Knowledge Management
Lecture 1

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Outline

- Content of Course
- Assignment (1 essay)
  - Date due: mid-April
- Books, notes, papers

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All teaching material available on WebCT
1. Introducing Knowledge Management
   - What is KM
   - Challenges of KM
   - Forces driving KM

1. Understanding Knowledge / Nature of Knowledge
   1. Data, Information and Knowledge
   2. Types of knowledge
   3. Human thinking and learning
   - Challenges / conventional versus KMSLC
   - KMSLC
   - Implications for KM

4. Knowledge Management Solutions
   - KM processes
   - KM systems
   - KM infrastructure
5. Organisational Impacts of KM
   1. Impact on People / Processes / Products
   2. Impact on Organisational Performance

6. Factors Influencing KM
   1. Effects of task characteristics
   2. Effects of knowledge characteristics
   3. Identifying appropriate KM solutions
7. KM Assessment of an Organisation
   1. Types of KM assessment
   2. Assessment of knowledge
   3. Assessment of impacts

8. Knowledge Codification
   1. Why codify?
   2. Codification tools and procedures
      - Knowledge maps
      - Decision trees
      - Case-based reasoning
      - Knowledge-based agents
Syllabus /5

9. Discovering New Knowledge: Data Mining
   1. Data mining and business intelligence
   2. Technical drivers
      - Statistics
      - Machine learning
   3. Data management

10. Knowledge Discovery Systems
    1. Mechanisms to discover knowledge
    2. Using DM to create new knowledge
Syllabus/6

11. Knowledge capture systems
12. Knowledge sharing systems
Textbooks


Aims of this course

- Provide an understanding of the concepts of information, knowledge and their management,
- Give an overview of available tools for managing both information and knowledge

in order to

- Make you understand the needs of an actual organization and accordingly build action plans for its information and knowledge management.
Why the current interest in KM?

- “knowledge is at the heart of much of today’s global economy, and managing knowledge has become vital to companies’ success”

- “this transformation from a world largely dominated by physical resources, to a world dominated by knowledge, implies a shift in the locus of economic power as profound as that which occurred at the time of the industrial revolution”
  Burton-Jones (1999)
Key themes in the knowledge society literature

- Knowledge is of central importance to advanced economies
- Knowledge is key to organisational performance
- Organisations and work have become more knowledge intensive

Introducing knowledge management
What is KM?

- Knowledge management (KM) may simply be defined as doing what is needed to get the most out of knowledge resources.
- In general, KM focuses on organizing and making available important knowledge, wherever and whenever it is needed.
- KM is also related to the concept of intellectual capital, composed of both human & structural capital.

Chapter 1, Becerra et al.
Why KM?

- Sharing knowledge, a company creates exponential benefits from the knowledge as people learn from it
- Building better sensitivity to “brain drain”
- Reacting instantly to new business opportunities
- Ensuring successful partnering and core competencies with suppliers, vendors, customers, and other constituents
- Shortens the learning curve
KM justification

- Is current knowledge going to be lost?
- Is proposed system needed in several locations?
- Are experts available/willing?
- Can experts articulate how problem will be solved?
- Is there a champion in the house?
Driving forces in KM

Increasing Domain Complexity
  • Intricacy of internal and external processes, increased competition, and the rapid advancement of technology all contribute to increasing domain complexity.

Accelerating Market Volatility
  • The pace of change, or volatility, within each market domain has increased rapidly in the past decade.
Forces driving KM

Intensified Speed of Responsiveness

• The time required to take action based upon subtle changes within and across domains is decreasing.

Diminishing Individual Experience

• High employee turnover rates have resulted in individuals with decision-making authority having less tenure within their organizations than ever before.
Implications

- Faced with increased complexity, market volatility and accelerated responsiveness, today’s younger manager feels less adequate to make the difficult decisions faced each day.
- KM is important for organizations that continually face downsizing or a high turnover percentage due to the nature of the industry.
Is KM for everyone?

- KM is important for all organizations
- Today’s decision maker faces the pressure to make better and faster decisions in an environment characterized by a high domain complexity and market volatility, even in light of
  - lack of experience typically from the decision-maker
  - outcome of those decisions could have such a considerable impact on the organization
KM Systems (1)

- Information technology facilitates sharing as well as accelerated growth of knowledge.
- Information technology allows the movement of information at increasing speeds and efficiencies.
- “Today, knowledge is accumulating at an ever increasing rate. It is estimated that knowledge is currently doubling every 18 months and, of course, the pace is increasing... Technology facilitates the speed at which knowledge and ideas proliferate”
  Bradley [1996]
Knowledge management mechanisms are organizational or structural means used to promote knowledge management.

The use of leading-edge information technologies (e.g., Web-based conferencing) to support KM mechanisms enables dramatic improvement in KM.

*knowledge management systems* (KMS): the synergy between latest technologies and social/structural mechanisms

Latest Technology + Social/Structural Mechanisms = Knowledge Management Systems
KMS (3)

• **KM systems classification** based on observations on the KM systems implementations:
  - *Knowledge Discovery Systems*
  - *Knowledge Capture Systems*
  - *Knowledge Sharing Systems*
  - *Knowledge Application Systems*
Issues in Knowledge Management

- “Effective KM is not about making a choice between “software vs. wetware, classroom vs. hands-on, formal vs. informal, technical vs. social…uses all the options available to motivated employees to put knowledge to work …[and] depends on recognizing that all of these options basically need each other” [Stewart, 2002].

- One of the primary differences between traditional information systems and KM systems is the active role that users of KM systems play on building the content of such systems.
Challenges

- Explaining what KM is and how it can benefit a corporate environment
- Evaluate the firm’s core knowledge, by employee, by department, and by division
- Learning how knowledge can be captured, processed, and acted on
- Addressing the still neglected area of collaboration
- Continue researching KM to improve and expand its current capabilities
- How to deal with tacit knowledge
Effective Knowledge Management

- 80% - Organizational culture and human factors
- 20% - Technology
Essence of KM

1. Knowledge is first created in the people’s minds. KM practices must first identify ways to encourage and stimulate the ability of employees to develop new knowledge.

2. KM methodologies and technologies must enable effective ways to elicit, represent, organize, re-use, and renew this knowledge.

3. KM should not distance itself from the knowledge owners, but instead celebrate and recognize their position as experts in the organization.
The Nature of Knowledge
The nature of knowledge

- Understand the difference between knowledge, data, and information
- Explain the alternative views of knowledge
- Understand the different types of knowledge
- Recognize the various locations of knowledge
Data

- **Data** represents unorganized and unprocessed facts.
  - Raw numbers, images, words, sounds, derived from observations or measurements
- Usually data is static in nature.
  - It can represent a set of discrete facts about events.
- An organization sometimes has to decide on the nature and volume of data that is required for creating the necessary information.
- Data in itself has no meaning; it is the raw material for **information**.
What is information?

- Information is processed data
- Information is a subset of data, only including those data that possess context, relevance and purpose
- Information involves manipulation of raw data
Information

- Is data with a meaning assigned to it
  - Example: raw data from survey analysed to produce structured results
- Information has **meaning**; it is organized for some purpose.
- Information can be considered as an aggregation of data (processed data) which makes decision making easier.
- It is the raw material for **knowledge**
Knowledge

- Means to analyse/ understand information/data, belief about causality of events/actions, provides the basis to guide meaningful action and thought.
- Broader, deeper, richer than information
- Knowledge is a basis for making decisions
- A combination of information, instincts, rules, ideas, procedures and experience that guide actions and decisions
Data, Information and Knowledge

From Data Processing to Knowledge-based Systems

From Awad, p.41
Data / information/ knowledge
Example

Knowledge

Counting

\[ p_H = \frac{n_H}{n_H + n_T} \]
\[ p_T = \frac{n_T}{n_H + n_T} \]

\[ EV = p_H R_H + p_T R_T \]

Data

\[ n_H = 40 \]
\[ n_T = 60 \]

Information

\[ p_H = 0.40 \]
\[ p_T = 0.60 \]
\[ R_H = +$10 \]
\[ R_T = -$8 \]

Value

Zero  Low  Medium  High  Very High
Knowledge - events

Knowledge

Data → Information System → Information

Use of information

Decision

Events
“A fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories, but also in organizational routines, process, practices, and norms”

(Davenport, 1998)
Subjective View of knowledge

- Knowledge as State of Mind
- Knowledge as Practice

Objective View of Knowledge

- Knowledge as Objects
- Knowledge as Access to Information
- Knowledge as Capability
Kinds of knowledge

- Shallow (readily recalled) and deep (acquired through years of experience)
- Explicit (codified) and tacit (embedded in the mind)
- Individual, social, causal, conditional, relational and pragmatic
- Embodied, encoded and procedural
Types of knowledge

- *Procedural knowledge* represents the understanding of how to carry out a specific procedure.
- *Declarative knowledge* is routine knowledge about which the expert is conscious. It is shallow knowledge that can be readily recalled since it consists of simple and uncomplicated information. This type of knowledge often resides in short-term memory.
Types of knowledge

- **Semantic knowledge** is highly organized, "chunked" knowledge that resides mainly in long-term memory. Semantic knowledge can include major concepts, vocabulary, facts, and relationships.

- **Episodic knowledge** represents the knowledge based on episodes (experimental information). Each episode is usually "chunked" in long-term memory.
From Procedural to Episodic Knowledge

- **Shallow Procedural Knowledge**
  Knowledge of how to do a task that is essentially motor in nature; the same knowledge is used over and over again.

- **Declarative Knowledge**
  Surface-type information that is available in short-term memory and easily verbalized; useful in early stages of knowledge capture but less so in later stages.

- **Semantic Knowledge**
  Hierarchically organized knowledge of concepts, facts, and relationships among facts.

- **Episodic Knowledge**
  Knowledge that is organized by temporal spatial means, not by concepts or relations; experiential information that is chunked by episodes. This knowledge is highly compiled and autobiographical and is not easy to extract or capture.
Tacit vs Explicit

- **Tacit knowledge** usually gets embedded in human mind through experience
  - Includes insights, intuitions, and hunches
- **Explicit knowledge** is codified and digitized in documents, books, reports, spreadsheets, memos etc.
  - We can convert explicit knowledge to tacit knowledge
# Characteristics of tacit and explicit knowledge

<table>
<thead>
<tr>
<th>Tacit knowledge</th>
<th>Explicit knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inexpressive in a codifiable form</td>
<td>Codifiable</td>
</tr>
<tr>
<td>Subjective</td>
<td>Objective</td>
</tr>
<tr>
<td>Personal</td>
<td>Impersonal</td>
</tr>
<tr>
<td>Context specific</td>
<td>Context independent</td>
</tr>
<tr>
<td>Difficult to share</td>
<td>Easy to share</td>
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</tbody>
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p.19 Hislop (2005)
General and Specific Knowledge

- General knowledge is possessed by a large number of individuals and can be transferred easily across individuals.
- Specific knowledge, or “idiosyncratic knowledge,” is possessed by a very limited number of individuals, and is expensive to transfer.
Technically and Contextually Specific Knowledge

- Technically specific knowledge is deep knowledge about a specific area.
- Contextually specific knowledge refers to the knowledge of particular circumstances of time and place in which work is to be performed.
## Illustrations of the Different Types of Knowledge

<table>
<thead>
<tr>
<th>Declarative</th>
<th>General</th>
<th>Contextually Specific</th>
<th>Technically Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explicit</strong></td>
<td>A book describing factors to consider when deciding whether to buy a company's stock. This may include price to earnings ratio, dividends</td>
<td>A company document identifying the circumstances under which a consultant team's manager should consider replacing a team member who is having problems with the project.</td>
<td>A manual describing the factors to consider in configuring a computer so as to achieve performance specifications</td>
</tr>
<tr>
<td>Tacit</td>
<td>Knowledge of the major factors to consider when deciding whether to buy a company's stock.</td>
<td>A human relations manager's knowledge of factors to consider in motivating an employee in a particular company.</td>
<td>A technician's knowledge of symptoms to look for in trying to repair a faulty television set.</td>
</tr>
<tr>
<td><strong>Explicit</strong></td>
<td>A book describing steps to take in deciding whether to buy a company's stock.</td>
<td>A company document identifying the sequence of actions a consultant team's manager should take when requesting senior management to replace a team member having problems with the project.</td>
<td>A manual describing how to change the operating system setting on a computer so as to achieve desired performance changes.</td>
</tr>
<tr>
<td>Procedural</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Tacit</td>
<td>Basic knowledge of the steps to take in deciding whether to buy a company's stock.</td>
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<td>A technician's knowledge of the sequence of steps to perform in repairing a television set.</td>
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Expert Knowledge

- It is the information woven inside the mind of an expert for accurately and quickly solving complex problems.

Knowledge Chunking

- Knowledge is usually stored in experts long-range memory as *chunks*.
- Knowledge chunking helps experts to optimize their memory capacity and enables them to process the information quickly.
- Chunks are groups of ideas that are stored and recalled together as an unit.
Knowledge as an attribute of expertise

- In most areas of specialization, insight and knowledge accumulate quickly, and the criteria for expert performance usually undergo continuous change.
- In order to become an expert in a particular area, one is expected to master the necessary knowledge and make significant contributions to the concerned field.
- The unique performance of a true expert can be easily noticed in the quality of decision making.
- The true experts (knowledgeable) are usually found to be more selective about the information they acquire, and also they are better able in acquiring information in a less structured situation.
- They can quantify soft information, and can categorize problems on the basis of solution procedures that are embedded in the experts long range memory and readily available on recall.
Expert knowledge

- Hence, they tend to use knowledge-based decision strategies starting with known quantities to deduce unknowns.
- If a first-cut solution path fails, then the expert can trace back a few steps and then proceed again.
- Non experts use means-end decision strategies to approach the problem scenario.
- Non experts usually focus on goals rather than focusing on essential features of the task which makes the task more time consuming and sometimes unreliable.
- Specific individuals are found to consistently perform at higher levels than others and they are labeled as experts.
Types of Expertise

- Associational Expertise
- Motor Skills Expertise
- Theoretical (Deep) Expertise
Types of Knowledge

- Simple knowledge focuses on one basic area
- Complex knowledge draws upon multiple distinct areas of expertise
- Support knowledge relates to organizational infrastructure and facilitates day-to-day operations
- Tactical knowledge pertains to the short-term positioning of the organization relative to its markets, competitors, and suppliers
- Strategic knowledge pertains to the long-term positioning of the organization in terms of its corporate vision and strategies for achieving that vision
Characteristics of Knowledge

- Explicitness
- Codifiability
- Teachability
- Knowledge Specificity
Reservoirs of Knowledge

Knowledge Reservoirs

- People
  - Individuals
  - Groups
- Artifacts
  - Practices
  - Technologies
  - Repositories
- Organizational Entities
  - Organizational Units
  - Organizations
  - Inter-organizational Networks
Conclusions

- Knowledge is different from data & information.
- Knowledge in an area can be defined as justified beliefs about relationships among concepts relevant to that particular area.
- Knowledge can be of different types.
- Knowledge has several characteristics.
- Knowledge resides in several different places.
Lecture 1 additional references

Chapters to read

Read from recommended textbooks:

- Chapters 1, 2 from Becerra
- Chapters 1, 2 from Awad