to Build a Learning Organization Culture.

GOAL 1: Manage Knowledge Assets

Managing knowledge assets involves finding, tagging, structuring and filtering the content of knowledge generated and used at Goddard. Goddard works with science, engineering and project knowledge. Each has a different structure. An appropriate structure of our knowledge is critical for making it accessible in a timely and convenient manner. Goddard is building a distributed knowledge system whereby the communities, collections and networks of knowledge

GOAL 2: Facilitate Knowledge Application

Facilitating knowledge application is dependent on having appropriate systems to deliver knowledge as needed to users. The systems must be convenient, attractive, easily navigated and present knowledge in recognizable forms. Technology systems are as important as social systems for sharing and delivering knowledge in a timely manner.

Our index and search systems will discover

GOAL 3: Build the Learning Organization

Building the learning organization requires a set of policies, behavior expectations and a structure to the collective knowledge. Policies help set expectations for valuing knowledge collection and sharing. To be effective, learning behavior must be modeled by organizational leaders. Members of a learning organization take time to reflect, learn and share. They take time

Supporting Pillars for Knowledge Management

PILLAR 1: Global Intranet Search Capability[7]

Global search simply means someone at Goddard should be able to find where information and knowledge is located either through a web based search of documents, an expertise directory (finding the person who knows) or a social network (finding the group already working on the

PILLAR 2: Digital Repository Standards[9]

Historically, project documentation has been managed by each individual project within an Enterprise. The project documents (text, images, video clips, software, etc.) are stored and managed in project libraries using commercial off-the-shelf, internally developed or contractor developed systems. This practice provides the project manager with flexibility within the NASA

Learning Organization Outcomes

OUTCOME 1: Communities of Practice

Communities of practice are spontaneous, interactive support groups that form across organizational boundaries and often outside traditional or formal channels of communication in order to address common concerns and challenges. They might be related to career worklife, competitive marketplace dynamics, technology, professional development, innovation and experiment or a host of other organization topics. Smart organizations provide tools as needed for these groups to form, operate and sustain themselves toward meaningful ends. Communities

OUTCOME 2: Sharing Behavior[18]

Sharing behavior is also an outcome of providing the means for people at Goddard to share, collaborate and take pride in collective results. Though it may be thought of as an antecedent to good knowledge management, like communities of practice, demanding it can be counter-productive. Sharing behavior is something people do when the circumstances warrant it. The

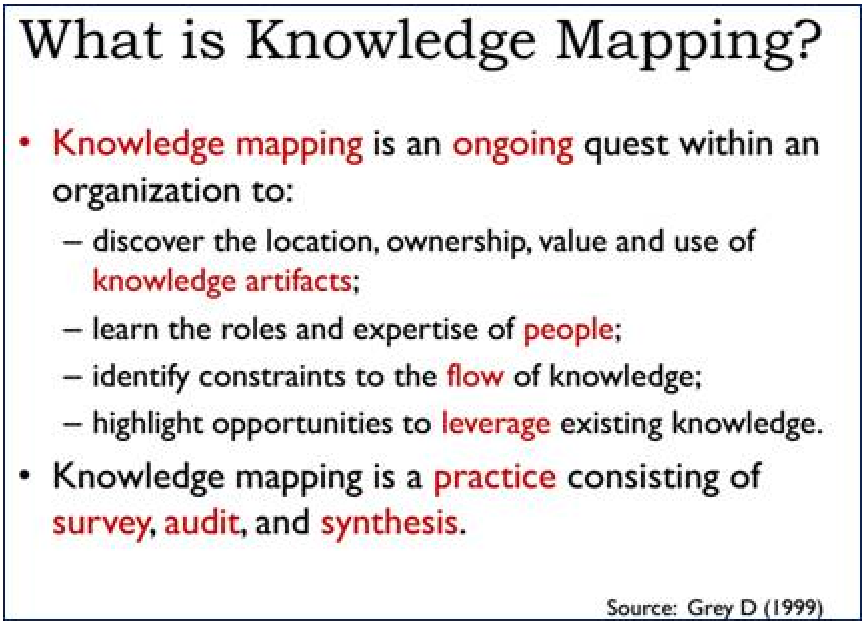
Sharing behavior is an organization attribute that attracts bright people. Intellectually curious people often know that they have the best chance of being stimulated, creating new knowledge or participating in exciting discoveries where a team or community of like-minded thinkers are engaged in open and honest sharing of their ideas, insights and experiments. Goddard wants to continue to attract these people in line with the Human Capital Plan to sustain and build on the competencies that have characterized the Goddard Spaced Flight Center for fifty years.

Implementation Plan Matrix

Table 1 is a matrix of the three goals and the eight elements of the Architecture. (The outcomes are not listed because they relate to all the actions, not specific ones). The cells list the tactical actions related to each of the goals that are underway or planned.

TABLE 1: MATRIX OF GOALS, PRACTICES AND TACTICS

GOALS *Pillars/Practices*	*GOAL 1: Manage Knowledge Assets*	*GOAL 2: Facilitate Knowledge Application*	*GOAL 3: Build the Learning Organization*
PILLAR 1: Center Global Search Capability	Adopt common meta-data tags across the Center.	Provide desktop global search to all employees.	Index all Goddard knowledge respecting ownership rights.
PILLAR 2: Center Digital Document Repository Standards	Build a digital archive system. Build a Center Doc. Mgmt. System.	Develop semantic search indices across the Center	Projects develop document repositories based on Center standards.
PRACTICE 1: Pause for Learning	Provide facilitators to conduct PALs through-out project life-cycle.	Develop PAL GUI system to represent project knowledge as lessons learned.	Use PAL as a leader development tool for communication and dialogue.
PRACTICE 2: Knowledge Sharing Workshops	Experienced project managers share their stories orally with emerging leaders.	Make workshops so valuable that emerging leaders will not want to miss the learning available.	Modeling by leaders of the acceptability of sharing mistakes and missteps of project management.
PRACTICE 3: Case Studies	Writing down the events, history and circumstances of a project life story.	Getting project mgrs to talk about their project experiences in training exercises.	Making sure all of GSFC is familiar with the learnings from our history.
PRACTICE 4: Project Management Training	Making stories into teaching cases. Collecting critical project documents to support the cases.	Develop and conduct a training course on the way Goddard does business based on case studies	Encourage the telling of stories at all levels (seminars, reviews, workshops, and training opptys)
PRACTICE 5: Goddard Design Rules	Establishing Design Rules for Goddard to make top level rules & procedures highly visible.	Moving LL and Best Practices into a process for updating rules and procedures.	Setting up an Office of Mission Success to monitor learning activities and knowledge mgmt.
PRACTICE 6: Review Processes and Common Lessons Learned	Capturing nuggets and lessons from incidents, accidents and reviews.	Mining records for insights, trends and rules. Making LL convenient to use.	Specifying use of LL in 7120.5 and related documents. Reporting CLL annually.



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What is Knowledge Map?

- Knowledge map is a navigation aid to explicit (codified) information and tacit knowledge, showing the importance and the relationships between knowledge stores and dynamics.

Knowledge Mapping Process

- Knowledge mapping is the process of creating a knowledge map.
- The process consists of the following steps:
  - Acquire data (through, e.g. survey)
  - Manipulate data (to produce first order data)
  - Store data (to form knowledge mapping database)
  - Process data (analysis, aggregation and contextualization to produce higher order data)
  - Visualize data (to produce knowledge maps)

Source: Ebener et al. (2006)

Contents of Knowledge Map

- A knowledge map – whether it is an actual map, knowledge "yellow pages" or a cleverly constructed database – points to knowledge but it does not contain it. It is a guide not a repository (Davenport and Prusak, 1998, p.72).
- Example contents of problem-based knowledge maps:
  - Intellectual capital guide (to display where the firm's knowledge is embedded and likely to grow)
  - Implement change in the firm's technology (to direct users to when, how and who will move from the old to new technology)
  - Accountability tree (to locate who is responsible for what and when)

Source: Wexler (2001)

Issues on Knowledge Mapping

- Scope – an exercise for the whole organization or a part of it?
- Timeliness – an one-time initiative or requiring on-going updating efforts?
- Completeness and level of granularity – can all concerned knowledge be completely mapped? how comprehensive?
- Design issues – to reduce miscommunication and increase communication.
- Dissemination of deliverables – in the form of written reports/documents, websites, databases? navigation interfaces for users? mapping software needed?

What is Knowledge Mapping ?

Definitions

"Knowledge mapping is a process of surveying, associating items of information or knowledge, preferably visually, in such a way that the mapping itself also creates additional knowledge determining for example where knowledge assets are, and how they flows in the system."

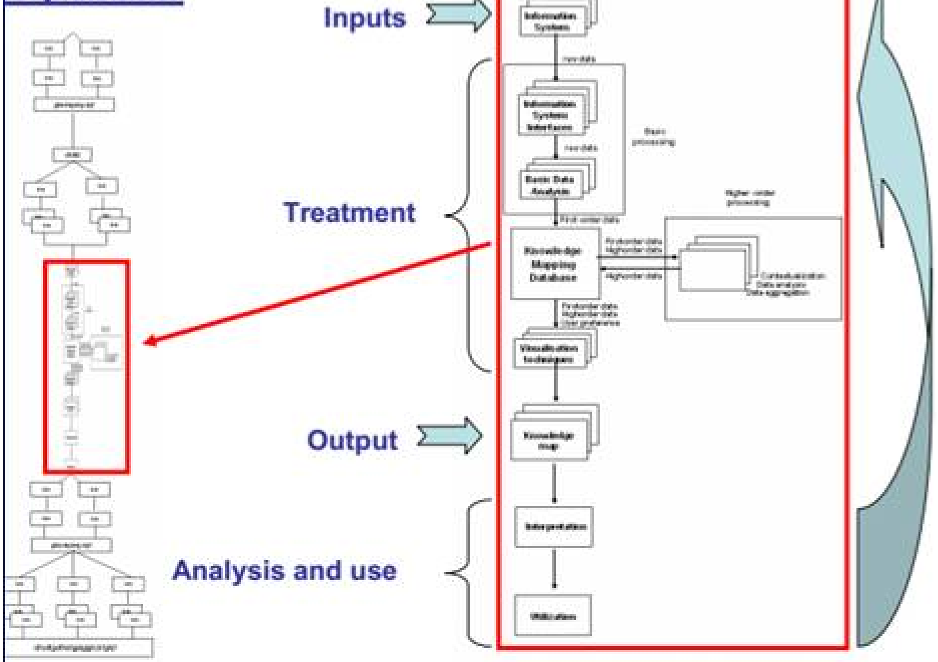
Modified from Vail E. (1999) and Hylton A. (2002)

"An ongoing, collaborative quest to uncover the constraints, assumptions, location, ownership, value and use of information artifacts, find people and qualify their expertise, surface blocks to knowledge creation, and discover opportunities to leverage tacit knowledge."

Grey D. (2005)

What is Knowledge Mapping ?

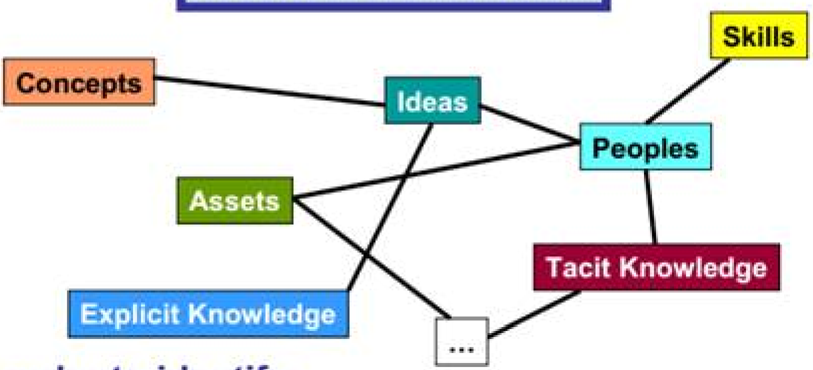
A process



What is Knowledge Mapping ?

how does K mapping differ from other mapping processes ?

What we map



In order to identify:

- assets
- flows
- gaps
- solutions

What is Knowledge Mapping ?

The visual Framework

FUNCTION
Coordination
Attention
Recall
Motivation
Elaboration
New Insight

KNOWLEDGE TYPE
Know-what
Know-how
Know-why
Know-where
Know-who

RECIPIENT
Individual
Group
Organization
Network

VISUALIZATION TYPE
Sketch
Diagram
Image
Map
Object
Interactive Visualization
Story

Extracted from Burkhard, R. 2005a

K-Mapping in the KMS strategy

WHERE WE WILL FOCUS OUR WORK

- Conduct country knowledge mapping using a standard methodology to identify current state of KMS and how KMS can best contribute to the countries' health care needs

HOW WE WILL ACHIEVE OUR OBJECTIVES

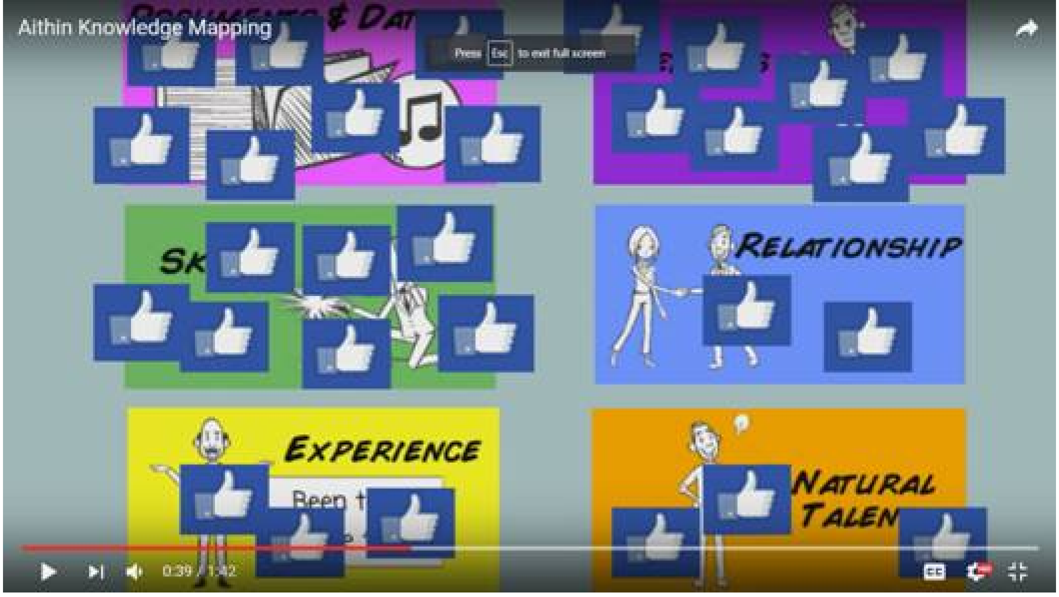
3 . *Foster the sharing and reapplication of Experiential Knowledge.*

- Establish and promote the use of a standardized methodology for knowledge mapping to better identify knowledge gaps and flow inefficiencies and potential ways to address them, as well as key knowledge assets and means to exploit them
- Support knowledge audits (applied knowledge mapping) in countries and technical programs
- Building on WHO collaborating Centres, foster global knowledge networks in WHO priority areas

_"A **knowledge map** is the intellectual infrastructure for knowledge management initiatives. The basis for it consists of **multiple taxonomies** for **content repositories**, dynamic **categorization of people**, their **expertise**, and the **communities they belong to**, and finally a set of taxonomies for the variety of tasks that are performed within and by the company's communities. The **taxonomies of content, people, and tasks** then have to be mapped across the three components in order to provide a foundation for such knowledge management enterprise projects as knowledge retrieval for both **document based knowledge** and the **tacit knowledge** located within the **minds of the company experts**."

Identification of knowledge assets in an organisation

Which knowledge assets are most valuable and where they are available?



Evidence based knowledge management Plan


AIthin Knowledge Mapping
INFORMATION AND RECORDS MANAGEMENT
COMMUNITY OF PRACTICE
RETENTION OF CRITICAL KNOWLEDGE
NETWORKING
AFTER ACTION REVIEWS
MENTORING AND COACHING
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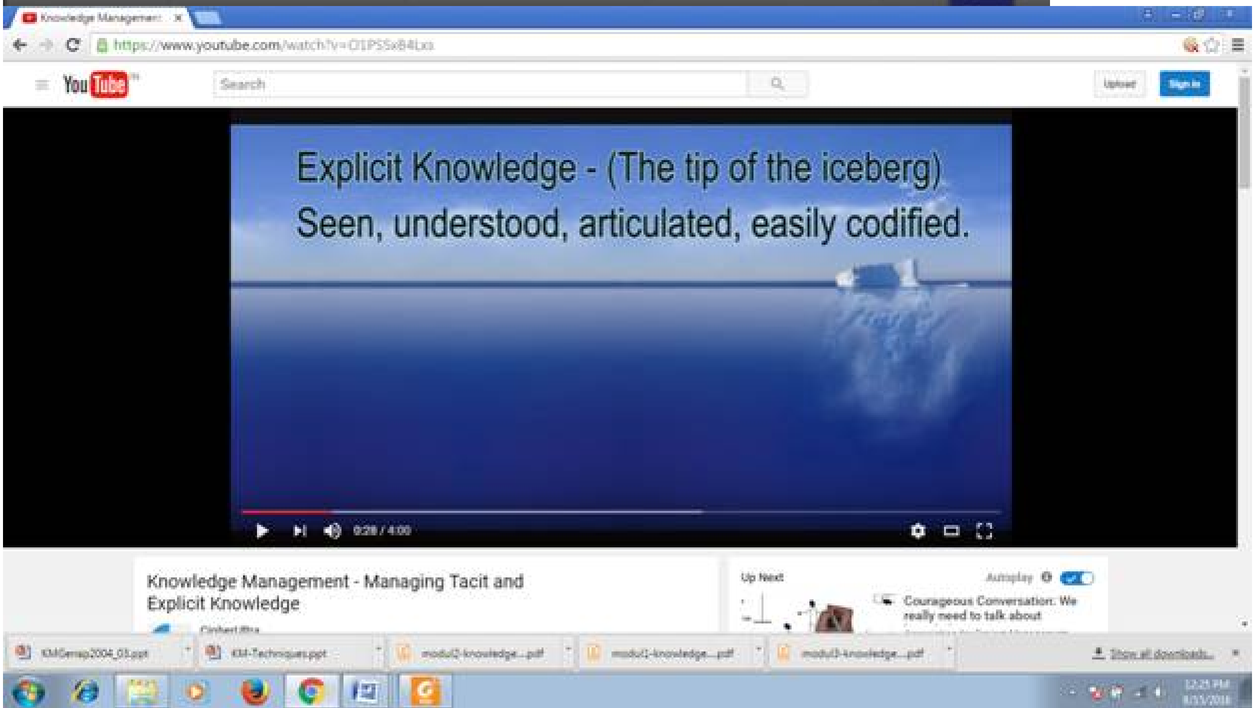
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Seen, understood, articulated, easily codified.
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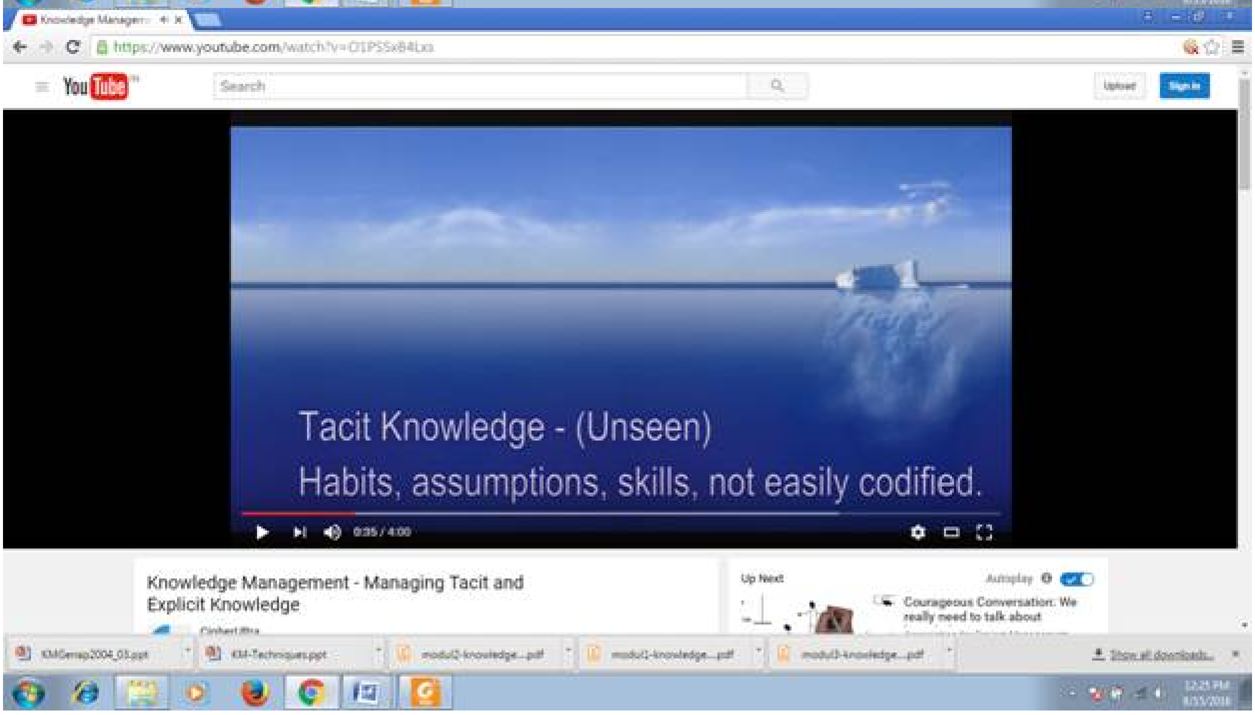
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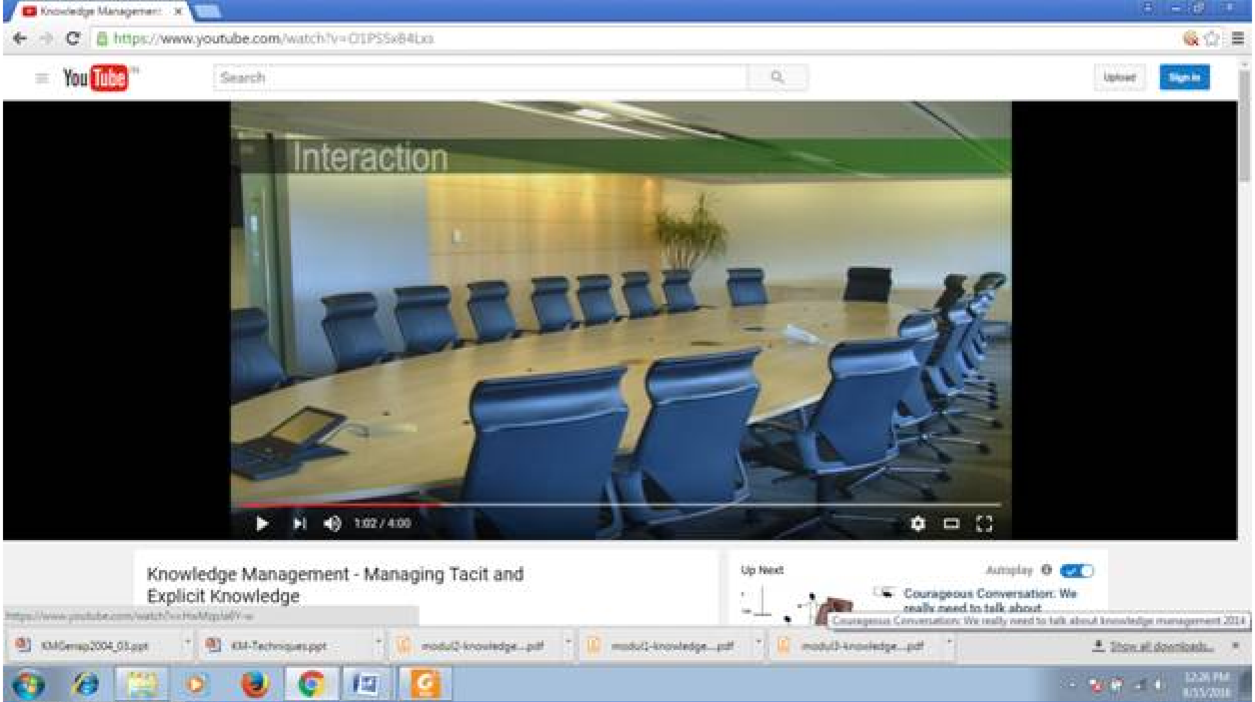
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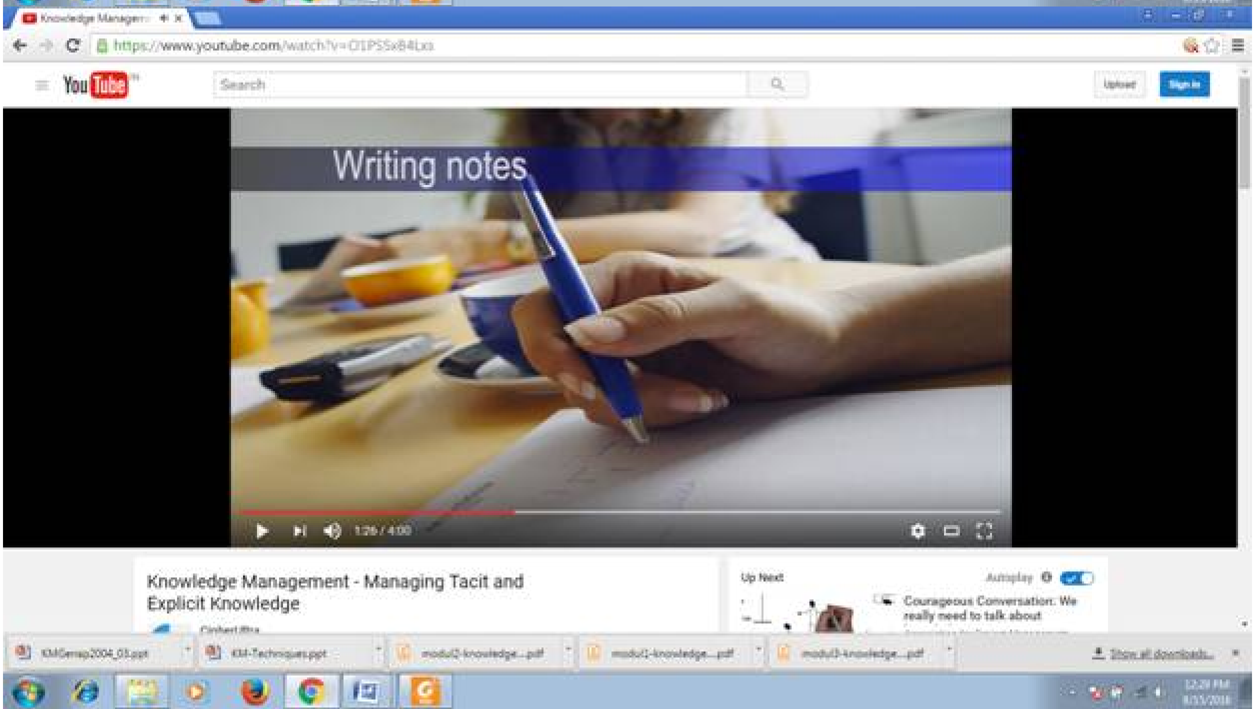
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It transforms to tacit and becomes part
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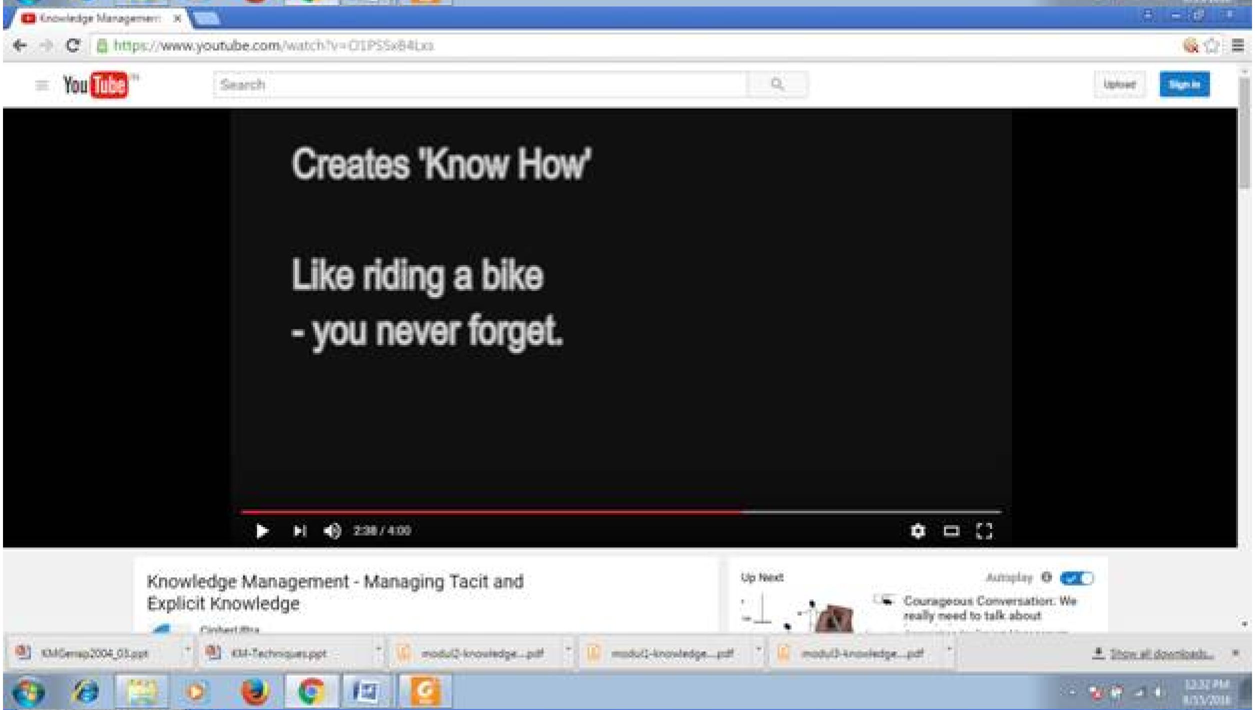
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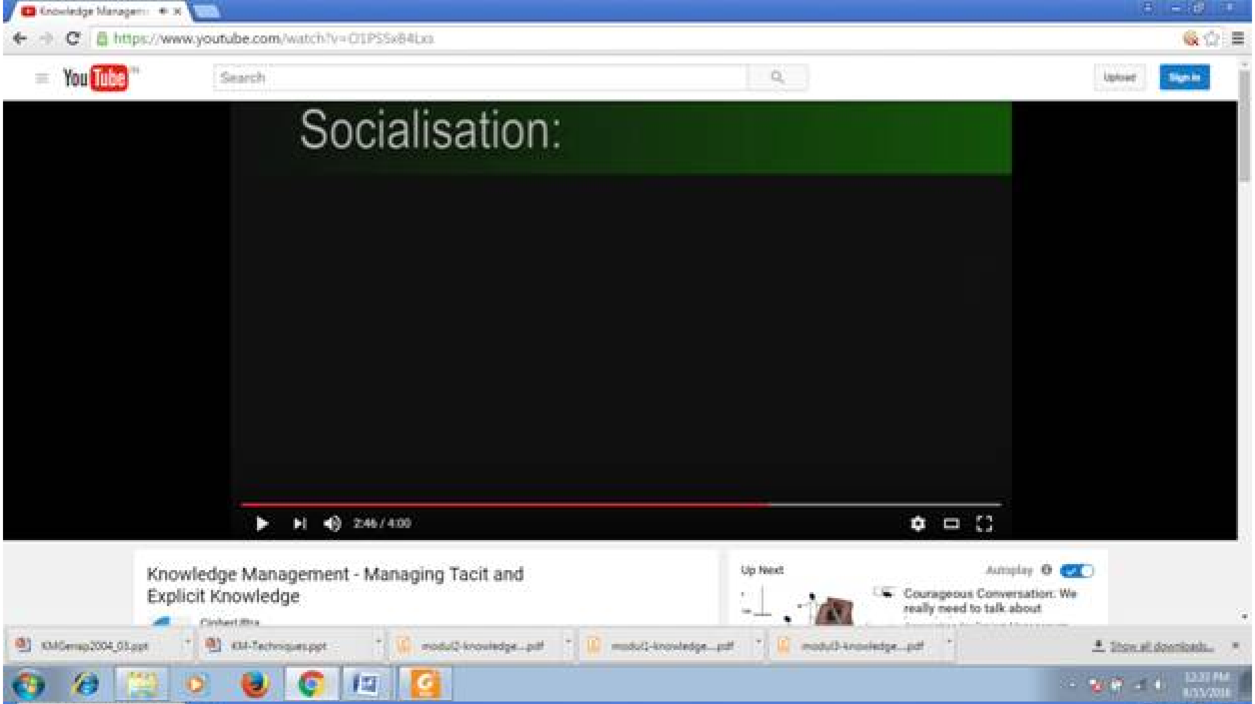
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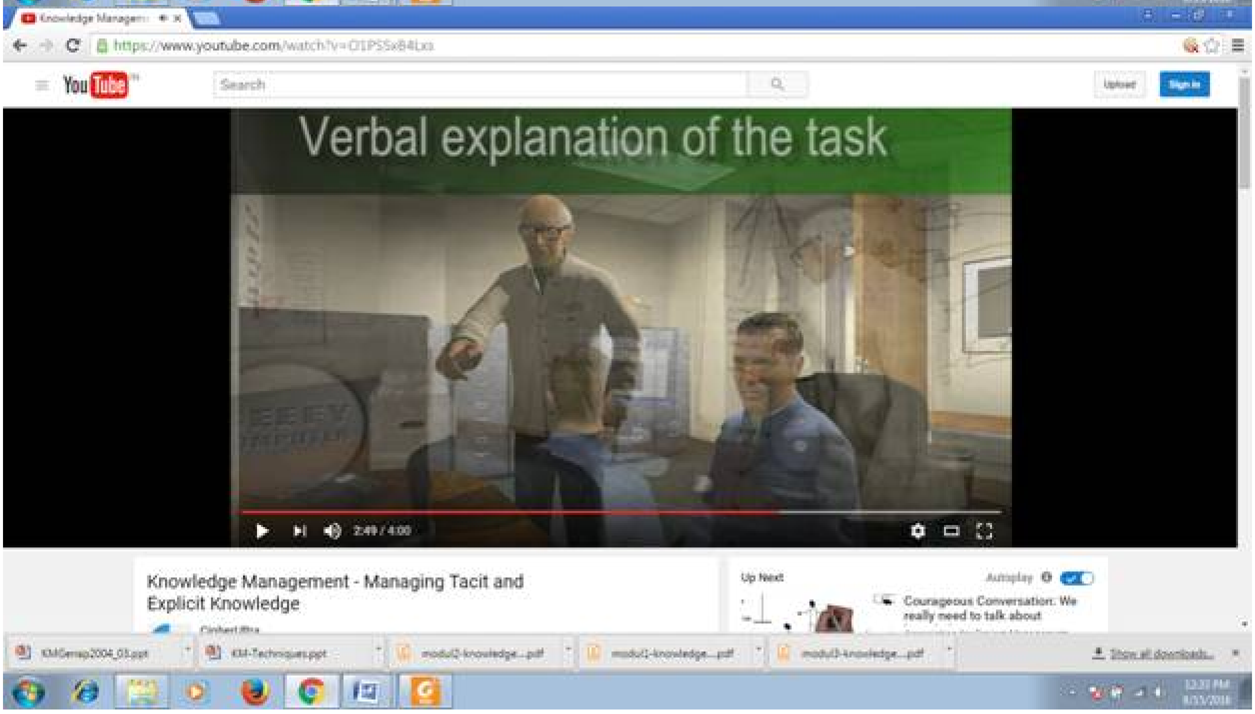
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Verbal explanation of the task
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Internalisation:
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After practicing the task often...
3:17 / 4:00
Knowledge Management - Managing Tacit and Explicit Knowledge
Up Next
Courageous Conversation: We really need to talk about


Now has the 'Know How'
3:20 / 4:00
Knowledge Management - Managing Tacit and Explicit Knowledge
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Courageous Conversation: We really need to talk about

To conclude, the SECI model shows:
Tacit knowledge can be converted to explicit
A framework for managing KM processes.
3:46 / 4:00
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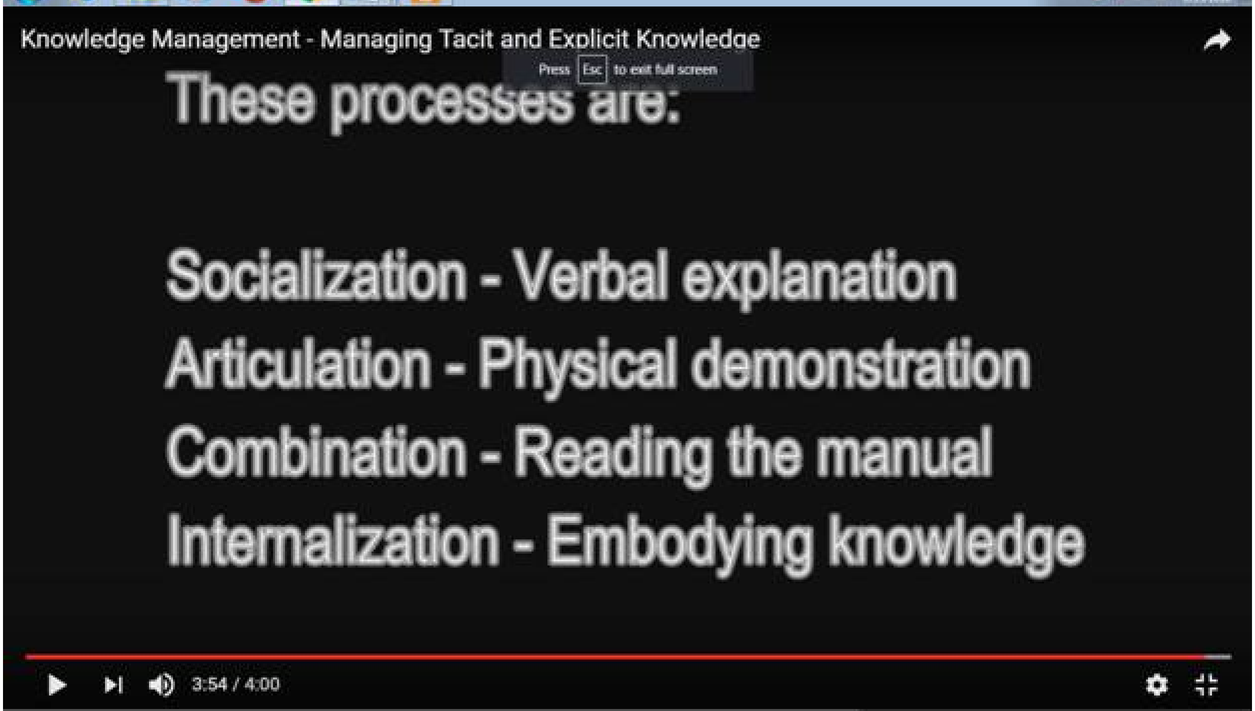

Knowledge Management - Managing Tacit and Explicit Knowledge
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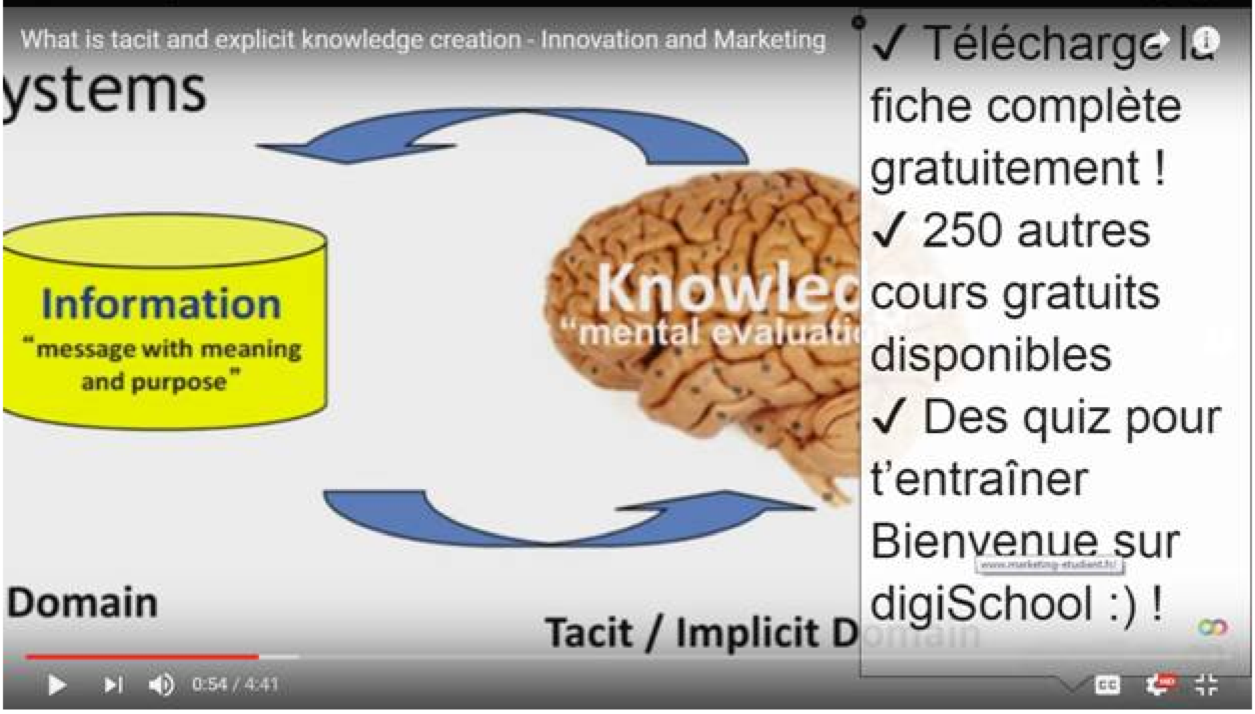
These processes are:
Socialization - Verbal explanation
Articulation - Physical demonstration
Combination - Reading the manual
Internalization - Embodying knowledge
3:54 / 4:00



What is tacit and explicit knowledge creation - Innovation and Marketing
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"message with meaning and purpose"
Knowle
"mental evaluati
Domain
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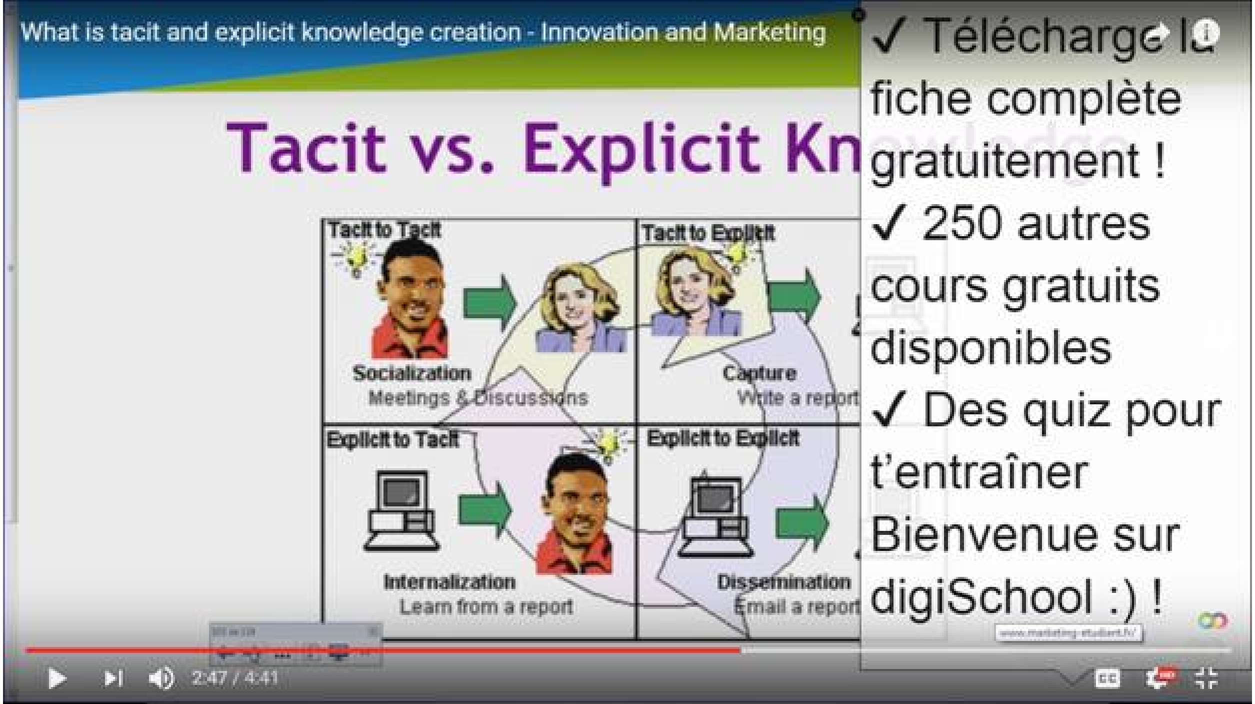

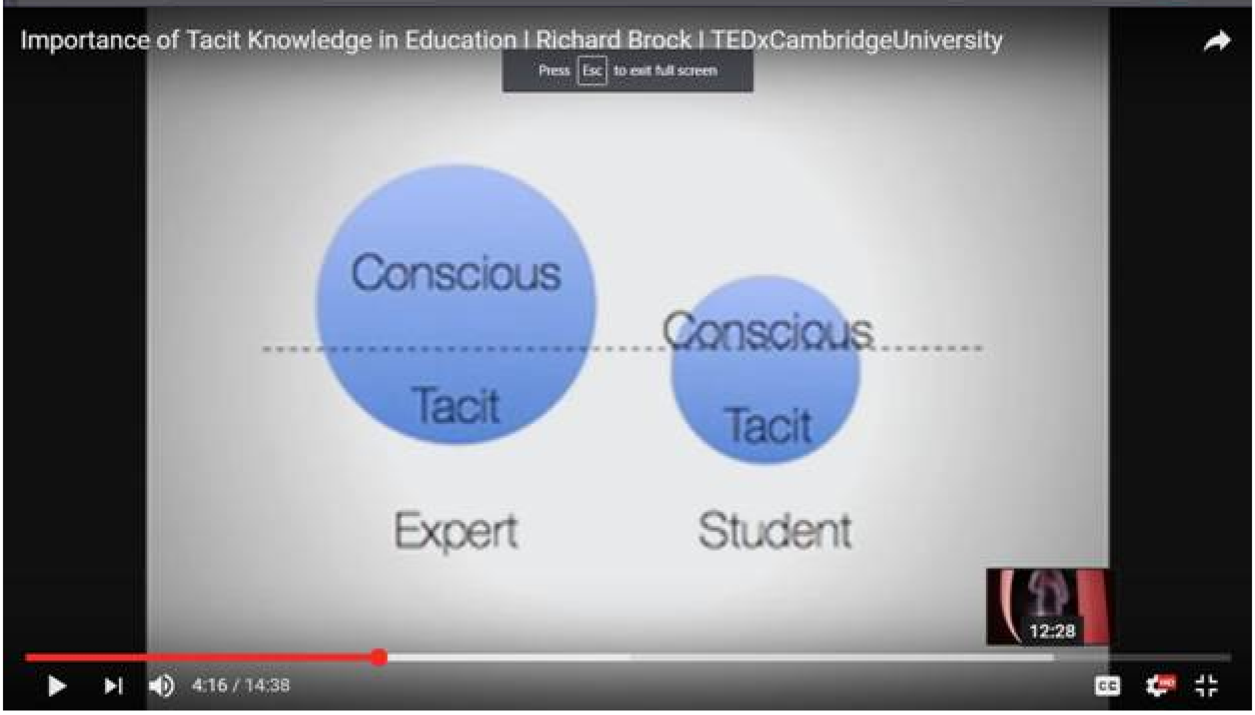

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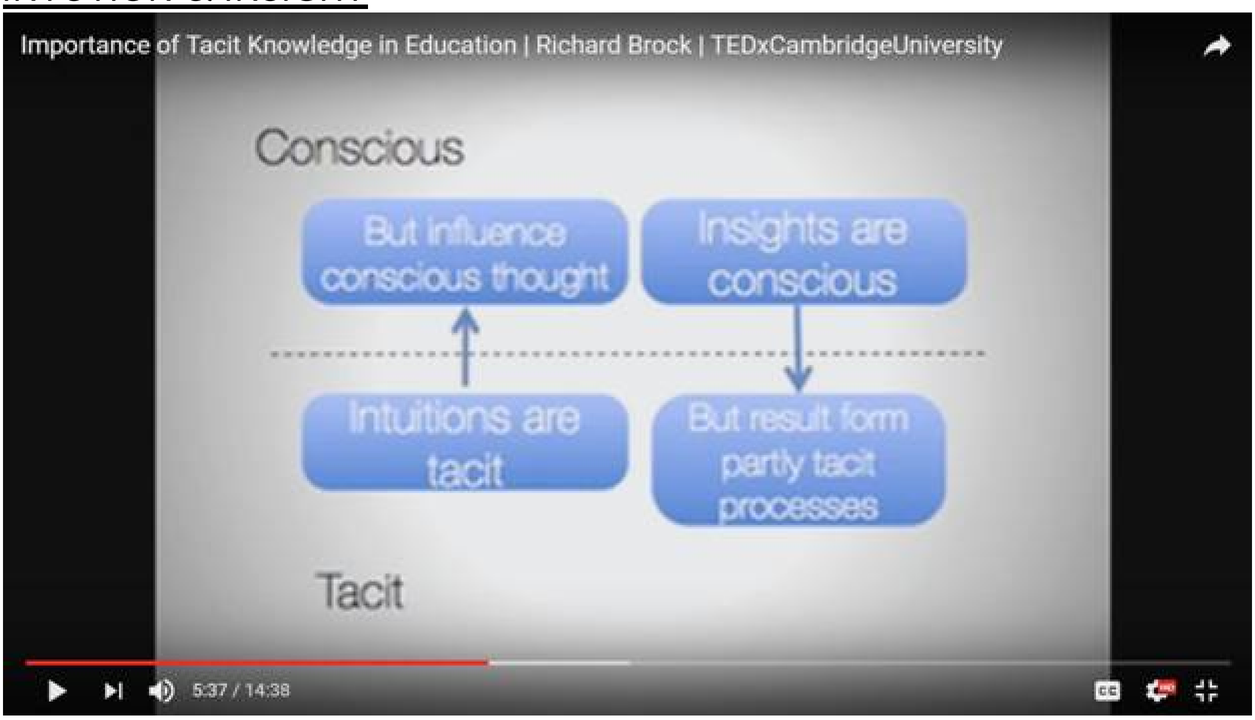

One of the definitions of knowledge map is presented here (Anon, 2003):

> *"A knowledge map is the intellectual infrastructure for knowledge management initiatives. The basis for it consists of multiple taxonomies for content repositories, dynamic categorization of people, their expertise, and the communities they belong to, and finally a set of taxonomies for the variety of tasks that are performed within and by the company's communities. The taxonomies of content, people, and tasks then have to be mapped across the three components in order to provide a foundation for such knowledge management enterprise projects as knowledge retrieval for both document based knowledge and the tacit knowledge located within the minds of the company experts."*

Knowledge mapping is defined as the process, methods and tools for analyzing knowledge areas in order to discover features or meaning and to visualize them in a comprehensive, transparent form such that the business-relevant features are clearly highlighted (Speel & al, 1999). It can be defined as a process of surveying, assessing and linking the information, knowledge, competencies and proficiencies held by individuals and groups within an organization (Hylton, KeKma-Training, 2002).

2. Knowledge Mapping Techniques

There are different techniques to map existing organizational knowledge. Each of these techniques uses a set of tools, approaches, objectives, and specific characteristics. In this section, these techniques are introduced concisely.

2.1. Yellow Paging

The yellow pages facility is a structural collection of data and documents about people in an organization. It is an effective way to know who knows what in an organization. The purpose of yellow pages is to facilitate communication and knowledge sharing between individuals and groups of people in organizations. Many organizations have their own yellow paging applications, which enable employees to find and communication with each other and with particular expertise and skills (Mikolajuk, 2005). This method has some weaknesses, 1) problems in quality reviewing or existing knowledge of people; 2) maintenance, like up-to-dating information in system. The underling reasons are as follows (Iske, 2005):

- The systems are not integrated in the business processes;
- There is no connection between the context of entering information and the context of using information;
- The information providers need to be pro-active in keeping the system up-to-date.

2.2. Information Flow Analysis

Information flow analysis determines who is accessing what information resources and how often by researching in organization's functional process and informal networks. This process can be put into practice by use of complex computer programs (Lutters, 2002).

Some techniques can provide the same information. Examples of them may be using sign-out sheets to capture real world usage information and taking advantage of questionnaires and interviews which include these questions about a specific topic (Maccall, 2006):

- Where do you refer when you need information on it?
- What resources do you use on it most of the time?
- Who or where do you submit information on it to?

2.3. Social Network Analysis

Social Network Analysis (SNA) can be defined as a map and a measuring of relationships and flows between people, groups, organizations, computers, or other information or knowledge processing entities (Pollock, 2002). The nodes in the network are the people and groups and the links show relationships or flows between the nodes. SNA provides both a visual and a mathematical analysis of complex human systems. It is one of the methods used to understand networks and their participants are to evaluate the location of actors in the network.

SNA try to understand how tacit knowledge was broadcasted and how it can be improved. SNA also enable managers to understand and exhibit thousand relations which facilitate or prevent creation or transfer knowledge.

After doing SNA we can answer to these questions (Cross, 2002): How does information flow in an organization? To whom do people turn for advice? Have subgroups emerged that are sharing what they know as effectively as they should?

2.4. Process Knowledge Mapping

Process knowledge mapping is a method of analysis to define the knowledge needed and the knowledge available to support a business process. It also analyzes a business process to identify decision milestones (where knowledge is needed), knowledge requirements (what knowledge is needed), routes for access and retrieval of knowledge through people and technology and gaps between required skills and current skills (USAID, 2003). In this technique, we can identify individual organizational processes and their steps, the position of the person performing the step, main skills and training which the person should have it in specific position, experiences and expertise for position, needed resources and procedures or actions that should be carried out by applying it. In the other word, we use job analysis in this technique to mapping knowledge.

Knowledge mapping techniques can be compared in many different ways. In this section, some comparison criteria are suggested. Theses criteria are:

- *Used tools for data gathering*: A key element of this framework can be the identification of tools used in a methodology for data gathering (Vestal, 2005).
- *Used tools for knowledge map evaluation*: These tools help analyzer to assess the knowledge map validation (Vestal, 2005).
- *Objectives*: Several objectives can be achieved when undertaking a knowledge mapping exercise. Practitioners are often faced with the dilemma of having to work with a knowledge mapping approach that is not intended nor adapted to the objectives they are pursuing. Therefore, the suitable technique with adopted objective should be taken (Lecocq, 2006).
- *Characteristics, capabilities*: The word "capabilities" is used to refer to the different functions and solutions that a knowledge mapping tool can offer. General and visual aspects of the represented knowledge assets which are the characteristic of any knowledge map are discussed as specific features for the representation of a network (Lecocq, 2006).
- *Users*: they include the members of the organization who need to access and use knowledge in their daily work. They are the ones who take advantage and benefit the most from the knowledge that is made accessible through the knowledge map (Lecocq, 2006).
- *Knowledge map elements*: Knowledge map does not contain the knowledge itself. We should determine in which techniques what the possible components of a knowledge map are, as well as the type of knowledge they represent and the assets they are linked to (Lecocq, 2006).
- *Knowledge mapping approaches*: There are three approaches to mapping knowledge (Jennings, 2005). These are process-based which is determined where we do work which predominantly repeats a predefined process, relationship-based which is determined where the work we do is primarily about managing a set of relationships, and project-based which is determined where the work we do is to complete a particular (usually substantial) project which, although process may play a role, is substantially different to others and unlikely to be repeated.
- *Top-down or bottom-up approach*: To mapping knowledge, we can apply two different approaches which are acquired two type map. Top-down map championing processes usually have those at the top of the hierarchy championing a map. In the other hand, Bottom-up knowledge map

Table 2: knowledge mapping techniques comparison

	Yellow Page	**Information Flow Analysis**	**Social Network Analysis**	**Process Knowledge Mapping**	**Functional Knowledge Mapping**
used tools for data gathering	Question and answer systems, Skills dictionary and reports	interviews, skill inventories, and extensive surveys information flow diagram (IFD)	Questionnaire Sociogram graph theory	brainstorming, or conduct interviews with the process owners	Survey and interview
used tools for knowledge map evaluation	Skills dictionary	Questionnaire, interviews and sign-out sheets	InFlow, Krackplot, and NetMiner	-	observations, interviews, internal reports
Objectives	create transparency as to the location of knowledge in the organization by registering individual competencies in a database or similar	Determining who is accessing what information resources and how often	discover interaction patterns between members	define the knowledge needed, Decision milestones, the knowledge available to support a business process, Routes for access and retrieval of knowledge and Gaps between required skills and current skills	locate knowledge sensitive areas Identifies and characterizes areas of process related critical knowledge spots
knowledge mapping approach	Project-based	Relationship-based	Relationship-based	Process-based	Process-based
create static or dynamic map	Static	Static	Dynamic	Dynamic	Dynamic
support tacit or explicit	Explicit	Tacit	Tacit	Explicit, Tacit	Explicit, Tacit