



Knowledge Management

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Chapter Five Knowledge Capture Systems: Systems that Preserve and Formalize Knowledge

- Knowledge capturing systems are designed to elicit and store knowledge,
- Both tacit and explicit knowledge can be captured using mechanisms or technologies so, that the captured knowledge can then be shared by others.
- earliest mechanisms for Knowledge capturing is using anthropological like:
 - Art, Education and entertainment.
 - Storytelling also another mechanisms by which early civilization passed on their values and wisdom from generation to generation.

Knowledge Capture systems

- Knowledge capture systems are designed to help elicit and store knowledge, both tacit and explicit
- Both mechanisms and technologies can support knowledge capture systems
 - by facilitating the knowledge management processes of externalization and internalization.
- The development of models or prototypes, and the articulation of stories are some examples of mechanisms that enable externalization.
- Learning by observation and face-to-face meetings are some of the mechanisms that facilitate internalization

Knowledge capture system

- Technologies can also support knowledge capture by facilitating externalization and internalization
- Externalization through knowledge engineering, its necessary for the implementation of intelligent technologies
 - such as Expert systems and
 - Case-based reasoning systems
- Technologies that facilitate internalization include computer-based communication and computer-based simulations

Knowledge management mechanism For capturing tacit knowledge: Using Organizational Stories

- The importance of using metaphors and stories as a mechanism
 - for capturing and transferring tacit knowledge is increasingly drawing the attention of organizations.
- Organizational stories defined a detailed narrative of past management actions, employee interactions, or other intra- or extraorganizational events that are communicated informally within organizations
- Stories originate within the organization and typically reflect organizational norms, values, and culture.
 - Because stories make information more clear, engaging, entertaining, and easily related to personal experience
- Storytelling is the mechanism by which early civilizations passed on their values and their wisdom from one generation to the next.

KMM For capturing tacit knowledge

Dave Snowden (1999) identify the following set of guideline for organizational storytelling:

Guidelines for organizational storytelling:

- ① Stimulate the natural telling and writing of stories
- ② Stories must be rooted in historical material reflective of the community in question
- ③ Should not represent idealized behavior
- ④ An organizational program to support storytelling should not depend on external experts for its sustenance
- ⑤ Organizational stories are about achieving a purpose, not entertainment
- ⑥ Be cautious (careful) of over-generalizing and forgetting the particulars
- ⑦ Adhere(respect) to the highest ethical standards and rules

Using Organizational Stories

- According to Phoel(2006) the following eight steps to successful storytelling will help work magic in the organization:
 - ① Have a clear purpose.
 - ② Identify and example of successful change.
 - ③ Tell the truth.
 - ④ Say who, what, when.
 - ⑤ Trim detail.(prepare in detail)
 - ⑥ Underscore the cost of failure.
 - ⑦ End on a positive note.
 - ⑧ Invite your audience to dream
- But Phoel also emphasizes that to tell the story right, **it is not just what you say but how you say it**, that will determine its success

Using Organizational Stories

- In fact, according to Guber (2007), there are four kinds of truth in each effective story:
 - ① Truth to the teller
 - The storyteller must be congruent to her story
 - ② Truth to the audience
 - The story must fulfill the listeners' expectations by understanding what the listeners know about
 - ③ Truth to the moment
 - Never tells a story the same way twice
 - ④ Truth to the mission

Using Organizational Stories

- Finally, Denning (2000) describes the organizational areas where storytelling can be effective, including
 - ① Igniting (connecting) action in knowledge-era organizations:-Storytelling can help managers and employees actively think about the implications of change
 - ② Bridging the knowing-doing gap:-The listener perceives and acts on the story as part of their identity.
 - ③ Capturing tacit knowledge
 - ④ To embody and transfer knowledge
 - ⑤ To foster innovation
 - ⑥ Launching and nurturing communities
 - Storytelling builds trust
 - Storytelling unlocks passion
 - Storytelling is non hierarchical
 - ⑦ Enhancing technology
 - ⑧ Individual growth

Techniques for organizing and using stories in the organization

- In order to capture organizational knowledge through narratives, it is best to encourage storytelling in a work context.
- In addition to the knowledge-elicitation techniques knowledge-elicitation pertaining specifically to stories.
- One technique described by Snowden for narrative KC is **anthropological observation** or the use of naive interviewers
 - example :- A group of school children to understand the knowledge flows in an organization
- He also describes a second technique, **storytelling circle**
 - for example:- Common experience in a project
- Once a number of stories has been elicited and captured, the next problem is how to store the narratives so people will find them.
- Narrative databases can be indexed by the **theme of the story**, by the stakeholders of the story.

Designing the knowledge capture system(KCS)

Concept maps(CM)

- Typically the documentation available in organizations is the result of applying expertise rather than expertise itself
- A concept map is a diagram showing the relationships among concepts.
- a concept map contains just two concepts connected by a linking word to form a single proposition, also called a semantic unit or unit of meaning
- CM represent organized knowledge and communicate complex ideas.
- CM are graphical tools used by engineers and others to organize and structure knowledge
- In a concept map, the vertical axis expresses a hierarchical framework for organizing the concepts

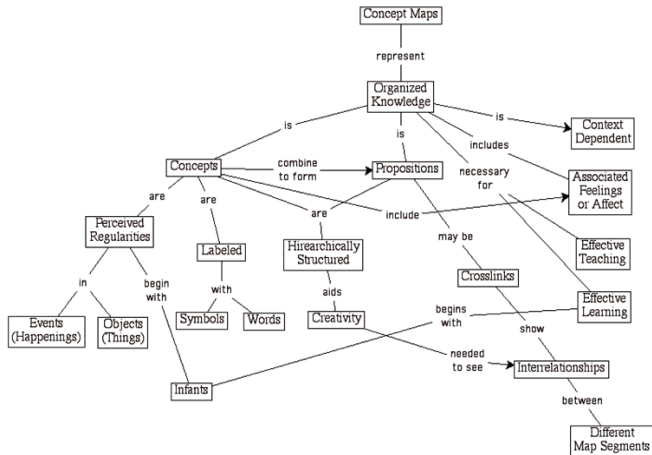
Designing the knowledge capture system(KCS)

Concept maps(CM)

- Inclusive concepts are found at the top of the map with progressively more specific
- Less inclusive concepts arranged below them
- CM represent meaningful relationships between concepts in the form of propositions
- Cross-links help to visualize how different knowledge domains are related to each other.
- The goal of CmapTools a concept map-based browser, is to capture the knowledge of experts.
- The Cmap- serve as the browsing interface to a domain of knowledge
- CmapTools users learn about the domain by clicking on the small icons depicted at the nodes in CM and navigate to other contexts

Designing the knowledge capture system(KCS)

- Concept maps provide a methodology to organize and structure the concepts representing the expert's domain knowledge



Source: Novak and Cañas 2008.

Designing the knowledge capture system(KCS)

Context based reasoning

- Context-based Reasoning is a human behavior representation paradigm specifically designed to effectively represent human tactical behavior
- Tactical behavior is defined as: the continuous and dynamic process of decision making by a performing agent (human or otherwise)
 - who interacts with his/its environment while attempting to carry out a mission in that environment
- In this sense **tactical knowledge is associated with:-**
 - Assessing a current situation
 - Selecting a plan to address the current situation, and
 - Executing that plan

Designing the knowledge capture system(KCS)

Context based reasoning(CxBR)

CxBR encapsulates knowledge about appropriate actions and/or procedures, as well as compatible new situations, into hierarchically organized contexts.

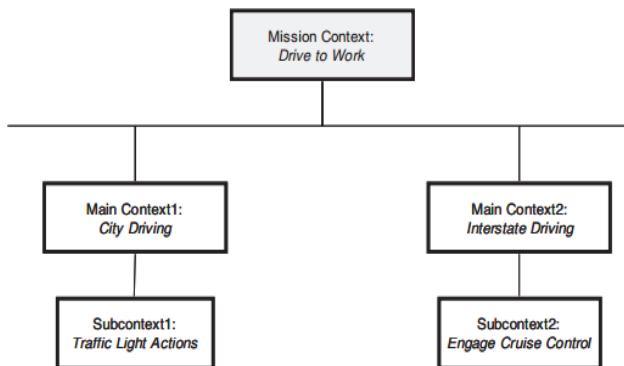
Tactical behavior is action-based at low levels (e.g., keeping the car on the traffic lane),

decision and action based at middle levels(stop or go at a traffic light), and decision-based at high levels (take the freeway or the back roads).

- The mission context defines the scope of the mission, its goals, the plan, and the constraints imposed .
- The main context contains functions, rules, and a list of compatible subsequent main contexts
- Sub-contexts are abstractions of functions performed by the main context

Designing the knowledge capture system(KCS)

- CxBR has proven to be a very intuitive, efficient, and effective representation technique for human behavior.
- Because of its hierarchical and modular nature, context-based reasoning lends itself well to automating the knowledge capture process.



Designing the knowledge capture system(KCS)

Context based reasoning(CxBR)

- Knowledge capture system based on CxBR known as **Context-based Intelligent Tactical Knowledge Acquisition (CITKA)**
- CITKA uses its own knowledge base to compose a set of intelligent queries to elicit the tactical knowledge of the expert.
- CITKA composes questions and presents them to the expert
- The questions are designed to elicit tactical knowledge
- The result is a nearly complete context base , when used with a CxBR reasoning engine

Designing the knowledge capture system(KCS)

Context based reasoning(CxBR)

The CITKA system consists of four modules of independent but cooperating sub- systems.

- ① Knowledge engineering database back-end (KEDB)
 - A data structure that holds the evolving context base as it gradually becomes developed, either by the knowledge engineer or by the subject matter expert.
- ② Knowledge engineering interface (KEI)
 - Maps into the KEDB module for data entry
- ③ Query rule-base back-end (QRB)
 - A rule-based system containing the rules for executing the intelligent dialog with the subject matter expert (SME)
 - These query rules have to be mapped to buttons, checkboxes, and menus by the SME Interface
- ④ Subject matter expert interface (SMEI)
 - The graphical user interface (GUI) for the Query rule-base back-end

Reading Assignment

- Barriers to the use of knowledge capture system

Barriers to the use of knowledge capture system

- ① The knowledge engineer who seeks to build such systems
 - Knowledge Engineer requires developing some idea of the nature and structure of the knowledge very early in the process .
 - An automated system for knowledge capture, without a-priori knowledge of the nature, is essentially not possible
- ② The subject matter expert, who would interact with an automated knowledge capture system to preserve his knowledge
 - Experts need to take the initiative of learning how to interact with the system and some people may be resistant to trying new things, but
 - with adequate training and the utilization of user-friendly interfaces it could be solved

- ① CITKA stands for
- ② tactical knowledge is associated with three activities what are they?
- ③ what are the two knowledge capturing designing model?
- ④ write the two techniques for organizing and using stories in the organization.
- ⑤ According to Guber (2007), there are four kinds of truth in each effective story what are they?

Chapter Six

Knowledge Sharing Systems

Systems that Organize and Distribute Knowledge

Knowledge Sharing Systems

- In this chapter we discuss what knowledge sharing systems are about, how they serve to organize and distribute organizational and individual knowledge,
- how KSS are designed to help users share their knowledge, both tacit and explicit.
- Most of the knowledge management systems in place at organizations are designed to share the explicit knowledge of individuals and organization
- These systems are also referred to as **knowledge repositories**
- In this chapter we also discuss some guidelines on how to design knowledge sharing systems for practical use.
- The two types of **explicit** knowledge sharing systems most widely discussed in the KM literature are **lessons learned systems and expertise locator systems**
- Systems that support **tacit** knowledge sharing are those typically utilized by communities of practice,

Knowledge Sharing Systems

- **Corporate memory** (also known as an organizational memory) is made up of the aggregate intellectual assets of an organization.
- It is the combination of both explicit and tacit knowledge that may or may not be explicitly documented.
- Knowledge management is concerned with developing applications that will prevent the loss of corporate memory. Such loss often results from
 - ① a lack of appropriate technologies for the organization and exchange of documents,
 - ② lack of adequate support for communication,
 - ③ the proliferation of disparate sources of information.

This results in the loss of **explicit organizational knowledge**.

- Another contributing factor to the loss of corporate memory is
 - ① Departure of employees because of either **turnover or retirement**.

Knowledge Sharing Systems

- A knowledge sharing system helps to organize and distribute an organization's corporate memory so that
- It can be accessed even after the original sources of knowledge no longer remain within the organization.
- The standard communications medium upon which KM applications are based is the World Wide Web
 - ① a medium that facilitates the **exchange of information, data, multimedia, and even applications among multiple distinct computer platforms.**
- This characteristic of the Web is referred to as platform independence.

What Are Knowledge Sharing Systems

- Knowledge sharing systems(KSS) can be described as systems that enable members of an organization to acquire tacit and explicit knowledge from each other.
- Knowledge sharing systems may also be viewed as **knowledge markets:**
- as markets require adequate liquidity to guarantee a fair exchange of products, between knowledge seekers and knowledge owners in order to be effective
- **knowledge owners will:**
 - ① want to share their knowledge with a controllable and trusted group,
 - ② decide when to share and the conditions for sharing, and
 - ③ seek a fair exchange, or reward, for sharing their knowledge.

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- By the same token, **knowledge seekers may:**
- ① not be aware of all the possibilities for sharing, thus the knowledge repository will typically help them through searching and ranking,
 - ② want to decide on the conditions for knowledge acquisition.
- KSS is supporting the sharing and **reuse** of individual and organizational knowledge.

What are Knowledge Sharing Systems

- **KSS** frequently uses **document management system(DMS)** as a tool.
 - At the core of a document management system is a **repository**
This repository can be centralized or it can be distributed
 - The document management application increases the sharing of documentation across the organization, which helps in the sharing of organizational knowledge.
 - document management system aggregates relevant information through a common typically Web-based interface.
 - Documents are typically organized or indexed following a standard hierarchical structure or classification taxonomy,
 - like, the **index catalog** is used to organize the books in a library.

The Computer as a Medium for Sharing Knowledge

- Prior to the information age, two-way communication relied on the telephone's **synchronous**
 - exchange information much like they did via face-to-face communications.
- Prior to the telephone, knowledge sharing required **asynchronous** communication via **telegraph and written artifacts**.
 - **Asynchronous** communications allowed communicants to exchange ideas without the need to both be present at the same time.
 - which is one of the limitations offered by the telephone.
 - In addition, the telephone did not facilitate communication of nonverbal multimedia information such as **documents, photos, drawings, videos**, and others.
- But the emergence of the Internet and the World Wide Web (WWW) would later revolutionize the concept of communications.

The Computer as a Medium for Sharing Knowledge

- The Internet is the underpinning infrastructure that allows the information exchange between computers in remote and heterogeneous networks.
- The **WWW** provides the required format so that **a large-scale storage of documents** may be accessed by a specialized software package called the browser.
- **WWW** servers are computers whose main objectives are to serve as repositories of multimedia information.
- The Client computer requests information from the WWW server, while servers share their contents to their clients through **Web pages**.

Designing the Knowledge Sharing System

- The main function of a knowledge sharing system is "to enhance the organization's competitiveness by improving the way it manages its knowledge"
- The creation of a knowledge sharing system is based on the organization of digital media, including documents, Web-links, and the like, which represent the explicit organizational knowledge.
- To designing the successful KSS in industrial practice, we should identify the following requirement:
 - ① Collection and systematic organization of information from various sources.
 - ② Minimization of up-front knowledge engineering.
 - ③ Exploiting user feedback for maintenance and evolution.
 - ④ Integration into existing environment.
 - ⑤ Active presentation of relevant information.

Barriers to the Use of Knowledge Sharing Systems

- Recent research pointed out some of the reasons why knowledge sharing systems may fail
 - ① If they don't integrate humans, processes, and technology
 - ② If they attempt to target a monolithic organizational memory
 - ③ If they don't measure and state their benefits
 - ④ If they store knowledge in textual representations
 - ⑤ If users are afraid of the consequences of their contributions
 - ⑥ If users perceive a lack of leadership support,

Specific Types of Knowledge Sharing Systems

Knowledge sharing systems are classified according to their attributes. These specific types of knowledge sharing systems include:

- ① Incident report databases
 - ② Alert systems
 - ③ Best practices databases
 - ④ Lessons learned systems
 - ⑤ Expertise locator systems
- **Incident report databases** are used to disseminate information related to incidents or malfunctions
Incident reports are typically used in the context of safety and accident investigations
 - **Alert systems** were originally intended to disseminate information about a negative experience that has occurred or is expected to occur.
 - Alert systems could be used to report problems experienced with a technology, such as an alert system that issues recalls for consumer products. Alert systems could also be used to share more positive experiences

Specific Types of Knowledge Sharing Systems

- **Best practices databases** describe successful efforts, typically from the re-engineering of business processes
 - Best practices differ from lessons learned in that they capture only successful events, which may not be derived from experience.
 - Best practices are expected to represent business practices that are applicable to multiple organizations in the same sector and are sometimes used to benchmark organizational processes.

For example, Microsoft,

- **Lessons Learned Systems (LLS)**
- The goal of lessons learned systems is "to capture and provide lessons that can benefit employees who encounter situations that closely resemble a previous experience in a similar situation"
- LLS could be pure repositories of lessons or be sometimes intermixed with other sources of information (eg. report)
- LLS typically not focused on a single task

Specific Types of Knowledge Sharing Systems

- The purpose of LLS is to support organizational processes through
 - ① **Collect the Lessons**
 - ② **Verify the Lessons**:-verification of lessons for correctness, redundancy, consistency, and relevance.
 - ③ **Store the Lesson**
 - ④ **Disseminate the Lesson**
 - ⑤ **Apply the Lesson**

Specific Types of Knowledge Sharing Systems

- **Expertise Locator Knowledge Sharing Systems**

Several different business organizations have identified the need to develop expertise locator systems(ELS)to help locate intellectual capital

- Differentiate characteristics of ELS across organizations

- ① **Purpose of the system:-** identify experts to help solve technical problems or staff project teams
- ② **Access Method:** Most company ELS are accessed via a company's Intranet.
- ③ **Self-assessment:**
- ④ **Participation:**
- ⑤ **Taxonomy:**
- ⑥ **Levels of Competencies:**

Shortcomings of Knowledge Sharing Systems

- Perhaps one of the biggest challenges for knowledge management systems is to make this knowledge **meaningful across the organization**
 - For example, lessons learned systems were one of the first types of KMS that gained acceptance in organizations
- Therefor to improve the success of their knowledge sharing activities, **organizations are encouraged** to:
 - ① Develop one-stop access to content that emulates Google's one-stop search functionality. **example:- designed with content metadata**
 - ② Design dynamic classification systems **example what its customers want to buy and sell**
 - ③ Entice employees to find what they need like **Amazon** helps people identify needed products based on their relevance and searching experience.

Chapter Seven

Reading Assignment

Knowledge Discovery Systems:
Systems that Create Knowledge

Introduction

Knowledge discovery dates back to the time before the existence of the word "researcher".

Galileo, The Wright brothers, Alexander Graham Bell, Thomas Edison, and thousands of other less well-known researchers and inventors throughout history have discovered knowledge.

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- support the process of developing new tacit or explicit knowledge from data and information or from the synthesis of prior knowledge.
- These systems support two KM subprocesses associated with knowledge discovery:
combination, enabling the discovery of new explicit knowledge; and
socialization, enabling the discovery of new tacit knowledge.

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combination, enabling the discovery of new explicit knowledge; and
socialization, enabling the discovery of new tacit knowledge.
- Thus, mechanisms and technologies can support knowledge discovery systems facilitating combination and/or socialization.

Mechanisms to Discover Knowledge :

Using Socialization to Create New Tacit Knowledge

Socialization

Socialization, is the synthesis of tacit knowledge across individuals, usually through joint activities rather than written or verbal instructions.

- Brainstorming camps
 - ① Describes the use of the creative brainstorming process
 - ② facilitator (the person controlling the process)
 - ③ innovators (who will brainstorm solutions to the customer's problems)
- how technologies can support the discovery of new knowledge?

Technologies to Discover Knowledge :

Using Data Mining to Create New Explicit Knowledge

Data Mining

Data mining is extraction of interesting (**non-trivial, implicit, previously unknown and potentially useful**) information or patterns from data source(Han and Kamber)



knowledge discovery in databases (KDD) is the process of finding and interpreting patterns from data, involving the application of algorithms to interpret the patterns

- Another name for KDD is data mining (DM).

Technologies to Discover Knowledge :

Using Data Mining to Create New Explicit Knowledge

Data Mining

- The exploration and analysis of large quantities of data in order to discover meaningful patterns and rules (Berry and Linoff)
- Focused on hypothesis generation, not on hypothesis testing
- The term Data mining is a misnomer as it doesn't directly related to what it does.
- For example mining gold from rock is called **Gold mining** but not rock mining.
- Similarly oil mining is mining oil from the ground.
- Data mining should best describe as **knowledge mining** from data rather than data mining
- Any way, we will use the term with this understanding

Data mining techniques have been applied across business

- ❶ **Marketing** Predictive DM techniques, like artificial neural networks (ANN), have been used for target marketing including market segmentation.

Eg. On Thursday nights people who buy diapers also tend to buy beer

- ❷ **Banking** Trading and financial forecasting have also proven to be excellent applications for DM techniques.

- ❸ **Insurance** DM techniques have been used for segmenting customer groups to determine premium pricing and to predict claim frequencies.

Eg. People with good credit ratings are less likely to have accidents

- ❹ **Telecommunications** Predictive DM techniques, like artificial neural networks, have been used mostly to attempt to reduce churn

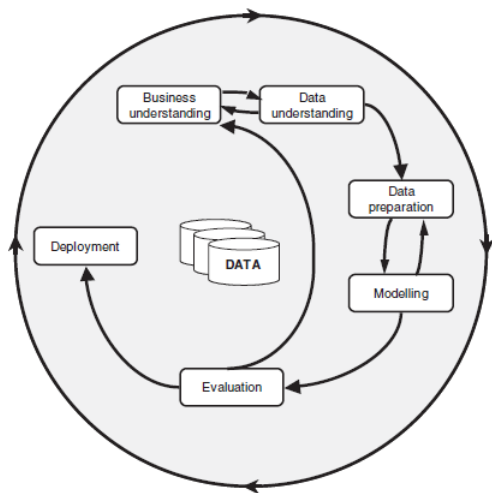
Eg. Government lines are busy than private line

how data mining techniques have been used to create new knowledge?

Designing the Knowledge Discovery System

Basically Knowledge discovery systems has two Designing method

① Cross Industrial Standard Process for Data mining(CRISP-DM)



Cross Industrial Standard Process for Data mining(CRISP-DM)

① Business Understanding

The first requirement for knowledge discovery is to understand the business problem.

② Data Understanding

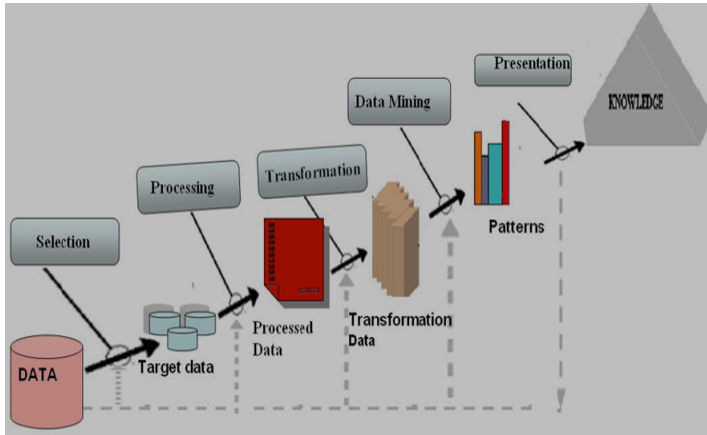
This maximizes the chances for success as well as the efficiency and effectiveness of the knowledge discovery system.

- data collection
- data description

③ Data preparation

- **Selection** Obtain data from various heterogeneous sources such as databases, data warehouses, files, non-electronic records, etc.
- **Preprocessing:** Cleanse inconsistent & incorrect data; fills incomplete records; predict missing values; correct erroneous & anomalous data.
- **Transformation:** Convert data from different sources into common new format. Apply data reduction & data categorization/binning to ease data mining

Knowledge Discovery in Databases (KDD) Process



Discovering Knowledge on the Web

There are three types of uses for Web data mining. They are as follows:

① Web Structure Mining

Mining the Web structure examines how the Web documents are structured and attempts to discover the model underlying the link structures of the Web.

② Web Usage Mining

Web usage mining tries to discover knowledge about the Web surfer's behaviors through analysis of his/her interactions with the Web site including the mouse clicks, user queries, and transactions.

③ Web content mining

Web content data include what is used to create the Web page including the text, images, audio, video, hyperlinks, and metadata.

Thank you!