KM Tools & Techniques for Organization Effectiveness

Dr Gunmala Suri, University Business School, Panjab University, Chandigarh

Abstract
Knowledge acquisition, modeling and representation communities have developed wide range of tools relevant to development and management of large-scale knowledge-based systems. Majority of these tools run on individual work-stations and use specialist data formats making system integration and knowledge interchange quite problematic. Development of knowledge based systems involves the management of a diversity of knowledge sources, computing resources, and system users, geographically distributed.

INTRODUCTION
The World Wide Web (WWW) is a distributed hypermedia system available internationally. It provides general-purpose client-server technology which supports interaction through document with embedded graphic user interfaces. Worldwide expenditures on IT have generated significant benefits for the knowledge workers and are growing in importance. As organizations grow, they are challenged by rapidly changing economic forces that necessitates the development of faster, more accurate responses.

The widespread availability and adoption of computers during the past three decades has brought highly evolved systems for constructing, acquiring, storing, and representing knowledge. The wealth of opportunities presented by technology tools has resulted in divergent methods for their application within organization businesses, in order to increase value.

A Knowledge Management system (KM) can be described as, “A system for managing, organizing, filtering, analyzing, and disseminating knowledge in all its forms within an organization.” It supports organizational functions while addressing the needs of the individual with a purposeful context (departments or divisions). Accordingly, KMS software can be classified into the five KM categories for Knowledge gathering

- Knowledge storage
- Knowledge communication
- Knowledge dissemination
- Knowledge synthesis

A Knowledge Management system

KM Software can be grouped into five common categories that represent the current software market:
- Document management
- Information management
- Searching & indexing
- Communication & collaboration
- Expert systems

A sixth category comprising of systems for managing intellectual property can be added to the list. They help codify intellectual Assets of an organization and are certainly part of the KM domain. Geographic Information System (GIS) and visualization techniques can be effectively deployed in the development of a KMS.
To locate and access information appropriate for an organization, one needs to understand how information and new knowledge are created, organized, and stored using currently available technologies. Individuals and organizations take information for granted, unaware of the complex process that takes place before new knowledge is produced. It is a commonly accepted fact that ideas form the basis for research. Ideas that are meticulously researched and developed, eventually lead to new knowledge. Complex process of developing a new idea into new knowledge can take a long time costing a great deal. Scientific research is most costly, but research in humanities and social sciences also costs money. Researchers spend a lot of time writing and submitting grants to various organizations, secure funding for their research projects.

Conversion of ideas into commercial revenue streams is essence of innovation. Idea creation is the starting point. In an organization, percentage of people whose ideas are implemented are measured by Innovation Quotient, and it is very low as compared to percentage of employees with good ideas. Innovation provides organizations with a definite competitive advantage. Secret to competitive advantage is innovation. Innovation can help businesses meet all their strategic challenges, not just competition; in confronting, accelerating rates of change, globalization, rapidly advancing technology, a more diverse workforce, and a change from an industrial to a knowledge based economy. Meeting all these challenges helps firms achieve competitiveness, and meeting challenges appropriately depends on innovation. Major issues faced by organizations in this context are:

- Sharing individual ideas that eventually become a part of the organization knowledge base.
- Nurturing relevant ideas and shaping into projects and prototypes.
- Encapsulating resultant knowledge into products and processes and organization’s Intellectual Capital.

It can be achieved by considering innovation process in terms of flows of knowledge and its conversion between tacit and explicit—flows between people, codification into designs and databases, combination and restructuring knowledge into new forms. The process is non-linear and non-sequential. It depends on knowledge flows across organizational and discipline boundaries and extensive informal networking by organizational knowledge workers, including customers and business partners.

We will now explore three common knowledge creation techniques, employed by organizations to harness their Intellectual Capital.

**KNOWLEDGE NETWORKS**

An effective utilization of knowledge and learning requires both culture and technology. A successful organizational KM implementation entails creation of an organizational learning and sharing culture coupled with the deployment of technology as an enabler. Explicit information and data can be easily codified, written down, and stored in a data base. Any organization worth its name would have the requisite skills and tools to handle this form of business information. Simple data is frequently not where competitive advantage is found. An organization’s real edge in marketplace is often found in complex, context-sensitive knowledge, which is difficult, to codify and store in a binary form. This core knowledge is found in individuals, communities of interest and their connections. An organization’s data is found in its computer systems, but a company’s intelligence is found in its associated biological and social systems. Computer networks must support the people networks in the emerging fluid and adaptive organizations of today. The reverse is just not possible.

Fast economy requires flexible & adaptive structures that self-organize in response to changes. Current knowledge-critical economy necessitates creation of charts to depict members with base operational knowledge, or primary members within an organization, as well as members with knowledge to complement these primary members, or the secondary members. Besides organizational hierarchy charts, visualizations of massive interconnectivity that occurs in the learning systems within organizations are required. The formation of such multi-tier structures is required to build and sustain effective learning systems within an organization that form key to a successful development of an effective organizational KMS. [1]

Knowledge is capacity of people and communities, continuously generated and renewed in their conversation, to meet new challenges and opportunities. People responsible for value creation can be inspired and supported, but they cannot be
“managed” as people were managed in the industrial era. Organizations need to shift focus of their knowledge initiatives to developing an open culture of communication and collaboration that is supportive to sharing of innovative work and business practices.

Knowledge networks, is a subset of an organizational ecosystem or a network of conversation, face-to-face and electronic meetings, facilitated for results, richly hyperlinked with, feeding, and fed by knowledge repositories of what, who, why, where, and when. Communities of practice co-evolve with their shared body of knowledge, and protocols and tools for upgrading it. Dynamic force of this co-evolution is the network of conversations, in which, critical perspectives, new needs, circumstances, and better solutions to meet them are introduced.

KNOWLEDGE ECOSYSTEM

A knowledge ecosystem can be construed as a network comprising of the following:
- People network
- Knowledge network
- Technology network

This includes a network of people with productive conversations facilitated for continuously creating a knowledge network of ideas, information and inspiration, that cross-fertilize and feed on each other, supported by a technology network of knowledge bases, communication links, action scripts, sense-making and negotiation tools, that generate business and social value through action of its members augmented by intelligence of the whole ecosystem. A knowledge ecosystem can be construed as a complex adaptive system of people in communities located in the same space, in which they cultivate relationships, tools, and practices for creating, integrating, sharing, and using knowledge.

Knowledge ecology is an interdisciplinary field of management practice, emerging from the confluence of management strategy, communities of practice, adaptive systems and knowledge management. It is a growing body of knowledge and practices focused on continuously improving relationships, tools and methods for creating, integrating, sharing, using and leveraging knowledge.

Based on recent research, an organization can be benchmarked in key dynamics such as adaptability to external environment, learning capacity, openness to environment, ability to span boundaries, brittleness of its structures, probability of project success and efficiency of information flow. This technology provides ability to drill into a complex organizational system and find emergent subject matter experts, natural leaders, bottlenecks, breakdowns in communication and communities of practice.

ONA is basically an Object-Oriented (O-O) model of an organization, with objects such as people, teams, and technologies interlinked, sending messages to each other and invoking respective methods to accomplish goals of the firm.

KNOWLEDGE MAPPING TECHNIQUES

Knowledge Mapping is an important practice consisting of survey, audit, and synthesis. It aims to track acquisition and loss of information and knowledge. It explores personal and group competencies and proficiencies. It illustrates or “maps” how knowledge flows throughout organization. Knowledge mapping helps an organization to appreciate how the loss to staff influences, to assist selection of teams, and to match technology to Intellectual Capital knowledge needs and processes.[2]

Knowledge mapping represents an opportunity to solve complex problems, and to democratize the understanding of transdisciplinary processes. The following are major challenges faced by organizations in quest for an effective KMS.

Issues & challenges:
- Escalating rate in growth and diversity of knowledge and information available within an organization.
- Fractionation of disciplines into narrow specialty fields.
- Increase in professional mobility, leading to a discontinuity of focus and experience within an individual’s career and resulting in fewer subject matter experts.
- Lack of formal framework that explicitly represents collective knowledge base and problem solving processes, to enable meaningful dialogue and action.
KNOWLEDGE MAPS

An organizational knowledge map is a navigational aid to explicit (codified) information and tacit knowledge, highlighting importance and the relationship between knowledge stores and dynamics. Organizational knowledge map is an outcome of synthesis within the organization and portrays the sources, flows, constraints and losses or stopping points of knowledge within an organization. An organizational knowledge map depicts the following:

- Location, ownership, validity, timeliness, domain, sensitivity, access rights, storage medium, statistics, medium and channels of common organizational data, information and knowledge pools or sources.
- Organizational documents, files, systems, policies, directories, competencies, relationships, authorities.
- Boundary objects, knowledge artifacts, stories, heuristics, patterns, events, practices, activities.
- Explicit and tacit knowledge closely linked to strategic drivers, core competencies and market intelligence.

BENEFITS OF K-MAPS

- Encouraging reuse of organizational knowledge and preventing re-invention, saving search time and acquisitions costs.
- Highlighting islands of expertise and suggesting ways to build bridges to increase knowledge sharing.
- Discovering effective and emergent communities of practice where learning is happening.
- Providing a baseline for measuring progress.
- Reducing burden on experts by helping staff to find critical information quickly.
- Improving customer response, decision making and problem solving by providing access to applicable information.

ORGANIZATIONAL KNOWLEDGE PROCESSING

Innovation is key to competitive advantage. Innovation begins by empowering an organization’s employees through learning, sharing knowledge, and collaboration. Knowledge includes the expertise an organization gains from developing its products, information about its competitors and their products, information regarding customers, their needs and their feedback on the organization’s products. The analysis of this knowledge and the subsequent action gives an organization the competitive advantage required to ensure its survival. Since employees acquire knowledge, they become an organization’s greatest asset. It represents organizations thinking on their ideas, inventions, and innovations that become the sources of sales and profits.

Document management systems facilitate communication, collaboration and capturing of organization’s knowledge. Document management systems databases, known as knowledge systems, serve as the repository for recording people’s learning and experiences. Document management systems provide a quick and easy way to capture and store knowledge. It promotes free flow of information, enhances innovation, supports and facilitates collective leadership. The result is that an organization is able to meet the challenges in the marketplace.

Organizational knowledge whether created, acquired, or captured need to be stored, structured or organized and processed or analyzed before it can be passed on to the organizational knowledge base for dissemination. The process is illustrated in figure 2.

Traditional On-Line Transaction Processing System (OLTP) are good at storing data into databases.
quickly, safely and efficiently but are not efficient at delivering meaningful analysis in return. Analyzing data could provide further knowledge about business processes by going beyond data explicitly stored to derive knowledge about the business. This is where Data Mining or Knowledge Discovery in Databases (KDD) provides benefits for any enterprise.

**DOCUMENT MANAGEMENT SYSTEMS**

The goal of any document management system is to take a paper document, which can easily be searched, retrieved, and shared with other people across a network. Document Management System keeps track of mass of data and information, which is stored in a secure file vault where its integrity is guaranteed and all changes to it are monitored, controlled, and recorded. A document management system provides for easy and faster access to all documents. It takes care of creating, storing, editing, and distributing documents. A document management system facilitates authorization and authentication of users to specific document, along with version control of the document.

**DATABASE MANAGEMENT SYSTEM**

A database is a collection of data or information. Database Management System (DBMS) is a program that manages data in a database. It is a computerized record-keeping system that stores, maintains, and provides access to information. A database can be simple as a phone book or stock table, or as sophisticated as a biological repository with terabytes of data. A database system involves four components:

- Data
- Hardware
- Software
- Users

Primary purpose of a DBMS is to allow a user to store, update, and retrieve data in abstract terms and make it easy to maintain and retrieve information from a database. A DBMS relieves the user from having to know about exact physical representations of data and having to specify detailed algorithms for storing, updating, and retrieving data. A DBMS usually a very large software package, that carries out many different tasks including the provision of facilities to enable user to access and modify information in the database. DBMS provide different database languages. Structured Query Language (SQL) is a de-facto standard. Database languages come in different forms. A language is needed to describe the database to the DBMS and provide facilities for changing database and for defining and changing physical data structures. Another language is needed for manipulating and retrieving data stored in the DBMS. These languages are called Data Definition Languages (DDL) and Data Manipulation Languages (DML) respectively. Latest development in the field of database management systems relate to the development of object oriented relational database or OORDBMS. This is based on the established concept of object oriented analysis and design or OOAD and provide for simplification of data storage, access, and retrieval and effective manipulation. Oracle Corporation, IBM and Microsoft are the leading vendors of DBMS and have a range of products to suit varied organizational requirements.

**DATA WAREHOUSE**

Organizations seeking to improve their decision-making ability are overwhelmed by volume and complexity of data available from operational and production systems. Making this data accessible is one of significant challenges for IT professionals. In response to this challenge many organizations choose to build a data warehouse to unlock the information in their operational systems. A data warehouse, is an integrated store of information collected from systems that becomes the foundation for decision support and data analysis. There are many types of data warehouses, based on design methodologies and philosophical approaches. They have common traits:

- Information is organized around major subjects of interest to an organization (customers, products, sales, or vendors), reflecting a data-driven design.
- Raw data is gathered from nonintegrated operational and legacy application, cleansed, summarized and presented in a way that makes sense to end users.
- Based on feedback from end users and discoveries in the data warehouse, the data warehouse architecture will change over time, reflecting iterative nature of the process.
Data warehousing process is complex, costly and time-consuming. Over past several years, Microsoft, IBM and other key vendors have been working to create a data warehousing platform that consists of component technology and leading products to lower costs and improve effectiveness of data warehouse creation, administration, and usage.

KNOWLEDGE ANALYSIS

Last two decades has seen a dramatic increase in the amount of information or data being stored in electronic format. This accumulation of data has taken place at an explosive rate. It has been estimated that amount of information in the world doubles every 20 months and the size and number of databases are increasing even faster. The increase in use of electronic data gathering devices such a point-of-scale or remote sensing devices has contributed to this explosion of available data. There was introduction of new machine learning methods for knowledge representation based on logic programming in addition to traditional statistical analysis. New methods tend to be computationally intensive, and demand more processing power. Analyzing data can provide further knowledge about a business by going beyond the data explicitly stored to derive knowledge about the business. Data Mining or Knowledge Discovery in Databases (KDD) provides an organization with highly tangible benefits in the area of analysis. The term data mining has been stretched beyond its limits to apply to any form of data analysis.

DATA MINING

Data mining or knowledge Discovery in Database (KDD), is the nontrivial extraction of implicit, previously unknown, and potentially useful information from data. This encompasses a number of different technical approaches, such a clustering, data summarization, learning classification rules, finding dependency net works, analyzing changes, and detecting anomalies. Data mining is concerned with the analysis of data and the deployment of software techniques for uncovering patterns and regularities in sets of data.

Data mining analysis tends to work upwards from the available data and the best techniques are those developed with an orientation towards large volumes of data, making use of as much of the collected data as possible to arrive at reliable conclusions and decisions. Analysis process starts with a set of data, use a methodology to develop and optimal representation of the structure of the data during which time knowledge is acquired.

KM and Data Mining are developed independently of each other, and their complementarities have not yet been fully recognized, much less exploited. Born of the understanding that knowledge is one, if not the most important asset of an organization, both KM and Data Mining grew and flourished resulting in the confluence of information technologies (machine learning, knowledge-based systems, and database), statistics and data analysis, and the business and management sciences. KM and Data Mining are not synonymous and cannot be equated directly, since there is lot of larger issues involved in these processes.

KNOWLEDGE DISMINATION

Simulation tools actually bridge the gap between codification and transfer. A great deal of time is spent in codifying all that is known about an event, process or activity which such tools are designed to emulate. Incorrect knowledge embodied in the simulator in the outset can easily destroy the necessary realism of the simulation, making it just an abstract exercise. Using genetic algorithms and other advanced technologies, such programs evolve over time, learning from their own experience. By codifying knowledge of the industry and letting individuals try out ideas, knowledge and experience is gained in a more efficient manner than through years of trial and error. This is the trademark of good knowledge transfer.

Significant benefits accrue to an organization, when one segment of an organization is able to take advantage of the understanding and experiences of another. Knowledge is a cycle, that moves from tacit/individual (socialized) to explicit/individual (through articulation), to explicit/group (through combination), to tacit/group (through internalization). Making this process observable allows management to use it as a tool to promote behavior which moves knowledge appropriately along this stream by calling on the tools of metaphors, analogies, and models.

Modern enterprises are rarely local, so coordinating global operations and interacting with
suppliers, customers, and partners wherever they may reside become necessary. Most people must be able to carry on transactions and interactions from afar. Groupware and similar Internet-based tools allow individuals to create virtual spaces to carry on conversations regardless of time and distance, work on documents, create virtual libraries and knowledge-base, and coordinate activities from remote locations.

Conferencing is an asynchronous medium, meaning that it is independent of time. This allows individuals to participate at their own convenience rather than having to match schedules with other people. The most significant drawback of this approach is that the time taken to complete conversation is very high. Many conferencing systems have added real time chat to their capabilities. This is a natural development, not only because chart is popular and fun, but because groups working together at a distance need to be able to communicate both asynchronously and in real time. In the future, additional real time communication features will be built in, particularly “white board” capabilities that allow participants to sketch diagrams and drawings for each other as they chat. Real-time audio and video conferencing might be added. All of these real-time media need to be integrated seamlessly into a conferencing environment, so that participants can move fluidly between synchronous and asynchronous communications.

**Communication Tools**

- Grape VINE two versions, one for lotus notes and one for Netscape; users can set up an interest profile that identifies what is useful to them and to filter information.
- Knowledge Software-two products PKM (Personal knowledge Manager) and PDP (Personal Development Plan) both based on Lotus Notes.
- Knowledge Exchange knowledge management system-a lotus notes based system.
- Microsoft NetMeeting – NetMeeting for Windows 95 and Windows NT is a product that provides complete conferencing solution for the internet and corporate intranet. Powerful features facilitates communication employing, audio and video, collaboration on virtually any windows-based application, exchange graphics on an electronic whiteboard, transfer files, usage of text-based chat program. Using a PC and the Internet, and individual can hold face-to-face conversations with co-workers, friends, and family around the world at a nominal cost.[3][4]

**SUMMARY**

During last few years, corporate world has seen emergence of interest in knowledge management and adoption of term by IT vendor’s ad industry solution providers. Despite popularity most implementations have been based on outdated business model and related information processing view. It is difficult to justify why specific IT solutions fall in the realm of KM rather than within scope of information management or data management. Key learning from this chapter is that, innovation is the key to competitive advantage. Innovation begins by empowering an organization’s employees through learning, sharing knowledge, and collaboration. Knowledge can include the expertise and organization gains from developing its products, information about its competitors and their products, information regarding customers, their needs and their feedback on the organization’s products. Analysis of this knowledge and the action gives an organization competitive advantage required to ensure its survival. Technology plays role of a catalyst and should not be mistaken as a process.

**REFERENCES**