IMS5330
Knowledge Management System Development

Lecture 8
Creating the KMS Blueprint

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The KMS Road Map

The first phase: evaluation of the infrastructure and aligning KM and business strategy.
The second phase: KM system analysis, design, and development.
  • Knowledge audit and analysis
  • Designing the KM team
  • Creating the KM system blueprint
  • Selecting KM technology
  • Developing the KM system
The third phase: KMS deployment.
The final phase: measuring ROI and performance evaluation.  

Amrit Tiwana, 2002
The KMS Blueprint

- The KMS blueprint is concerned with the design of the KM architecture and the IT infrastructure for collecting, sharing and distributing organizational knowledge. The design and deployment of the KMS is based on this blueprint.
- The Blueprint aims to:
  - develop the key layers of the KM architecture to meet the organisation’s requirements
  - address the architecture’s interoperability and scalability with the existing IT infrastructure
  - finalise the scope of the KMS, defining measurable outcomes
  - decide on system components such as:
    - user interface options
    - repositories
    - tools

A KMS Architecture: A 7 Layer Model

- User interface
- Authentication/security layer
- Collaborative intelligence and filtering
- Application layer
- Transport layer
- Physical layer
- Repositories
- Middleware and legacy applications

Tiwana, 2000
A KMS Architecture?

- KM Processes – discovery, capture, sharing/distribution, application
- KM Systems
- KM Mechanisms
- KM Technologies
- KM Infrastructure

Becerra-Fernandez et al, 2004

Components of the KMS Architecture

Comprises several sub-components:
- Repositories
  - Store formal and informal (explicit) knowledge;
- Collaborative platforms
  - Support communication, co-ordination and knowledge sharing
- Networks
  - Physical and logical channels for communication
- Organisational culture
  - Major enabler

Nothing can be done if organisational culture is not supportive of KM!
Knowledge as Asset

- Knowledge is a valuable organisational asset if it is formalised, stored, distributed, and used.
- Knowledge can be used if it is retrievable, accessible, and comprehensible.
- A knowledge repository that is formalised, comprehensible, accessible and retrievable is an organisational memory.
- An IT infrastructure is required to facilitate knowledge storage, distribution and usage.  
  (Leibowitz 1999, Housel and Beş, 2001)

Knowledge Repositories

- Knowledge repositories are essential part of any KMS.
- Knowledge repositories must store and retrieve different types of knowledge structures.

"A knowledge repository organises, and makes available to all employees, basic information on the company’s organisation, products, services, customers and business processes."

"A knowledge repository is an on-line, computer-based storehouse of expertise, experience, and documentation about a particular domain or expertise".

(Leibowitz 1999)
Types of Knowledge Structures

- Text
- Data structures (e.g., relational as in relational database)
- Document structure: forms, templates, charts, interfaces
- Images: pictures, video
- Sounds
- Cases/sories: in case base systems (CBR)
- Rules: in rule base systems (RBS)
- Models: frameworks, simulations

(Data oriented repository)

Data Oriented Repository

Data warehouses are motivated by:
- the need to view the entire enterprise from a single point
- the need to make information available and easily accessible

"The data warehouse is a non-volatile, time-based repository in which knowledge workers can access, query, and analyse information in a variety of forms and arrangements to see trends over extended periods of time"

(A decision-making perspective):

"An integrated and consistent store of subject-oriented data that is obtained from a variety of sources and formatted into a meaningful context to support decision-making in an organization"
Text Oriented Repositories

- Organisations interact internally and externally through text-based records that include data elements.
  - American business generates about 90 billion documents per year.
  - Each of these documents is copied an average of 11 times
    \[\text{CompuTechnics, 1999 (Source: Windows Magazine)}\]
  - Office workers spend 20% of their time performing document management in non-automated environment
  - A typical organization of 1,000 people wastes over $11 million per year through manual document handling and management
    \[\text{CompuTechnics, 1999 (Source: Gartner Group)}\]

- "Information overload is not a function of the volume of information... it’s a gap between the volume of information and the tools we have to assimilate that information into useful knowledge.”
  \[\text{Insight Presentation, Reuters Business Information 1996}\]

Managing Text

- Metadata is used to define, describe and categorize documents
- Metadata is also used to establish ownership, access authority, providence and durability
- The objective is to provide the means to reconstruct the text with fidelity in respect to its original context
- Such metadata schemas are now defined by Australian and international standards
  - the standards facilitate access, search and retrieval from documentary repositories
Text as Data: Structured Textual Information

- XML (eXtensible Markup Language) uses a system of tags that define individual pieces of text as data and describe their functions.
- XML can be used by a system to parse data from the rest of the text to identify data values and then store these values in a database.

Example:
The following statement, uses two predefined XML tags, <retail-price> and <disc-price>

Original text:
The retail price of this CD is $17. Your discounted price is $14.99

XML text:
<p>The <i>retail</i> price of this CD is <b>$</b><retail-price>17.99</retail-price><b/></p>
<p>Your <i>discounted</i> price is <b>$</b><disc-price>14.99</disc-price><b/></p>

Process Oriented Repositories

- Workflow systems model, implement and manage the flow of work process by defining the sequence of actions or steps used in a business process.
- Workflow assumes a network model of business processes that allows both sequential and parallel steps and implies more than 1 person is involved in the process.
- Workflow systems seek to automate formal policies and procedures but not necessarily to automates every action or step.
- Workflow applies to information-based tasks (white collar work) but is comparable to the automation of manual work (blue collar), both aim to improve productivity.
  - White collar productivity has not increased in the last 20 years due mainly to increases in capital expenditure for IT.
  - Blue collar productivity over this period has increased at double digit rates.
Difficulties with Workflow

- Automating an existing process
  - paving the cow path
- Over-linearization
  - white collar Taylorism or assembly line
- Dynamic allocation of work is difficult to model
- Lack of flexibility in applying a workflow shell over an existing legacy systems

Core Services for Knowledge Repository

Core services are tasks or activities that deal with knowledge by directly accessing knowledge repositories. These services can be fully or partially automated

(Housel and Bell 2001)
Core Knowledge Services

- **Knowledge generation services** create new knowledge in forms that can be stored in the repository (e.g., data mining, pattern recognition, collaborate creation of documents etc.)
- **Knowledge capture services** facilitate addition to repositories
- **Knowledge organization services** arrange items in repository to facilitate retrieval and use (add or modify indexes, directories)
- **Access management services** facilitate the control of access to the knowledge repository
- **Retrieval services** make knowledge available for specific users (include searching, navigation, translation, integration)

Housel and Bell, 2001

Other Knowledge Services

- **Electronic Communication services** – e.g. e-mail, chats
- **Collaboration services** – on-line meetings, discussion groups, groupware
- **Translation services** - from one file format to another, language to language
- **Work management services** – built upon collaboration services (define work activity, view the status of tasks, share results etc...)
- **Search and Intelligence services** - Intranet, extranet, intelligent agents
The SECI Model of Knowledge Creation

Socialisation  
- Tacit to Tacit  
- Tacit to Explicit

Externalisation  
- Explicit to Tacit  
- Explicit to Explicit

Combination  
- Intranets & Groupware  
- Web forums  
- Project databases  
- Lessons learned databases

Internalisation  
- Individual reflection

(Nonaka and Takeuchi, 1998)

IT Infrastructure for SECI

Socialization  
- Face to face communications  
- Web Cams  
- Collaborative computing tools

Externalisation  
- Publishing tools  
- Process Capture Tools  
- Expert systems

Combination  
- Discussion lists  
- Customer support databases  
- Lessons learned databases  
- Best practice databases

Internalisation  
- Justifying concepts facilitated by individual reflection
Issues for the Blueprint

- Understanding the technical components of the KMS
- Integration and interoperability
- Position and scope of the KMS (who/where/why)
- Build or buy?
- Optimal performance, scalability and flexibility
- Interface options
- Future-proof (dynamic change of technology)

Tiwana, 2000

Organisational Knowledge

- Two perspectives
  - Knowledge as an asset
  - Knowledge as a process of understanding and continuous learning
  
  Spender, 1996

- Both perspectives must be supported by the blueprint
- The KM strategy and objectives determine which perspective is emphasised or both co-exist
**Knowledge Usage**

- Knowledge distribution and sharing is mainly based on a process of learning and communication
  - it is a process of creating a joint understanding and shared meaning among the group of people responsible for the task outcomes
  - it is not a mechanical process as there is nothing tangible to distribute
- Collective knowledge is context-specific and embedded in the organisation as a community of practice
- Organizational knowledge loss can lead to the strategic crisis (rules without meaning)

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**Knowledge Usage**

- In order to be distributed knowledge has to:
  - exist and be available
  - needs to be created
  - be identifiable
    - needs to be represented and stored properly
    - can come from internal as well as external resources
- A sharing culture must exist
  - knowledge sharing needs to be promoted and rewarded
    - formally through organisational performance indicators
    - informally through social learning
The Paradox of Using Knowledge

- What you want to distribute, is not what is distributed
- What you are distributing is not what someone gets at the end
- Knowledge is increased as a result of its sharing and distribution

Communication

- The act of communication involves two agents, and serves the purpose of knowledge externalization, internalization and sharing between those agents. \cite{kaufer1993}
- Communication is essential to construct collective meaning through a process of transforming personal knowledge
- Shared meaning can be considered as organisational knowledge
Organisational Learning (OL)

- “The ability to create an organization capable of learning, i.e. the ability to create, use the knowledge and disperse it throughout the organization ...... creating innovations or actionable knowledge (that involves the) transfer of knowledge into value-added activity for the company.”
  
  (Ingelgård et al. 2002)

- “Learning in organisations means the continuous testing of experience, and the transformation of that experience into knowledge - accessible to the whole organisation, and relevant to its core purpose”

(SENGE ET AL. 1999)
**Individual and Collective Learning**

- Individual learning is experience driven - learning by doing
- "Learning at the collective level is the outcome of the interplay between the conscious and automatic (unconscious) types of knowledge, and between the individual and collective types of knowledge as they interact through the social processes of the collective, such as teamwork"

  *Spender, 1996*

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**The Nature of Organisational Learning**

- Learning facilitates change by adapting memory artefacts to the current situation
  - memory is not a repository of stored knowledge (and meaning) but the capability to re-reconstruct knowledge using a shared understanding of the new context.
- Culture is a stabilising force, while learning implies constant innovation.
- Strong forces for conformity and stability in organisations severely limit organisational learning.
- Most learning occurring in organisations tends to be lower-level (fixing the problem) but dynamic, complex environments demand higher-level learning (changing practices)
Supporting Knowledge Work

- The blueprint is to support changing work practices
  - the focus is on work practices that require expertise and knowledge to be applied and used to perform activities.
  - the activities need to produce tangible outcomes as well as contributing to the creation of knowledge.
  - work practices combine productive and cognitive work

- Cognitive work is about
  - sense making
  - learning
  - memory

and the processes that integrate these activities

References

- Tondl, L. 1981, Problems of Semantics