8 Knowledge Codification

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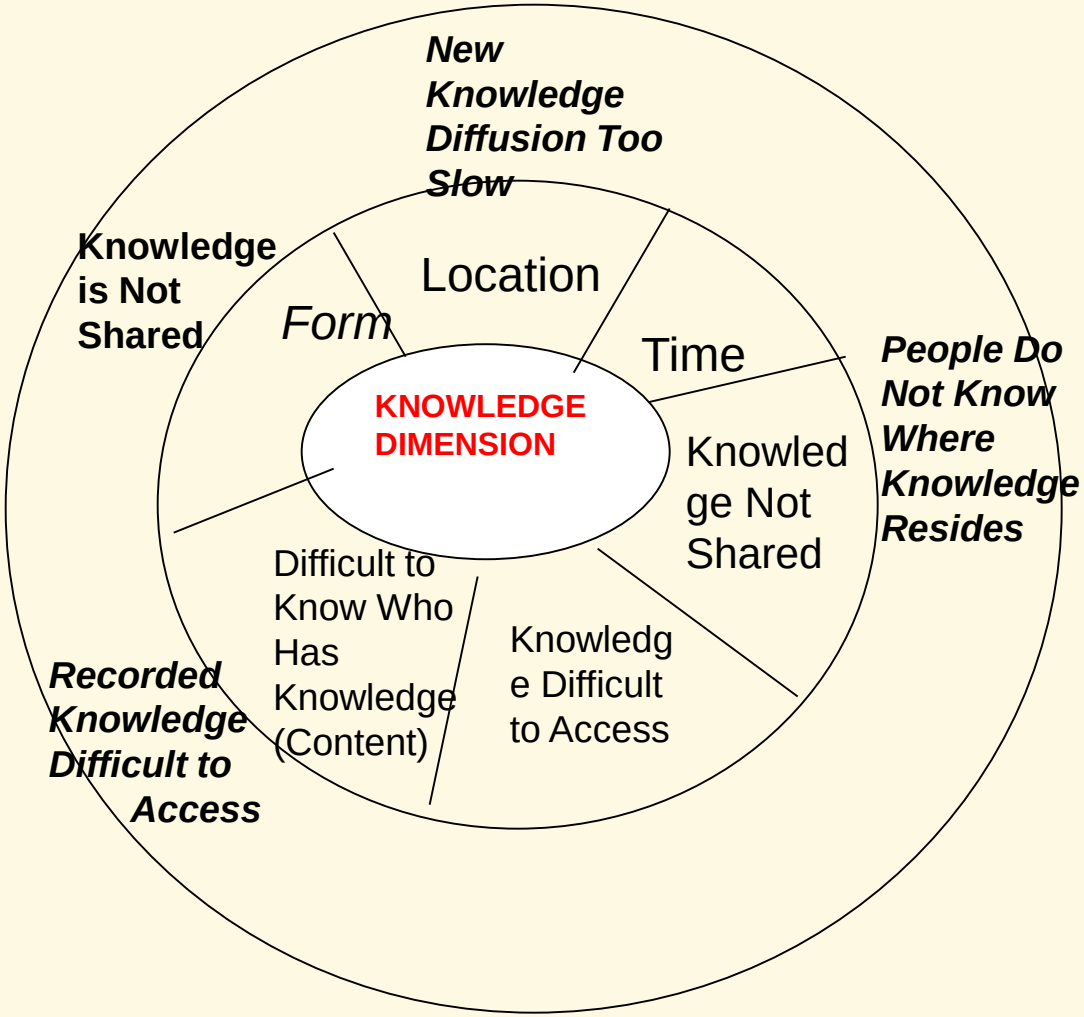
What Is Knowledge Codification?

- Organizing and representing knowledge before it is accessed by authorized personnel
- The organizing part is usually in the form of a decision tree, a decision table, or a frame
- Converting tacit knowledge to explicit knowledge in a usable form
- Converting undocumented to documented information
- Making corporate-specific knowledge visible, accessible, and usable for decision making

Why Codify?

- Diagnosis—addressing identifiable symptoms of specific causal factors
- Instruction/training
- Interpretation—promoting training of junior personnel based on captured knowledge of senior employees
- Planning/scheduling—mapping out an entire course of action before any steps are taken
- Prediction—inferring the likely outcome of a given situation and flashing a proper warning or suggestion for corrective action

Knowledge Dimensions and Bottlenecks



Modes of Conversion

- Tacit to tacit knowledge—produces socialization. Observation and practice are two knowledge capture tools
- Tacit to explicit knowledge— externalizing via analogies or metaphors. Resulting explicit knowledge can then be stored in repositories
- Explicit to tacit knowledge—internalizing explicit knowledge into tacit knowledge
- Explicit to explicit knowledge—combining or sorting different bodies of explicit knowledge to lead to knew knowledge

Things To Consider

- What organizational goals will codified knowledge serve?
- What knowledge exists in the organization that addresses these goals?
- How useful is existing knowledge for codification?
- How would one codify knowledge?

Problems With Codifying Tacit Knowledge

- Distinctive style of the expert
- Special knowledge capture skills to codify tacit knowledge effectively
- Certain knowledge is more of an art than a science and art is difficult to codify into rules
- Dealing with experts is not easy
- Many firms lack the transparency of company-wide knowledge
- Critical knowledge is often available, but no one knows where to find it

Tools and Procedures—Knowledge Maps

- A guiding function
- Identify strengths to exploit and missing knowledge gaps to fill
- Visual representation of knowledge, not a repository
- A straightforward directory that points to people, documents, and repositories
- Direct people where to go when they need certain expertise
- Recognize explicit and tacit knowledge captured in documents and in experts' heads

How Knowledge Maps Work

- The map depicts visually the business issue or problem at hand
- Pace of the group's collaborative discussions guided by questions to create shared knowledge
- Facts presented to the group to focus on realities of the problem
- Nature of the collaborative discussion among peers should be an open environment, facilitated by a coach
- Post session follow-up activities are reviewed, and conclusions are drawn

The Building Cycle

- Once you know where knowledge resides, you simply point to it and add instructions on how to get there
- A company's intranet is a common medium for publishing knowledge maps
- Building criteria: clarity of purpose, ease of use, accuracy of content

Building Cycle (cont'd)

- First building step: Develop a structure of the knowledge requirements
- Second building step: Define the knowledge required of specific jobs
- Third building step: Rate employee performance by knowledge competency
- Fourth building step: Link knowledge map to a training program for career development and job advancement

Case-Based Reasoning (CBR)

- CBR is reasoning from relevant past cases in a manner similar to humans' use of past experiences to arrive at conclusions
- Goal is to bring up the most similar historical cases that match the current case
- More time savings than rule-based systems
- Requires rigorous initial planning of all possible variables

Question for Discussion

- Review the literature via the Internet and write a 2-page essay on CBR. What it is, how it relates to knowledge codification, etc.

Decision Tables

- More like a spreadsheet—divided into a list of conditions and their respective values and a list of conclusions
- Conditions are matched against conclusions (See Table)

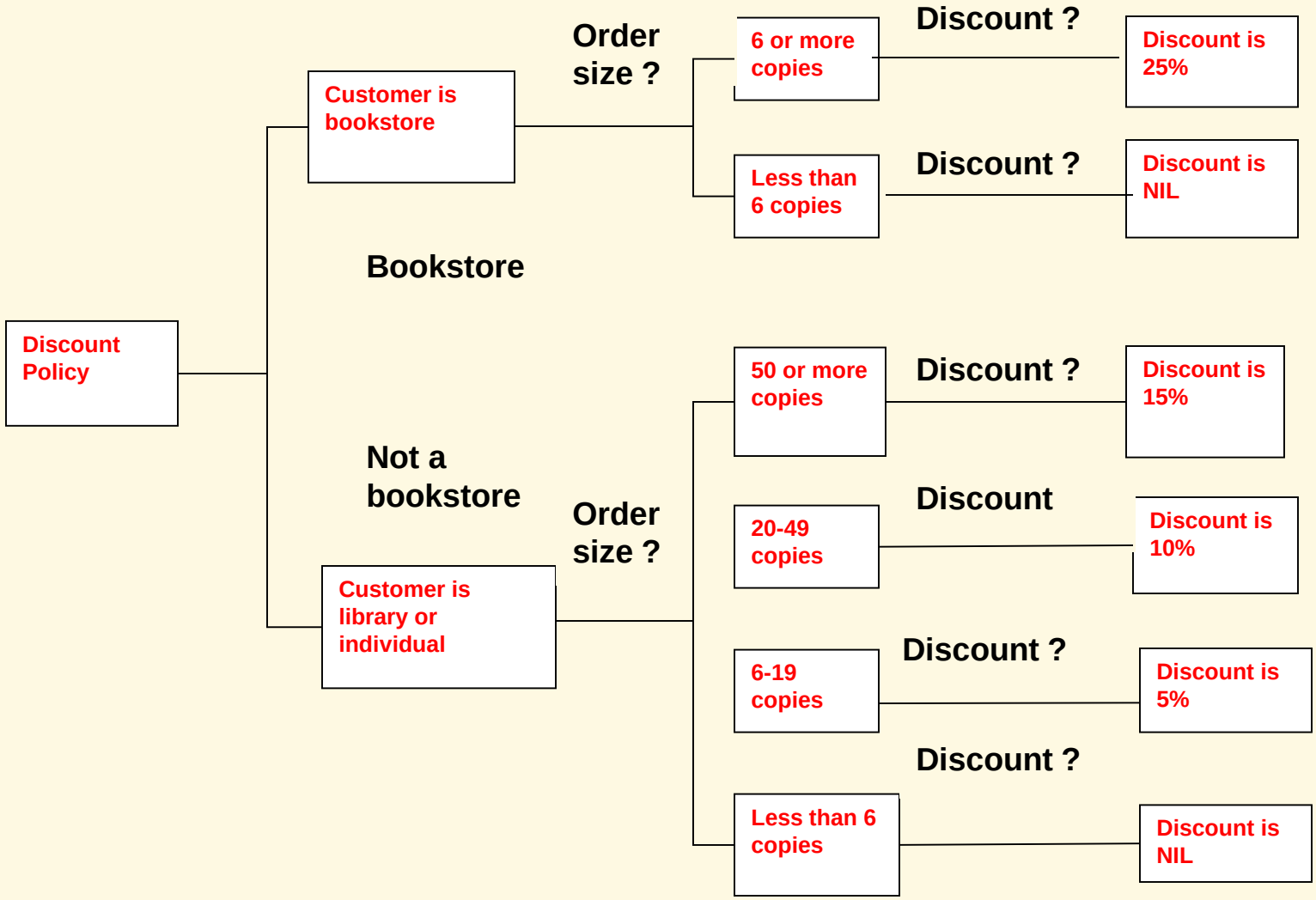
Table 1. Decision Table

	Condition Stub	Condition Entry					
		1	2	3	4	5	6
	Customer is bookstore	Y	Y	N	N	N	N
	Order size > 6 copies	Y	N	N	N	N	N
	Customer is librarian/individual			Y	Y	Y	Y
IF	Order size 50 copies or more			Y	N	N	N
(condition)	Order size 20-49 copies				Y	N	N
	Order size 6-19 copies					Y	N
	Allow 25% discount	X					
	Allow 15% discount			X			
	Allow 10% discount				X		
THEN	Allow 5% discount					X	
(action)	Allow no discount		X				X
	Action Stub	**Action Entry**					

Decision Trees

- A hierarchically arranged semantic network
- Composed of nodes representing goals and links representing decisions or outcomes.
- Read from left to right, with the root being on the left
- All nodes except the root node are instances of the primary goal. See next Figure
- First step before actual codification
- Ability to verify logic graphically in problems involving complex situations that result in a limited number of actions

Decision Tree



Frames

- Represent knowledge about a particular idea in one place
- Handle a combination of declarative and operational knowledge, which make it easier to understand the problem domain
- Have a slot (a specific object or an attribute of an entity) and a facet (the value of an object or a slot)
- When all the slots are filled with values, the frame is considered instantiated

Production Rules

- Form of tacit knowledge codification in the form of premise-action pairs
- Rules are conditional statement that specify an action to be taken if a certain condition is true
- The form is *IF… THEN,* or *IF…THEN…ELSE*
- *Premise:* A Boolean expression that must be evaluated as true for the rule to be applied
- *Action:* Second component, separated from the premise by THEN; executed if the premise is true

Role of Planning

In knowledge-based systems, planning involves:

- Breaking the KM system into module
- Looking at partial solutions
- Linking partial solutions via rules and procedures to arrive at final solutions
- Deciding on the programming language
- Selecting the right software package

Role of Planning (cont'd)

- Arranging for the verification and validation of the system
- Developing user interface and consultation facilities
- Promoting clarity and flexibility
- Reducing unnecessary risks
- Making rules easier to review and understand

Inferencing and Reasoning

- Inferencing is deriving a conclusion based on statements that only imply that conclusion
  - Brothers and sisters have I none,
  - But that man's father is my father's so

    $\Rightarrow$That man is my son.
- Reasoning is applying knowledge to arrive at solutions
  - The victims were stabbed to death in a dance hall in the mall. The suspect was on a nonstop fight to Chicago when the murder occurred.

    $\Rightarrow$ The suspect was innocent.
- To reason is to think clearly and logically, to draw reasonable inferences or conclusions from known or assumed facts

Requirements for Knowledge Development Work

- Computer technology
- Domain-specific knowledge
- Knowledge repositories and data mining
- Cognitive psychology

Skills Requirements of Knowledge Development

- Interpersonal communication
- Ability to articulate project's rationale
- Rapid prototyping skills
- Personality attributes such as intelligence, creativity, persistence, and a good sense of humor

Question for Discussion

- Examine the following profiles of knowledge developers and discuss their qualifications:
  - Erika and Lori were contracted to build a knowledge-base system for a country club. The system is designed to improve the process of evaluating the applications that the club receives for snack bar worker, lifeguard, and coach. Erika and Lori hold B.S degrees in IT and are well versed in two knowledge software packages. Erika is quite congenial and loves to talk to people. Lori is more introspective and enjoys building knowledge systems without involvement with the user or the company's human experts. In addition, they are both well versed in Pascal and C++. Neither has built a knowledge-based system for the club before.

Thank You !

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