Chapter 12
Business Intelligence, Knowledge Management, and Analytics

Jason C. H. Chen, Ph.D.
Professor of MIS
School of Business Administration
Gonzaga University
Spokane, WA 99258
chen@gonzaga.edu

From “Old World” to E-World of Business: Knowledge Management for “Paradigm Shifts”

“Old World” of Business
  - IT-intensive Radical Redesign
  - Streamlining Bottlenecks
  - Replacing humans with machines

E-World of Business
  - for “Paradigm Shifts”
  - Radical Rethinking of the Business and Organization for a “World of Re-everything”

Learning Objectives
• Understand the difference between data, information, and knowledge.
• Define how tacit knowledge differs from explicit knowledge.
• Describe why knowledge management is so important.
• Understand how knowledge is generated and captured.
• Describe a knowledge map.

Five Ways Data Analytics can Help an Organization (McKinsey and Co.)
• Making data more transparent and usable more quickly
• Exposing variability and boosting performance
• Tailoring products and services
• Improving decision-making
• Improving products

Terminology
• Knowledge Management (KM): The processes needed to generate, capture, codify and _______ knowledge across the organization to achieve competitive advantage
• Business Intelligence (BI): The set of ________ and _________ that use data to understand and analyze business performance
• Business Analytics (BA): The use of ________ and ________ models (e.g., statistics), algorithms, and evidence-based management to drive decisions
  – Focus on _______ - based management to drive decision making
• The difference of BI and BA is in their methods, and in the general direction of their analysis.

Database, Datawarehouse and Big Data
• DBMS
• Database
• Datawarehouse
• Big Data

McKinsey and Co.

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• The difference of BI and BA is in their methods, and in the general direction of their analysis.
According to Davenport and Harris, information technology projects are

- Emphasizes ________ information for users
- Support organization improvement and innovation
- Adds value to content by filtering, interpretation, and synthesis
- Require on-going user contributions
- Balanced focus on both technology and
- Variety of inputs often precludes automated capture of knowledge

KM Project vs. IT Project

- According to Davenport and Prusak point out in their “_______% rule;”
  - if more than one-third of the time and money spent on a project is spent on technology, the project becomes an IT project rather than a KM project.

Online Transaction Process vs. Online Analytic Process

- Real-Time, Relational DB (Daily operations)
- Not Real-Time, Data Warehouse/ Data Mart (Non-daily operations)
- OLTP
  - Business
- OLAP
  - Business

Business Analytics (cont.)

- Davenport and Harris suggest that companies who are successful competing with business analytics have these five capabilities:
  - Hard to duplicate
  - Uniqueness
  - Adaptability
  - Better than competition
  - Renewability

The Content of Human Mind

- According to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories:
  - Data: symbols or facts
  - Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions
  - Knowledge: application of data and information; answers "how" questions
  - Intelligence/Understanding: appreciation of "why"
  - Wisdom: evaluated understanding.

Value Chain Data of the Enterprise

- Simple observation of states of the world
  - Easily captured
  - Easily structured
  - Easily transferred
  - Compact, quantifiable
- Data
- Information
- Knowledge
- Greater value
- Business
- Data Warehouse/ Data Mart (Non-daily operations)
- OLAP
- Business

Figure 12.1 The relationships between data, information, and knowledge

- Data
- Information
- Knowledge
- Greater value
Tacit vs. Explicit Knowledge

- _______ knowledge is personal, context-specific and hard to formalize and communicate.
- _______ knowledge can be easily collected, organized and transferred through digital means.

Types of Knowledge

<table>
<thead>
<tr>
<th>We Know (Explicit knowledge)</th>
<th>We don’t know (Tacit knowledge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>We know what we know</td>
<td>We don’t know what we know</td>
</tr>
<tr>
<td>I. Data, information, insight</td>
<td>II. Frame areas of insight</td>
</tr>
<tr>
<td>[Certainty]</td>
<td>[Un-certainty/Future]</td>
</tr>
<tr>
<td>We know what we don’t know</td>
<td></td>
</tr>
<tr>
<td>III. Blind spots, competing</td>
<td></td>
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<tr>
<td>worldviews</td>
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</table>

Dimensions of Knowledge

**Explicit**
- Teachable
- Articulable
- Observable in use
- Scripted
- Simple
- Documented

Examples:
- Explicit steps
- Procedure manuals

**Tacit**
- Not teachable
- Not articulable
- Not observable
- Rich
- Complex
- Undocumented

Examples:
- Estimating work
- Deciding best action

Why think about the future?

All our knowledge is about the past, but all our decisions are about the future.

Most of what we need to know to make good decisions today is outside our comprehension: we don’t even know it’s there.

The Four Modes of Knowledge Conversion, Fig. 12.4

<table>
<thead>
<tr>
<th>Tacit Knowledge</th>
<th>Explicit Knowledge</th>
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<tbody>
<tr>
<td>A. (Sympathized Knowledge)</td>
<td></td>
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</table>
| (Transferring tacit knowledge through shared experiences, apprenticeships, mentoring relationships, on-the-job training, “Talking at the water cooler”)
| (Conceptual Knowledge) |
| B. (Operational Knowledge) |
| (Converting explicit knowledge into tacit knowledge: learning by doing; studying previously captured explicit knowledge (manuals, documentation) to gain technical know-how)
| (Systematic Knowledge) |
| C. (Systematic Knowledge) |
| (Combining existing explicit knowledge through exchange and synthesis into new explicit knowledge)

Which mode is the one for classroom processes? C
Why Knowledge Management?

- Business evolve from competing on ____, to competing on _____, to competing on __________.
- Effectively managing knowledge as a strategic asset will enable companies – to adapt to new ways of thinking, – to respond to change quickly and easily, and – to adopt a broader view when defining products and services.

Knowledge Management and Four Processes

- KM is a process (practice) of capturing a corporation’s collective experiences.
- Four processes are required to achieve organization’s competitive advantage.
  1. ________ – discover “new” knowledge
  2. ________ – scan, organize, and package it
  3. ________ – represent it for easy access and transfer (even as simple as using hash tags to create a folksonomy)
  4. Transfer – transmit it from one person to another to absorb it
- Collaboration and innovation are essential to knowledge management

To successfully build B.A. capabilities in the enterprise, companies make a significant investment in their: 1) __________, 2) ________, and 3) strategic decision-making __________

<table>
<thead>
<tr>
<th>Component</th>
<th>Definition</th>
<th>Example</th>
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<tbody>
<tr>
<td>1. Data Source</td>
<td>Data streams and repositories</td>
<td>Data warehouses, weather data</td>
</tr>
<tr>
<td>2. Software Tools</td>
<td>Applications and processes for statistical analysis, forecasting, predictive modeling and optimization.</td>
<td>Data mining process</td>
</tr>
<tr>
<td>3. Data-Driven (Analytics)</td>
<td>Organizational environment that creates and sustains the use of analytics tools</td>
<td>Forecasting software package</td>
</tr>
<tr>
<td>4. Skilled Work Force</td>
<td>Work force that has the training, experience and capability to use the analytics tools</td>
<td>Data scientists, chief data officers, chief analytics officers, analysts, etc.</td>
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</tbody>
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Figure 12.5 Components of successful business analytics programs

What is Data Mining?

- Data mining – the process of analyzing data to extract information (unknown patterns) not offered by the raw data alone
- To perform data mining users need data-mining tools
  - Data-mining tool – uses a variety of techniques to find patterns and relationships in large volumes of information and infers rules that predict future behavior and guide decision making
- A wide range of data mining techniques are being used by organization to gain a better understanding of their customers and their operations and to solve complex organizational problems.
- An example
  - Grocery Store in UK (see next slide)

Unsupervised vs. Supervised Data Mining

Unsupervised
- Analyst does not start with a priori hypothesis or model
- Hypothesized model created (after) based on analytical results to explain patterns found
- Example: Cluster analysis to find groups (Decision Tree)

Supervised
- Model created before analysis
- Hypotheses created before analysis
- Regression analysis: make predictions
- Identify cross-selling opportunities
- Example: Market Basket Analysis: Customers who bought fins also bought a mask.

How to be Successful

- Achieve a data-driven ________ – alignment of the corporate culture, incentive systems, the metrics used to measure the success of initiatives (i.e., alignment of BS, OS, and IS/IT)
- Develop ________ for data mining
- Use a Chief Analytics Officer (CAO) or Chief Data Officer (CDO)
- Shoot for high maturity level (see next slide)
Introduction to Big Data Analytics

• Big Data?
  – Not just big!
  – V____
  – V____
  – V____
  – structured, unstructured, or in a stream

By Doug Laney, Gartner analyst, 2001

• Two aspects for studying “Big Data”
  – Storing and processing/analyzing “Big Data”
  – Push ______ to the data instead of pushing data to a computing mode.

Practical Example

• Asthma outbreaks can be predicted by U. of Arizona researchers with 70% accuracy
• They examine tweets and Google searches for words and phrases like
  – “wheezing” “sneezing” “inhaler” “can’t breathe”
  – Relatively rare words (1% of tweets) but 15,000/day
• They examine the context of the words:
  – “It was so romantic I couldn’t catch my breath” vs
  – “After a run I couldn’t catch my breath”
• Helps hospitals make work scheduling decisions

Internet of Things (IoT)

• Much big data comes from IoT
  – Definition 1: IoT is a proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data.
  – Definition 2: IoT is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

• Sensor data in products can allow the products to:
  – Call for service (elevators, heart monitors)
  – Parallel park, identify location/speed (cars)
  – Alert you to the age of food (refrigerator)
  – Waters the lawn when soil is dry (sprinklers)
  – Self-driving cars find best route (Google)

Sentiment Analysis

• Can analyze tweets and Facebook likes for
  – Real-time customer reactions to products
  – Spotting trends in reactions
• Useful for politicians, advertisers, software versions, sales opportunities
• Text and Sentiment Mining tool

Social Media Analytics

• Measuring + Analyzing + ________ interactions and associations between people, topics and ideas.

• Social media analytics
  – the practice of gathering data from blogs and social media websites and analyzing that data to make business decisions.
  – the most common use of social media analytics is to mine customer sentiment in order to support marketing and customer service activities.
  – monitoring your social media analytics can make the difference between the success or failure of your social media presence.

IDEAL KNOWLEDGE ORGANIZATION

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<thead>
<tr>
<th>Strategy</th>
<th>Measurement</th>
<th>Policy</th>
<th>Content</th>
<th>Process</th>
<th>Technology</th>
<th>Culture</th>
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Knowledge Exchange

People

Knowledge Assets

Knowledge

Explicit to Tacit

Knowledge Reuse

Knowledge

People
THE WORLD OF RE-EVERYTHING

- Knowledge is productive **ONLY** when ____________________.
- __________ requires decentralized intelligence.
- We need to empower ________ workers
- Top performers can be a problem; they are not the most ________.

From Data to Knowledge:
How Can Organization Gain Competitive Advantage? (Survive and Prosper in the Digital Economy)

**Conclusion**

Literacy +
Electronic Infrastructure +
Social Revitalization =

Knowledge distribution

Opportunity for New Societal Infrastructure

**Summary**

- KM is related to information systems in three ways: IT makes up its infrastructure, KM makes up the data infrastructure for many IS and apps, and KM is often referred to as an app of IS.
- Data, information, and knowledge should not be seen as interchangeable.
- The 2 kinds of knowledge are tacit and explicit.
- Manage knowledge carefully, there are many valid and of course legal reasons.
- KM projects can be measured using project-based measures.