Lecture 2: Knowledge Management Foundations

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Knowledge Management

• Perform activities involved in discovering, capturing, sharing, and applying knowledge
• Enhance the impact of knowledge on the unit’s goal achievement
• in cost-effective ways
What is Data?

- Data comprises facts, observations, or perceptions
- Data represents raw numbers or assertions

Example:
- A restaurant sales order including two large burgers and two medium-sized vanilla milkshakes.
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 (using knowledge) – data processing / information processing
  - Information systems must meet organizational / user requirements

Information - Example

- Consider the numbers indicating the **daily sales of burgers, vanilla milk-shakes, and other products of a restaurant**

  - For the restaurant manager
    - *information* – he can use such to make decisions concerning pricing and raw material purchases.
  - For the CEO of the restaurant chain
    - *data* only – he need processing to consolidate such *data* of all the restaurants for his *information*.
  - For most customers
    - *data* – uninteresting things.
What is Knowledge?

- A justified true belief (Nonaka and Takeuchi)
- It is different from data & information
- Knowledge is at the highest level in a hierarchy with information at the middle level, and data to be at the lowest level
- It is the richest, deepest & most valuable of the three
- **Information with direction**, i.e., leads to appropriate actions

Value of Data, Information, & Knowledge

[Diagram showing the value of data, information, and knowledge with a counter example]

```
EV = p_H * R_H + p_T * R_T
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<table>
<thead>
<tr>
<th>Data</th>
<th>Information</th>
<th>Knowledge (approximation only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H H H T</td>
<td>p_H = n_H/(n_H+n_T)</td>
<td>Counting</td>
</tr>
<tr>
<td>H H H H</td>
<td>p_T = n_T/(n_H+n_T)</td>
<td></td>
</tr>
<tr>
<td>T T T H</td>
<td>n_H = 40</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td>n_T = 60</td>
<td></td>
</tr>
<tr>
<td>T T T H</td>
<td>R_H = +$10</td>
<td></td>
</tr>
<tr>
<td>T T T H</td>
<td>EV = -$0.80</td>
<td></td>
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Value: Zero, Low, Medium, High, Very High
Beyond Knowledge

- Knowledge – the know how
  - actionable information
  - e.g., Increasing the production capacity before X’mas each year to handle the extra sales volume;

- Wisdom – the know why
  - e.g., why there is increasing sales volume just before X’mas?
  - inclination to adjust

Relating Data, Information, Knowledge to Events

- Data → Information System → Information
- Use of information → Decision Support System → Decision → actions → Events
- Information → Knowledge
- Knowledge → Use of information
Knowledge Classification

- Procedural Vs. Declarative Knowledge
- Tacit Vs. Explicit Knowledge
- General Vs. Specific Knowledge
  - Technically Vs. Contextually Specific Knowledge

Procedural Vs. Declarative Knowledge

- **Declarative knowledge** (substantive knowledge)
  - focuses on beliefs about relationships among variables
    - e.g., moon is round, Peter get married with Susan
    - Round (moon), married (Peter, Susan)

- **Procedural knowledge**
  - focuses on beliefs relating sequences of steps or actions to desired (or undesired) outcomes
    - Run a lecture: take attendance, open PPT, ...
    - Flowcharts
    - Procedure manuals
Tacit Vs. Explicit Knowledge

- **Tacit (implicit) knowledge** includes insights, intuitions, and hunches
  - e.g., don’t dive on PP island when something wrong (tsunami’s coming)

- **Explicit knowledge** refers to knowledge that has been expressed into words and numbers
  - e.g., $E=mc^2$

- We can convert explicit knowledge to tacit knowledge or vice versa

General Vs. Specific Knowledge

- **General knowledge** is possessed by a large number of individuals and can be transferred easily across individuals
  - e.g. operating MS Windows

- **Specific knowledge**, or “idiosyncratic knowledge,” is possessed by a very limited number of individuals, and is expensive to transfer
  - e.g. writing programs for MS Windows

Question: How about “Installing MS Windows”?
Technically Vs. Contextually Specific Knowledge

- Technically specific knowledge is deep knowledge in a specific application domain
  - e.g., information technology, financial investment, etc.

- Contextually specific knowledge refers to the knowledge of particular circumstances of time and place in which work is to be performed
  - e.g., work knowledge in a particular organization

Different Types of Knowledge

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<th>General</th>
<th>Contextually Specific</th>
<th>Technically Specific</th>
</tr>
</thead>
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<tr>
<td><strong>Declarative</strong></td>
<td>A book describing factors to consider when deciding whether to buy a company’s stock. This may include price, earnings, 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><strong>Tacit</strong></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>Procedural</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>Tacit</td>
<td>Basic knowledge of the steps to take in deciding whether to buy a company’s stock.</td>
<td>A human relations manager’s knowledge of steps to take in motivating an employee in a particular company.</td>
<td>A technician’s knowledge of the sequence of steps to perform in repairing a television set.</td>
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Knowledge Management Processes

Discovery
- Combination
- Socialization

Capture
- Externalization
- Internalization

Sharing
- Socialization
- Exchange

Application
- Direction
- Routines

Knowledge Discovery

- Development of new tacit or explicit knowledge
  - from data and information
  - or from the synthesis of prior knowledge

- 2 main ways
  - Combination
  - Socialization
Knowledge Discovery: Combination

- The process of **synthesizing explicit knowledge**
  - create new, more complex sets of explicit knowledge
- **Multiple bodies of explicit knowledge**
  - also involve data and information
- Incremental
  - e.g., “new” proposal
- Radical
  - e.g., data mining

Knowledge Discovery: Socialization

- The process of **synthesis of tacit knowledge** across individuals
  - usually through joint activities instead of written or verbal instructions
  - e.g. chatting about how to find a good job
- Facilitation by technologies
  - Groupware
  - Web 2.0 – forums, chat-room, Facebook
Knowledge Capture

• The process of retrieving either explicit or tacit knowledge that resides within people, artifacts, or organizational entities.

• Knowledge captured might reside outside the organizational boundaries,
  – including consultants, competitors, customers, suppliers, and prior employers of the organization’s new employees.

• Externalization Vs. Internalization

Externalization Vs. Internalization

• Externalization
  – converting tacit knowledge into explicit forms such as words, concepts, visuals, or figurative language.

• Internalization
  – conversion of explicit knowledge into tacit knowledge.
  – traditional notion of “learning”.
  – e.g., after reading a book, you learn in your mind

Discussion: How does IT help?
Knowledge Sharing

- The process through which explicit or tacit knowledge is communicated to other individuals.
  - i.e. process of communication

- **effective transfer**
  - so that the recipient of knowledge can understand it well enough for actions.
  - may take place across individuals, groups, departments or organizations.

- Knowledge is **shared** (*internalized*) and not recommendations (no internalization occurs) based on knowledge.

- Socialization Vs. Exchange.

Knowledge Sharing: Socialization

- Focuses on the *sharing of tacit knowledge* among individuals, groups, and organizations
  - e.g., talking to a senior year student about how to finish your degree course with minimal amount of effort in the orientation camp.
  - e.g., apprenticeships

Note: one may also use socialization to *synthesize* tacit knowledge for knowledge discovery.
Knowledge Sharing: Exchange

• Focuses on the sharing of explicit knowledge.
• Communicate or transfer explicit knowledge between individuals, groups, and organizations.
  – e.g., passing a computer manual from one to another.

Discussion: How does IT help?

Knowledge Application

• The process of applying explicit or tacit knowledge to carry out some tasks.
• The knowledge may have been internalized (exist in one’s mind) or not (e.g., work according to a manual).

• Direction Vs. Routines.
Direction

- Individuals possessing the knowledge direct the action of another individual without transferring to that person the knowledge underlying the direction.
  - e.g., calling the help desk to solve your PC problems.

- Experts’ knowledge embedded in knowledge-base, expert systems and decision support systems.

Routines

- Involve the utilization of knowledge embedded in procedures, rules, and norms that guide future behavior.
- *Economize on communication* more than directions because they are embedded in procedures or technologies.
  - e.g., inventory management system for automatic re-ordering.
- general information systems and automation helps:
  - Enterprise resource planning systems
  - Management information systems ...

*Discussion: How does IT help?*
KM Solutions (Summary)

**KM Processes**
- Knowledge Discovery
  - Combination
  - Socialization
- Knowledge Capture
  - Internalization
  - Externalization
- Knowledge Sharing
  - Exchange
  - Direction
  - Routines
- Knowledge Application

**KM Systems**
- Knowledge Discovery Systems
- Knowledge Capture Systems
- Knowledge Sharing Systems
- Knowledge Application Systems

**KM Mechanisms**
- Analogies and metaphors
- Brainstorming retreats
- On-the-job training
- Face-to-face meetings
- Apprenticeships
- Employee rotation
- Learning by observation

**KM Technologies**
- Decision support systems
- Web-based discussion groups
- Repositories of best practices
- Artificial intelligence systems
- Case-based reasoning
- Groupware
- Web pages

**KM Infrastructure**
- Organization Culture
- Organization Structure
- IT Infrastructure
- Common Knowledge
- Physical Environment

**Question Please?**