ACS-1803 Introduction to Information Systems

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Systems that span Organizational Boundaries

Lecture Outline 8-2

Expert Systems

Systems That Span Organizational Boundaries

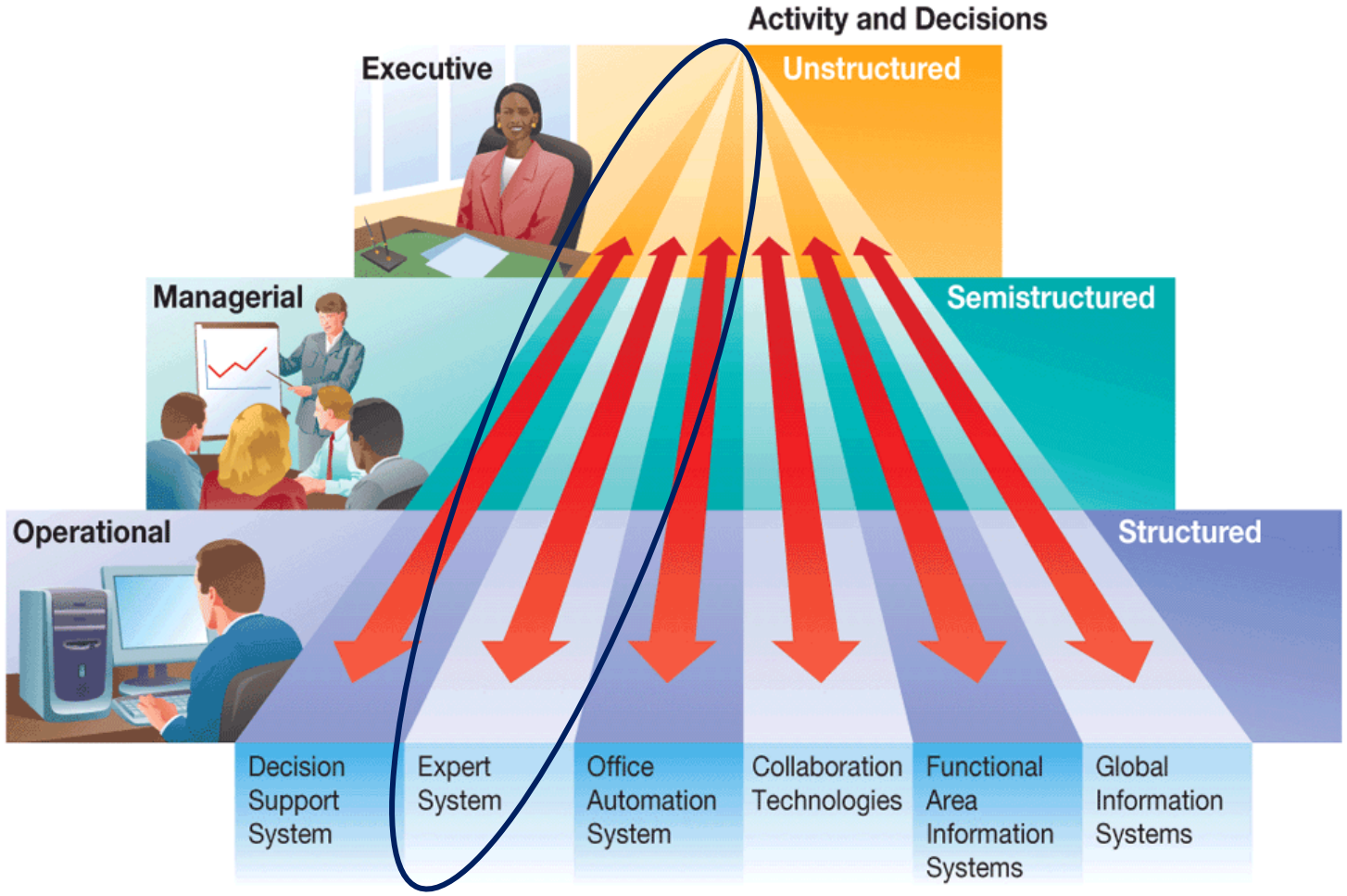


Figure 6.19 Organizational boundary-spanning information systems.

Expert Systems

- **Expert Systems** Special-purpose systems used by operational level employees to make decisions usually made by more experienced employees or an expert in the field
- **System Details** These systems use **inference engines** that match **facts** and **rules**, sequence **questions** for the user, draw a **conclusion**, and present **a recommendation** to the user
- **Supported Activities**: These systems support many activities, including:
  - **Medical Diagnosis**
  - **Machine Configuration**
  - **Financial Planning**
  - **Software Application Assistance (help wizards)**

System Architecture: Expert Systems

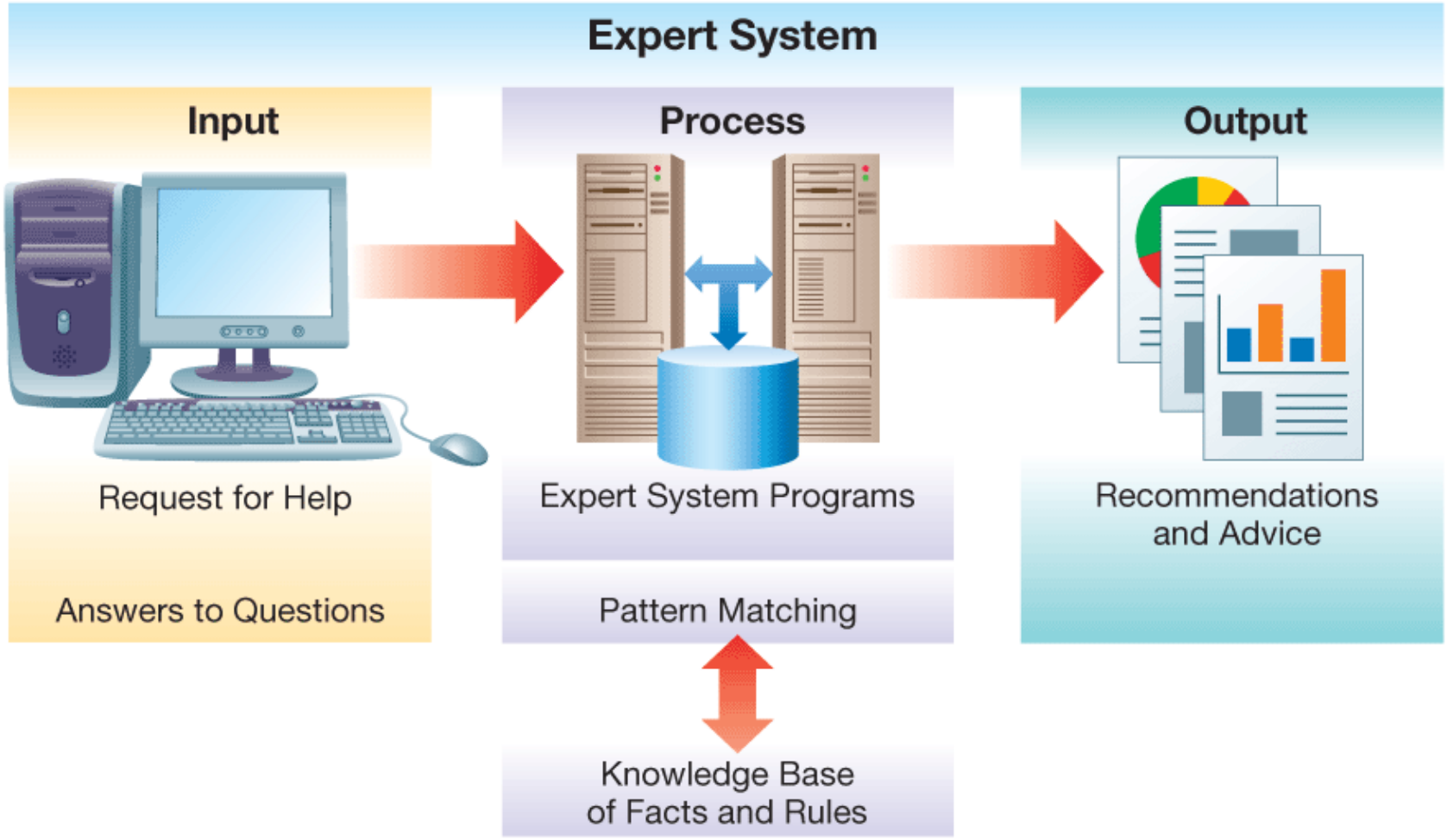


Figure 6.22 Architecture of an expert system using the basic systems model.

Expert System Example

End user

The end-user usually sees an expert system through an example of which follows:

Q. Do you know which restaurant you want to go to?

A. No

Q. Is there any kind of food you would particularly like?

A. No

Q. Do you like spicy food?

A. No

Q. Do you usually drink wine with meals?

A. Yes

Q. When you drink wine, is it French wine?

A. Yes

As can be seen from this dialog, **the system is leading the user through a set of questions**, the purpose of which is to determine a suitable set of restaurants to recommend. This dialog begins with the system asking if the user already knows the restaurant choice (a common feature of expert systems) and immediately illustrates a characteristic of expert systems; **users may choose not to respond to any question**. **In expert systems, dialogs are not pre-planned**. **There is no fixed control structure**. **Dialogs are synthesized** from the **current information** and the **contents of the knowledge base**. Because of this, not being able to supply the answer to a particular question does not stop the consultation.

Expert System Example

Explanation system Another major distinction between expert systems and traditional systems is illustrated by the following answer given by the system when the user answers a question with another question, "Why", as occurred in the above example. The answer is:

A. I am trying to determine the type of restaurant to suggest. So far Chinese is not a likely choice. It is possible that French is a likely choice. I know that if the diner is a wine drinker, and the preferred wine is French, then there is strong evidence that the restaurant choice should include French.

Expert Systems

- Such systems are different than traditional reporting or DSS systems
- They apply *artificial intelligence* to situations where many **facts** and complex **decision rules** are involved, such that only a few people can solve such problems well
- An expert system mimics the thinking of an expert

Expert Systems

- Expert system manipulate *knowledge* and not just *information*

- e.g. what drug and in what dose to give for particular types of cancer
  - Many factors involved
  - Many questions must be asked
  - Many IF … THEN rules
    - A rule is a way of encoding knowledge

- An ES should be able to explain its reasoning to the user

Expert Systems

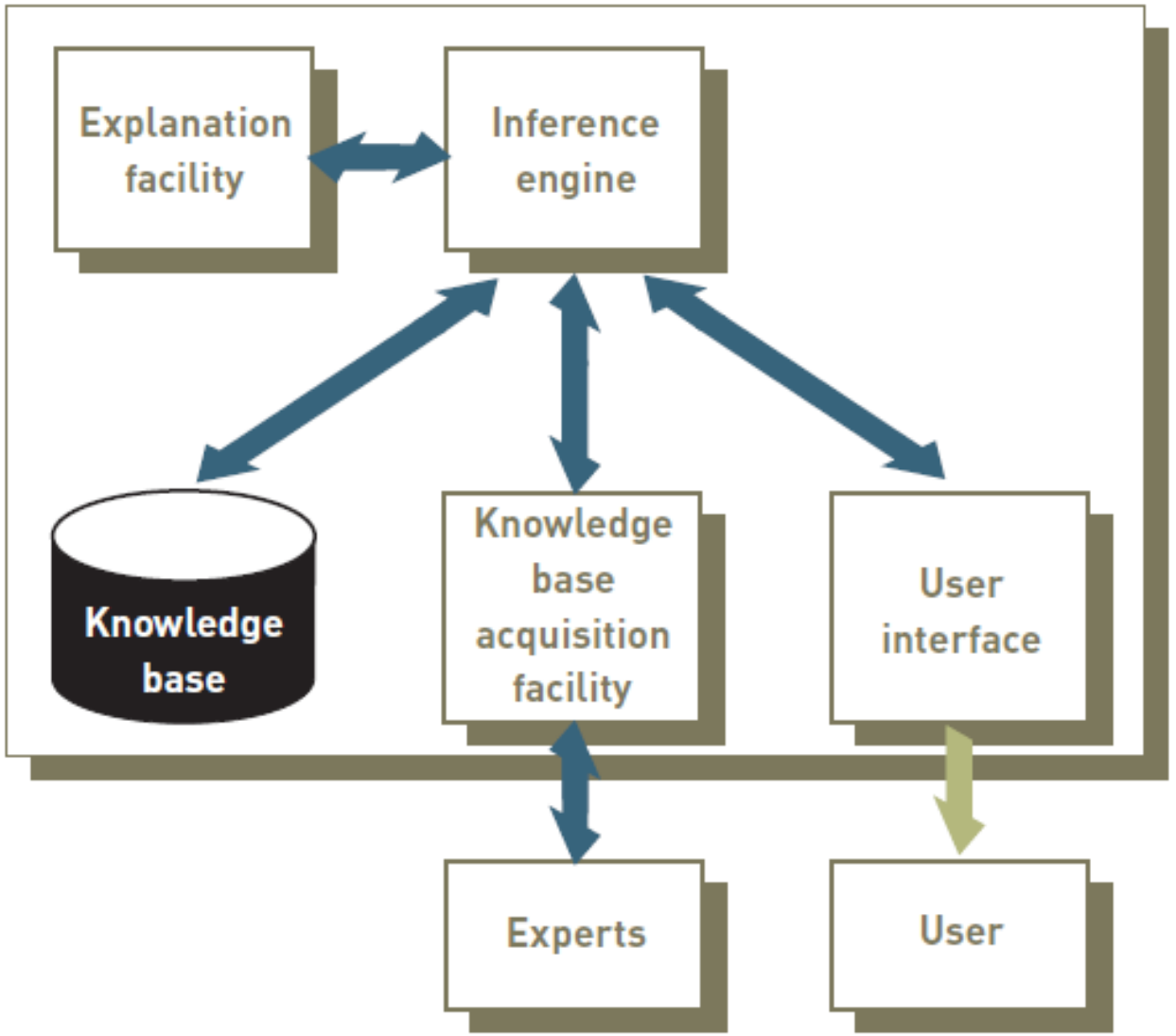
- Why develop them?
  - to retain expert's knowledge if (s)he retires or dies
  - to pool expertise from several experts
  - to clone the expert's knowledge and have it available in many places at once (e.g., cancer treatment in remote Manitoba areas)

- They can be developed through detailed programming or through an "expert system shell" such as VP Expert

Expert Systems Structure

- Knowledge base
  - Facts and rules
- Inference engine
  - Software that takes user input and "sifts through" the knowledge base mimicking the mind of an expert
- This is **Artificial Intelligence (AI)**

Components of Expert Systems



Expert System Development

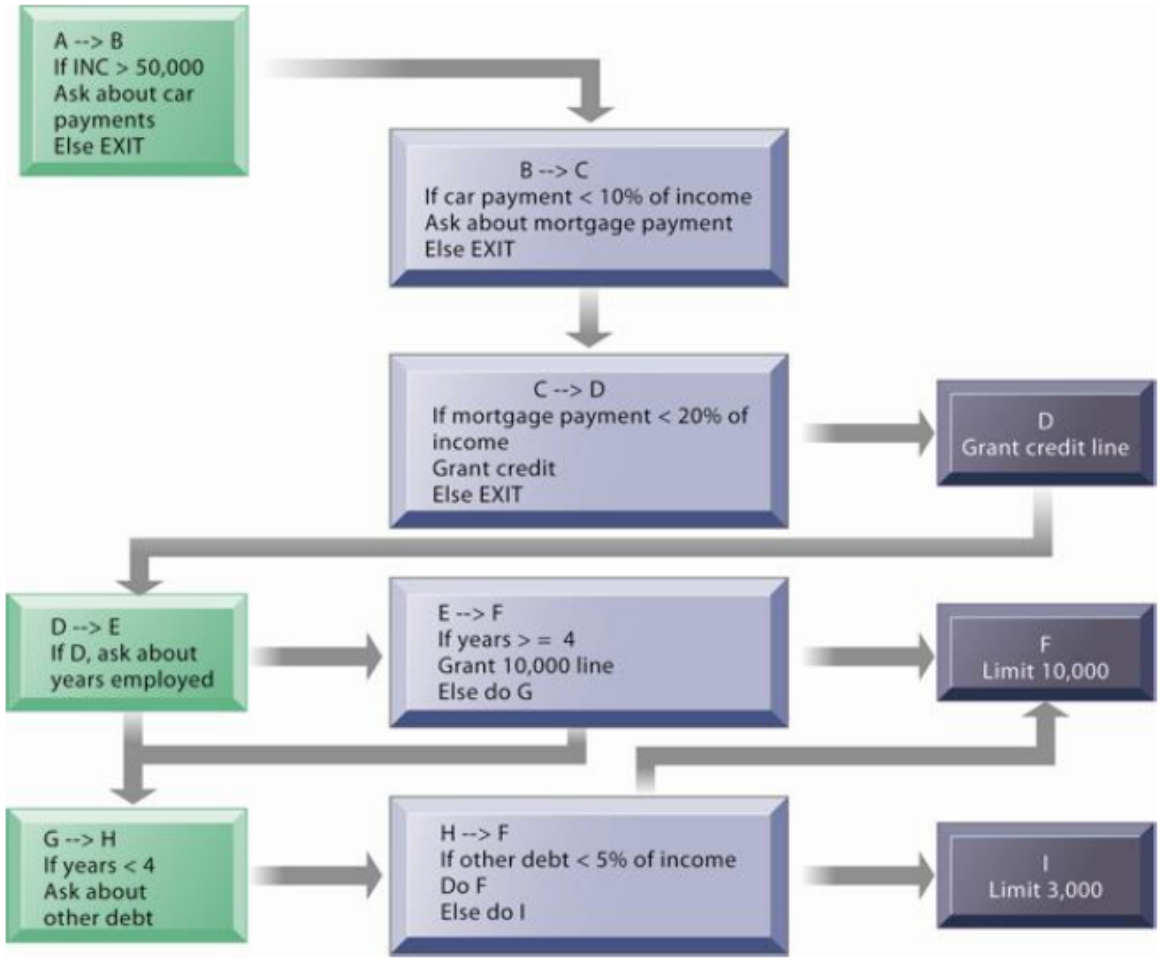
- A **Knowledge Engineer** has special expertise in eliciting information and expertise from experts

- (S)he translates the expert's knowledge into a set of (if .. then) rules

Expert System Development

"IF … THEN" Rules in an Expert System

An expert system contains a set of rules to be followed when used. The rules are interconnected; the number of outcomes is known in advance and is limited; there are multiple paths to the same outcome; and the system can consider multiple rules at a single time. The rules illustrated are for a simple credit-granting expert system.



Expert Systems Examples

- Parker, Smartphone Parking Application
- AMDOCS, Call Centre System

IBM's Watson for healthcare

- Watson mines patient data to find relevant facts about family history, current medications and other existing conditions.
- It combines this information with current findings from tests and instruments and then examines all available data sources to form hypotheses and test them.
- Watson can incorporate treatment guidelines, electronic medical record data, doctor's and nurse's notes, research, clinical studies, journal articles, and patient information into the data available for analysis.
- Watson will then provide a list of potential diagnoses along with a score that indicates the level of confidence for each hypothesis
- IBM Watson: How it Works
- IBM's Breakthrough: Watson May Help Beat Cancer
- Using Watson Analytics in the restaurant business

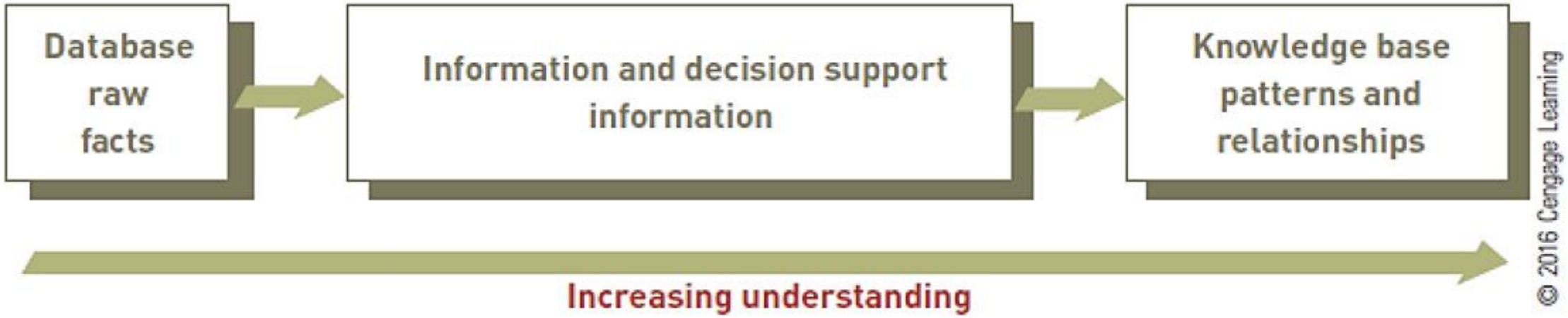
Knowledge Management Systems

Knowledge Management Definitions

- **Knowledge Management**
  - The process an organization uses to gain the greatest value from its knowledge assets
- **Knowledge Assets**
  - All underlying skills routines, practices, principles, formulae, methods, heuristics, and intuitions whether explicit or tacit
- **Explicit Knowledge**
  - Anything that can be documented, archived, measured, or codified often with the help of information systems
- **Tacit Knowledge**
  - The processes and procedures on how to effectively perform a particular task stored in a person's mind

Knowledge Management

- An expert system works on a knowledge base
  - It is part of a larger area called 'knowledge management'



Knowledge Management System (KMS)

- **Best Practices**
  - Procedures and processes that are widely accepted as being among the most effective and/or efficient
- **Primary Objective**
  - How to recognize, generate, store, share, manage this tacit knowledge (Best Practices) for deployment and use
- **Technology**
  - Generally not a single technology but rather a **collection of tools** that include **communication technologies** (e.g. e-mail, groupware, instant messaging), and **information storage** and **retrieval systems** (e.g. database management system) to meet the **Primary Objective**

Knowledge Management Systems

- Data consists of raw facts
- Information:
  - Collection of facts organized so that they have additional value beyond the value of the facts themselves
- Knowledge:
  - Awareness and understanding of a set of information and the ways that information can be made useful to support a specific task or reach a decision
- Knowledge Management System (KMS):
  - Organized collection of people, procedures, software, databases, and devices
  - Used to create, store, share, and use the organization's knowledge and experience

Knowledge Management Systems*

Data	There are 20 PCs in stock at the retail store.
Information	The store will run out of inventory in a week unless more is ordered today.
Knowledge	Call 800-555-2222 to order more inventory.

The differences between Data, Information, Knowledge

Data and Knowledge Management Workers and Communities of Practice

- Data workers:
  - Secretaries, administrative assistants, bookkeepers, etc.

- Knowledge workers:
  - Create, use, and disseminate knowledge
  - Professionals in science, engineering, or business

Data and Knowledge Management Workers and Communities of Practice

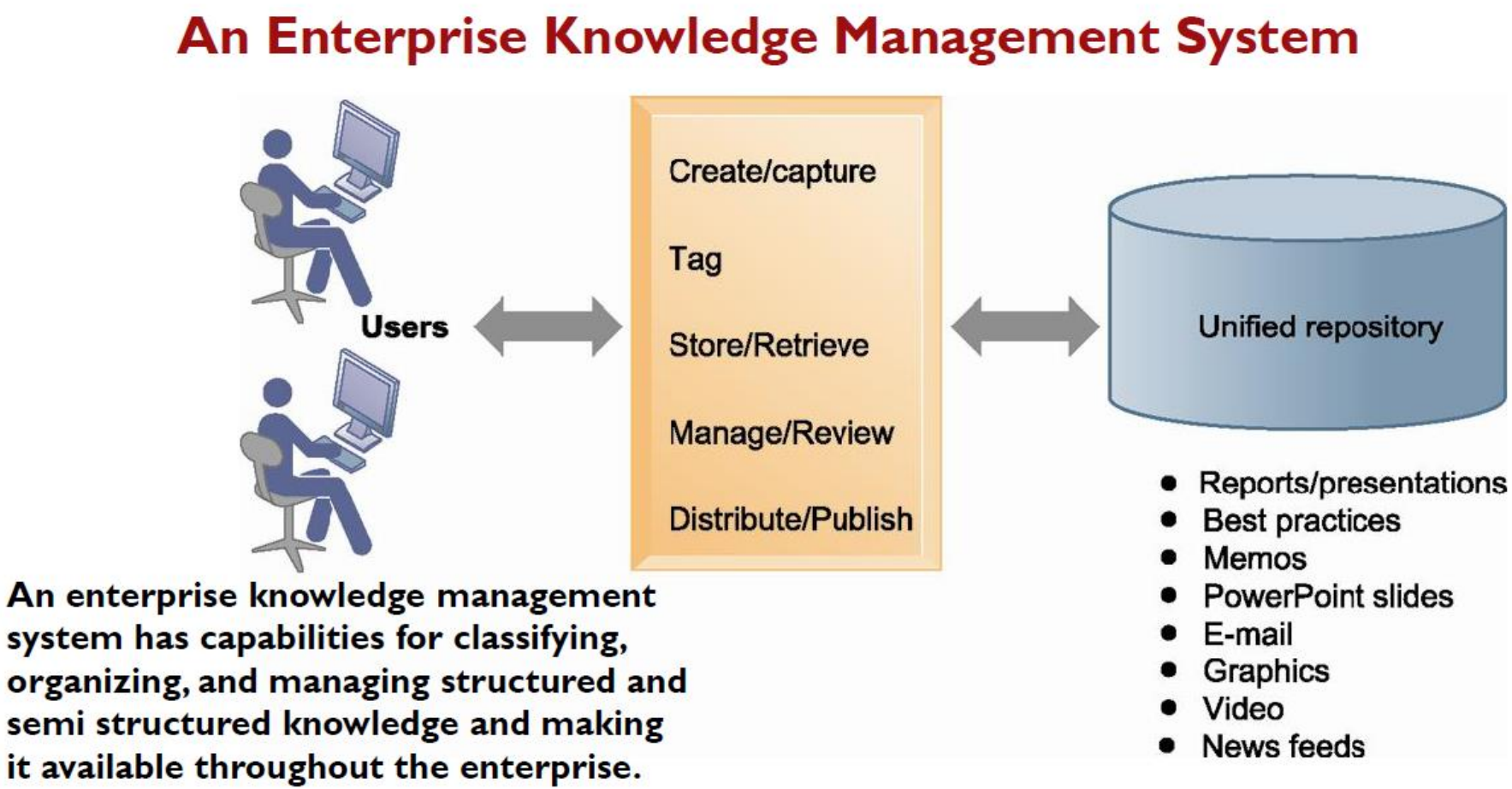
- Chief Knowledge Officer (CKO):
  - Top-level executive who helps the organization use a KMS to create, store, and use knowledge to achieve organizational goals

- Communities of Practice (COP):
  - Group of people dedicated to a common discipline or practice
  - May be used to create, store, and share knowledge

Obtaining, Storing, Sharing, and Using Knowledge

- Knowledge workers:
  - Often work in teams
- Knowledge repository:
  - Includes documents, reports, files, and databases
- Knowledge map:
  - Directory that points the knowledge worker to the needed knowledge

Obtaining, Storing, Sharing, and Using Knowledge



Expert & Knowledge Management Systems

End of Lecture 8-2