



# Chapter 11

## MANAGING KNOWLEDGE

### VIDEO CASES

*Case 1: L'Oréal: Knowledge Management Using Microsoft SharePoint*

*Case 2: IdeaScale Crowdsourcing: Where Ideas Come to Life*



### Learning Objectives

- **Apa peran program manajemen pengetahuan dan manajemen pengetahuan dalam bisnis?**
- **Apa jenis sistem yang digunakan untuk manajemen pengetahuan seluruh perusahaan dan bagaimana mereka memberikan nilai bagi bisnis?**
- **Apa saja jenis utama dari sistem kerja pengetahuan dan bagaimana mereka memberikan nilai bagi perusahaan?**
- **Apa manfaat bisnis menggunakan teknik cerdas untuk manajemen pengetahuan?**



### P&G Moves from Paper to Pixels for Knowledge Management

- **Problem:** Penelitian Dokumen-intensif dan bergantung pada kertas catatan perkembangan
- **Solutions:** Manajemen dokumen menyimpan informasi sistem penelitian elektronik digital
- **eLab Notebook documentum management software** menciptakan PDF, memungkinkan tanda tangan digital, embeds hak penggunaan, memungkinkan pencarian digital perpustakaan
- Menunjukkan TI berperan dalam mengurangi biaya dengan membuat pengetahuan organisasi lebih mudah tersedia
- Menggambarkan bagaimana suatu organisasi dapat menjadi lebih efisien dan menguntungkan melalui content



### Pemandangan Manajemen Pengetahuan

- **Sistem manajemen pengetahuan antar wilayah yang paling cepat berkembang dari investasi perangkat lunak**
- **Information economy**
  - **55% angkatan kerja AS: pengetahuan dan informasi pekerja**
  - **60% Gross domestic product -GDP AS dari sektor pengetahuan dan informasi**
- **Substansial bagian dari nilai pasar saham perusahaan terkait dengan aset tidak berwujud: pengetahuan, merek, reputasi, dan proses bisnis yang unik**
- **Proyek berbasis pengetahuan dilaksanakan dengan baik dapat menghasilkan ROI yang luar biasa**



### The Knowledge Management Landscape

- **Dimensi penting dari pengetahuan**
  - **Pengetahuan adalah aset perusahaan**
    - intangible
    - Penciptaan pengetahuan dari data, informasi, membutuhkan sumber daya organisasi
    - Seperti hal itu dibagikan, mengalami efek jaringan
  - **Pengetahuan memiliki bentuk yang berbeda**
    - Mungkin eksplisit (didokumentasikan) atau tacit (berada dalam pikiran)
    - Tahu-bagaimana, kerajinan, keterampilan
    - Cara mengikuti prosedur
    - Mengetahui mengapa sesuatu terjadi (kausalitas)





### The Knowledge Management Landscape

- **Dimensi penting dari pengetahuan (cont.)**
  - **Pengetahuan memiliki lokasi**
    - acara kognitif
    - Baik sosial dan individu
    - "Sticky" (sulit untuk bergerak), terletak (terjerat dalam budaya perusahaan), kontekstual (bekerja hanya dalam situasi tertentu)
  - **Pengetahuan adalah situasional**
    - Conditional: Mengetahui kapan harus menerapkan prosedur
    - Kontekstual: Mengetahui keadaan untuk menggunakan alat tertentu



### The Knowledge Management Landscape

- **To transform information into knowledge, firm must expend additional resources to discover patterns, rules, and contexts where knowledge works**
- **Wisdom:**
  - Collective and individual experience of applying knowledge to solve problems
  - Involves where, when, and how to apply knowledge
- **Knowing how to do things effectively and efficiently in ways others cannot duplicate is prime source of profit and competitive advantage**
  - E.g., Having a unique build-to-order production system



### The Knowledge Management Landscape

- **Organizational learning**
  - **Process in which organizations learn**
    - Gain experience through collection of data, measurement, trial and error, and feedback
    - Adjust behavior to reflect experience
      - Create new business processes
      - Change patterns of management decision making





### The Knowledge Management Landscape

- **Knowledge management: Set of business processes developed in an organization to create, store, transfer, and apply knowledge**
- **Knowledge management value chain:**
  - Each stage adds value to raw data and information as they are transformed into usable knowledge
    1. Knowledge acquisition
    2. Knowledge storage
    3. Knowledge dissemination
    4. Knowledge application



### The Knowledge Management Landscape

- **Knowledge management value chain**
  1. **Knowledge acquisition**
    - Documenting tacit and explicit knowledge
      - Storing documents, reports, presentations, best practices
      - Unstructured documents (e.g., e-mails)
      - Developing online expert networks
    - Creating knowledge
    - Tracking data from TPS and external sources



### The Knowledge Management Landscape

- **Knowledge management value chain (cont.)**
  2. **Knowledge storage**
    - Databases
    - Document management systems
    - Role of management:
      - Support development of planned knowledge storage systems
      - Encourage development of corporate-wide schemas for indexing documents
      - Reward employees for taking time to update and store documents properly



### The Knowledge Management Landscape

- **Knowledge management value chain (cont.)**
  3. **Knowledge dissemination**
    - Portals
    - Push e-mail reports
    - Search engines
    - Collaboration tools
    - A deluge of information?
      - Training programs, informal networks, and shared management experience help managers focus attention on important information



### The Knowledge Management Landscape

- **Knowledge management value chain (cont.)**
  - 4. **Knowledge application**
    - To provide return on investment, organizational knowledge must become systematic part of management decision making and become situated in decision-support systems
      - New business practices
      - New products and services
      - New markets





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## CHAPTER 11: MANAGING KNOWLEDGE

### The Knowledge Management Landscape

#### THE KNOWLEDGE MANAGEMENT VALUE CHAIN

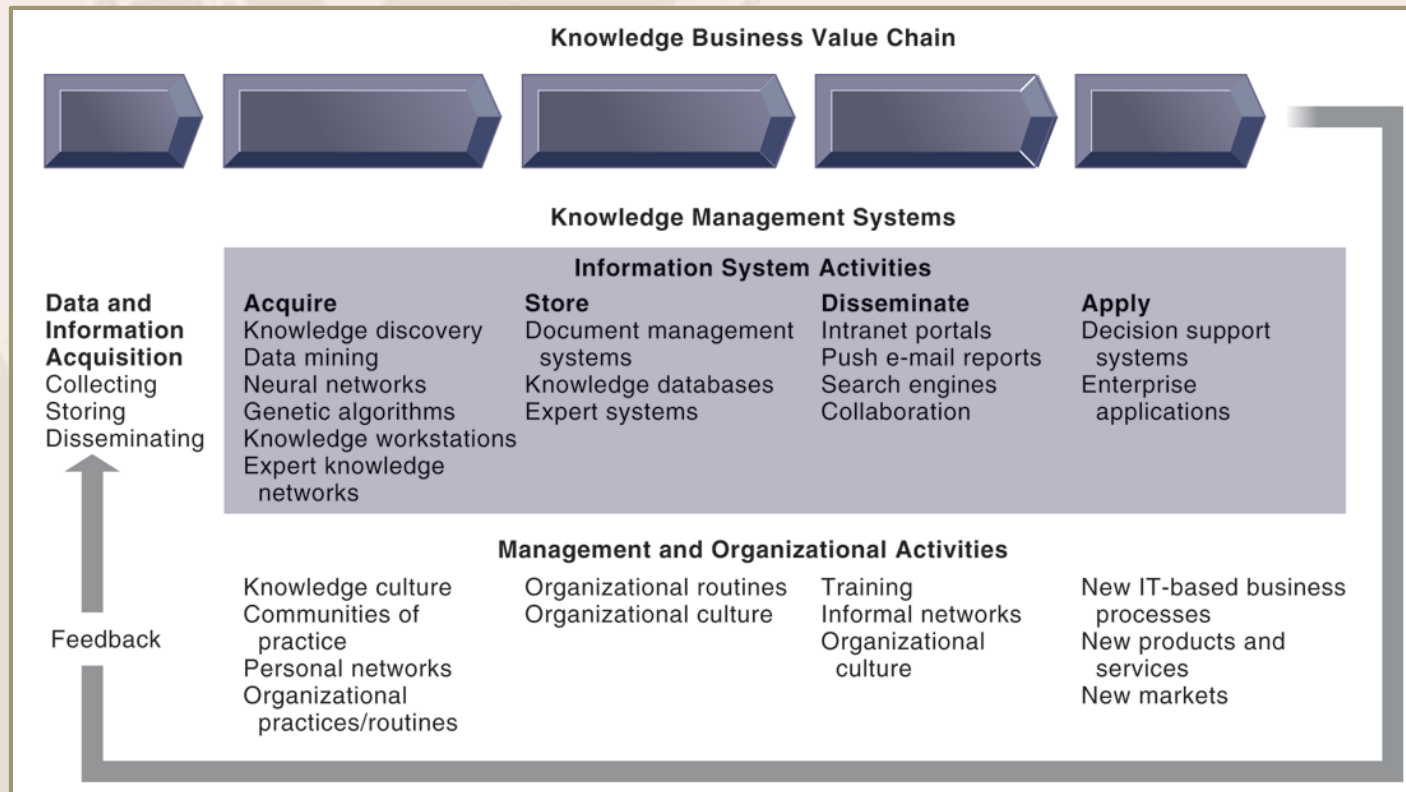


FIGURE 11-1

Knowledge management today involves both information systems activities and a host of enabling management and organizational activities.



### The Knowledge Management Landscape

- **New organizational roles and responsibilities**
  - Chief knowledge officer executives
  - Dedicated staff / knowledge managers
  - **Communities of practice (COPs)**
    - Informal social networks of professionals and employees within and outside firm who have similar work-related activities and interests
    - Activities include education, online newsletters, sharing experiences and techniques
    - Facilitate reuse of knowledge, discussion
    - Reduce learning curves of new employees



### The Knowledge Management Landscape

- **3 major types of knowledge management systems:**
  - 1. Enterprise-wide knowledge management systems**
    - General-purpose firm-wide efforts to collect, store, distribute, and apply digital content and knowledge
  - 2. Knowledge work systems (KWS)**
    - Specialized systems built for engineers, scientists, other knowledge workers charged with discovering and creating new knowledge
  - 3. Intelligent techniques**
    - Diverse group of techniques such as data mining used for various goals: discovering knowledge, distilling knowledge, discovering optimal solutions

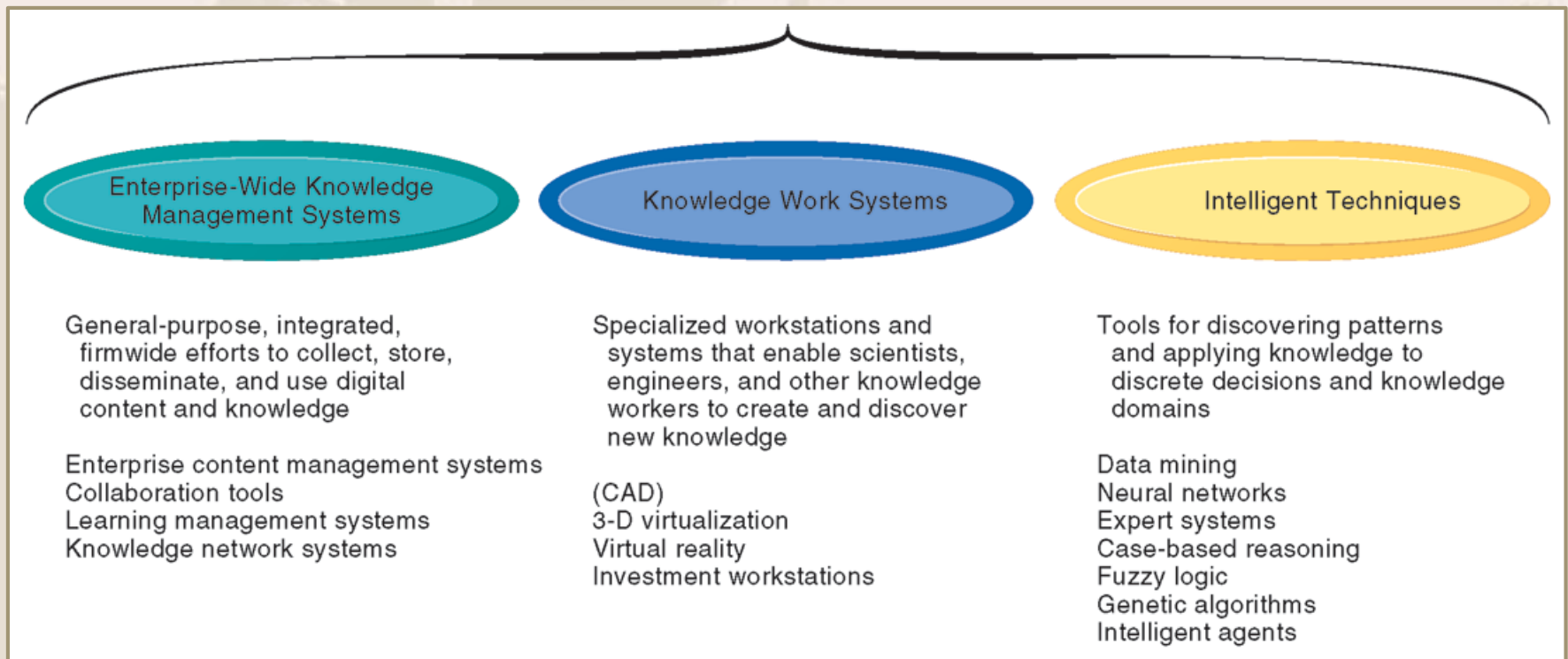


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## CHAPTER 11: MANAGING KNOWLEDGE

### The Knowledge Management Landscape

#### MAJOR TYPES OF KNOWLEDGE MANAGEMENT SYSTEMS



**FIGURE 11-2**

There are three major categories of knowledge management systems, and each can be broken down further into more specialized types of knowledge management systems.



### Enterprise-Wide Knowledge Management Systems

- **Three major types of knowledge in enterprise**
  - 1. Structured documents**
    - Reports, presentations
    - Formal rules
  - 2. Semistructured documents**
    - E-mails, videos
  - 3. Unstructured, tacit knowledge**
- **80% of an organization's business content is semistructured or unstructured**





### Enterprise-Wide Knowledge Management Systems

- **Enterprise content management systems**
  - **Help capture, store, retrieve, distribute, preserve**
    - Documents, reports, best practices
    - Semistructured knowledge (e-mails)
  - **Bring in external sources**
    - News feeds, research
  - **Tools for communication and collaboration**

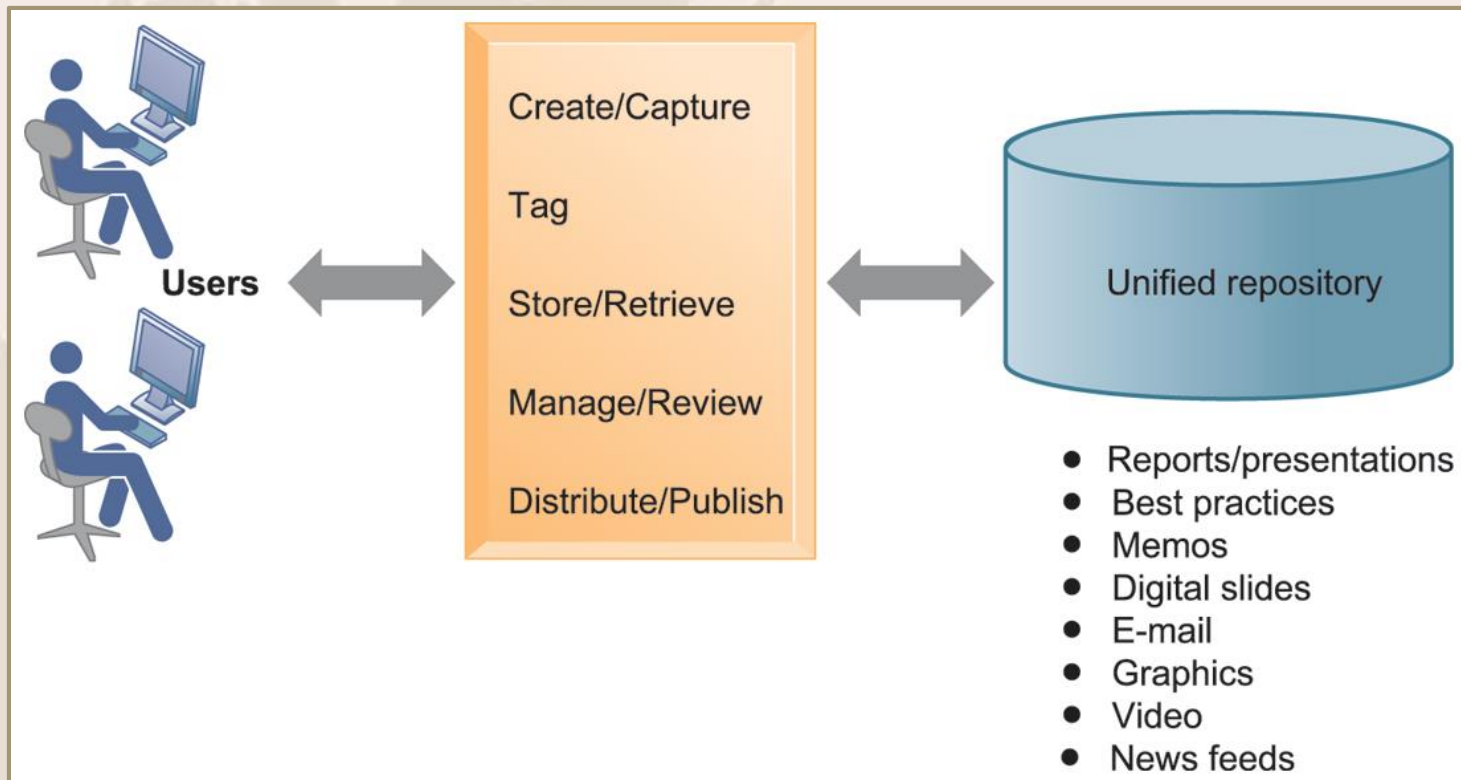


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### Enterprise-Wide Knowledge Management Systems

#### AN ENTERPRISE CONTENT MANAGEMENT SYSTEM



**FIGURE 11-3**

An enterprise content management system has capabilities for classifying, organizing, and managing structured and semistructured knowledge and making it available throughout the enterprise.



### Enterprise-Wide Knowledge Management Systems

- **Enterprise content management systems**
  - **Key problem – Developing taxonomy**
    - Knowledge objects must be tagged with categories for retrieval
  - **Digital asset management systems**
    - Specialized content management systems for classifying, storing, managing unstructured digital data
    - Photographs, graphics, video, audio



### Enterprise-Wide Knowledge Management Systems

- **Knowledge network systems**
  - Provide online directory of corporate experts in well-defined knowledge domains
  - Use communication technologies to make it easy for employees to find appropriate expert in a company
  - May systematize solutions developed by experts and store them in knowledge database
    - Best-practices
    - Frequently asked questions (FAQ) repository



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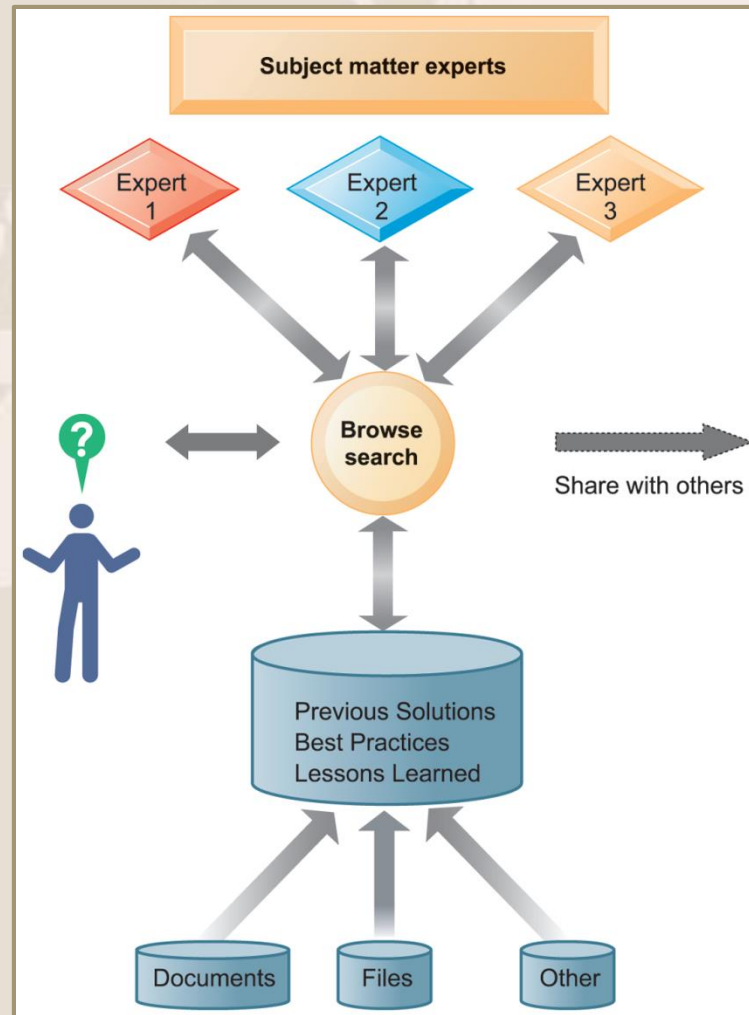
## CHAPTER 11: MANAGING KNOWLEDGE

### Enterprise-Wide Knowledge Management Systems

#### AN ENTERPRISE KNOWLEDGE NETWORK SYSTEM

A knowledge network maintains a database of firm experts, as well as accepted solutions to known problems, and then facilitates the communication between employees looking for knowledge and experts who have that knowledge. Solutions created in this communication are then added to a database of solutions in the form of FAQs, best practices, or other documents.

FIGURE 11-4







### Enterprise-Wide Knowledge Management Systems

- **Portal and collaboration technologies**
  - **Enterprise knowledge portals: Access to external and internal information**
    - News feeds, research
    - Capabilities for e-mail, chat, videoconferencing, discussion
  - **Use of consumer Web technologies**
    - Blogs
    - Wikis
    - Social bookmarking



### Enterprise-Wide Knowledge Management Systems

- **Learning management systems**
  - Provide tools for management, delivery, tracking, and assessment of various types of employee learning and training
  - **Support multiple modes of learning**
    - CD-ROM, Web-based classes, online forums, live instruction, etc.
  - **Automates selection and administration of courses**
  - **Assembles and delivers learning content**
  - **Measures learning effectiveness**



### Knowledge Work Systems

- **Knowledge work systems**
  - Systems for knowledge workers to help create new knowledge and integrate that knowledge into business
- **Knowledge workers**
  - Researchers, designers, architects, scientists, engineers who create knowledge for the organization
  - Three key roles:
    1. Keeping organization current in knowledge
    2. Serving as internal consultants regarding their areas of expertise
    3. Acting as change agents, evaluating, initiating, and promoting change projects



### Knowledge Work Systems

- **Requirements of knowledge work systems**
  - Substantial computing power for graphics, complex calculations
  - Powerful graphics and analytical tools
  - Communications and document management
  - Access to external databases
  - User-friendly interfaces
  - Optimized for tasks to be performed (design engineering, financial analysis)



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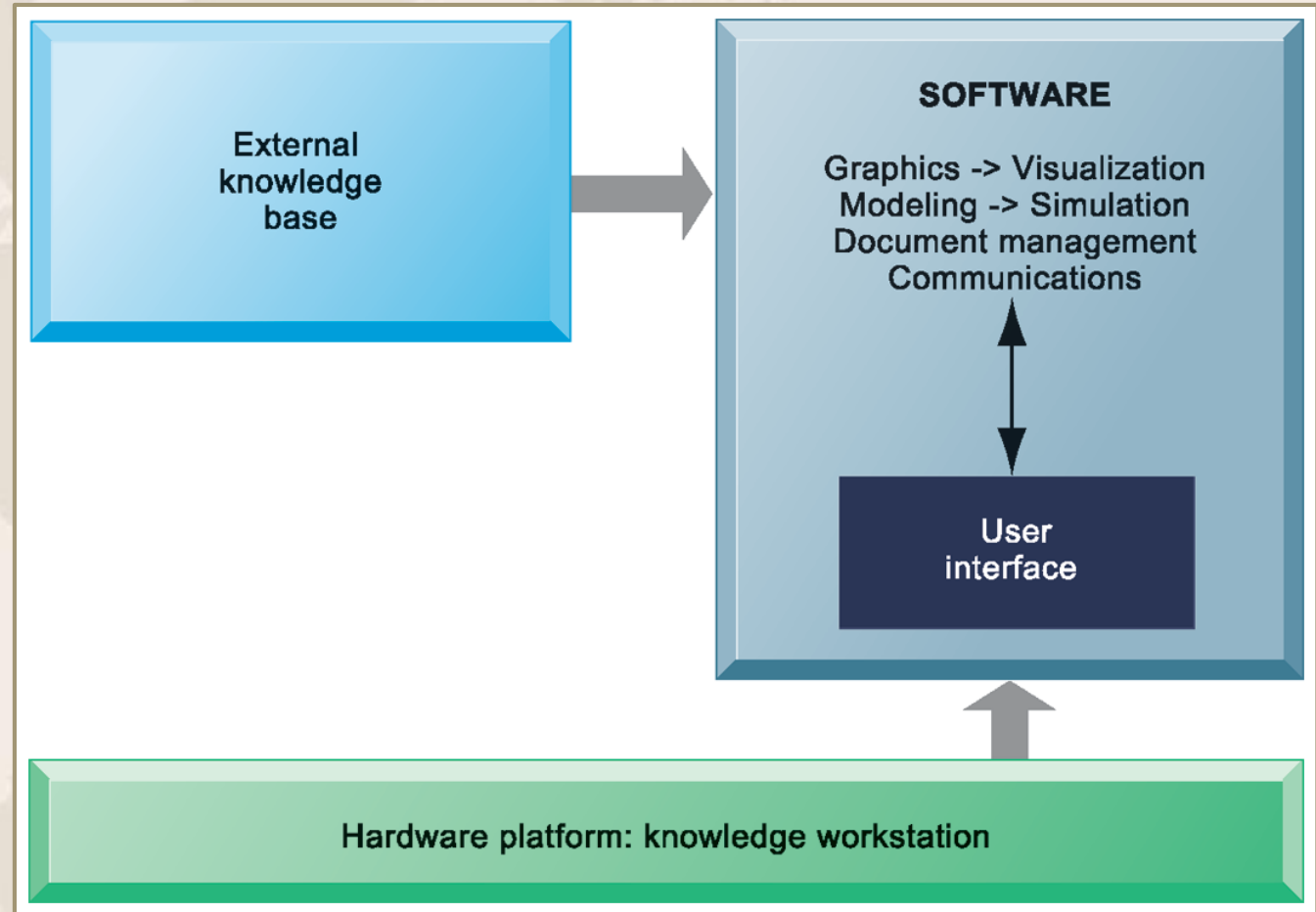
## CHAPTER 11: MANAGING KNOWLEDGE

### Knowledge Work Systems

#### REQUIREMENTS OF KNOWLEDGE WORK SYSTEMS

Knowledge work systems require strong links to external knowledge bases in addition to specialized hardware and software.

FIGURE 11-5







### Knowledge Work Systems

- **Examples of knowledge work systems**
  - **CAD (computer-aided design):**
    - Creation of engineering or architectural designs
  - **Virtual reality systems:**
    - Simulate real-life environments
    - 3-D medical modeling for surgeons
    - Augmented reality (AR) systems
    - VRML
  - **Investment workstations:**
    - Streamline investment process and consolidate internal, external data for brokers, traders, portfolio managers



### Knowledge Work Systems

#### AUGMENTED REALITY: REALITY GETS BETTER

*Read the Interactive Session and discuss the following questions*

- **What is the difference between virtual reality and augmented reality?**
- **Why is augmented reality so appealing to marketers?**
- **What makes augmented reality useful for real estate shopping applications?**
- **Suggest some other knowledge work applications for augmented reality**



### Intelligent Techniques

- **Intelligent techniques:** Used to capture individual and collective knowledge and to extend knowledge base
  - **To capture tacit knowledge:** Expert systems, case-based reasoning, fuzzy logic
  - **Knowledge discovery:** Neural networks and data mining
  - **Generating solutions to complex problems:** Genetic algorithms
  - **Automating tasks:** Intelligent agents
- **Artificial intelligence (AI) technology:**
  - **Computer-based systems that emulate human behavior**



### Intelligent Techniques

- **Expert systems:**
  - Capture tacit knowledge in very specific and limited domain of human expertise
  - Capture knowledge of skilled employees as set of rules in software system that can be used by others in organization
  - Typically perform limited tasks that may take a few minutes or hours, e.g.:
    - Diagnosing malfunctioning machine
    - Determining whether to grant credit for loan
  - Used for discrete, highly structured decision-making



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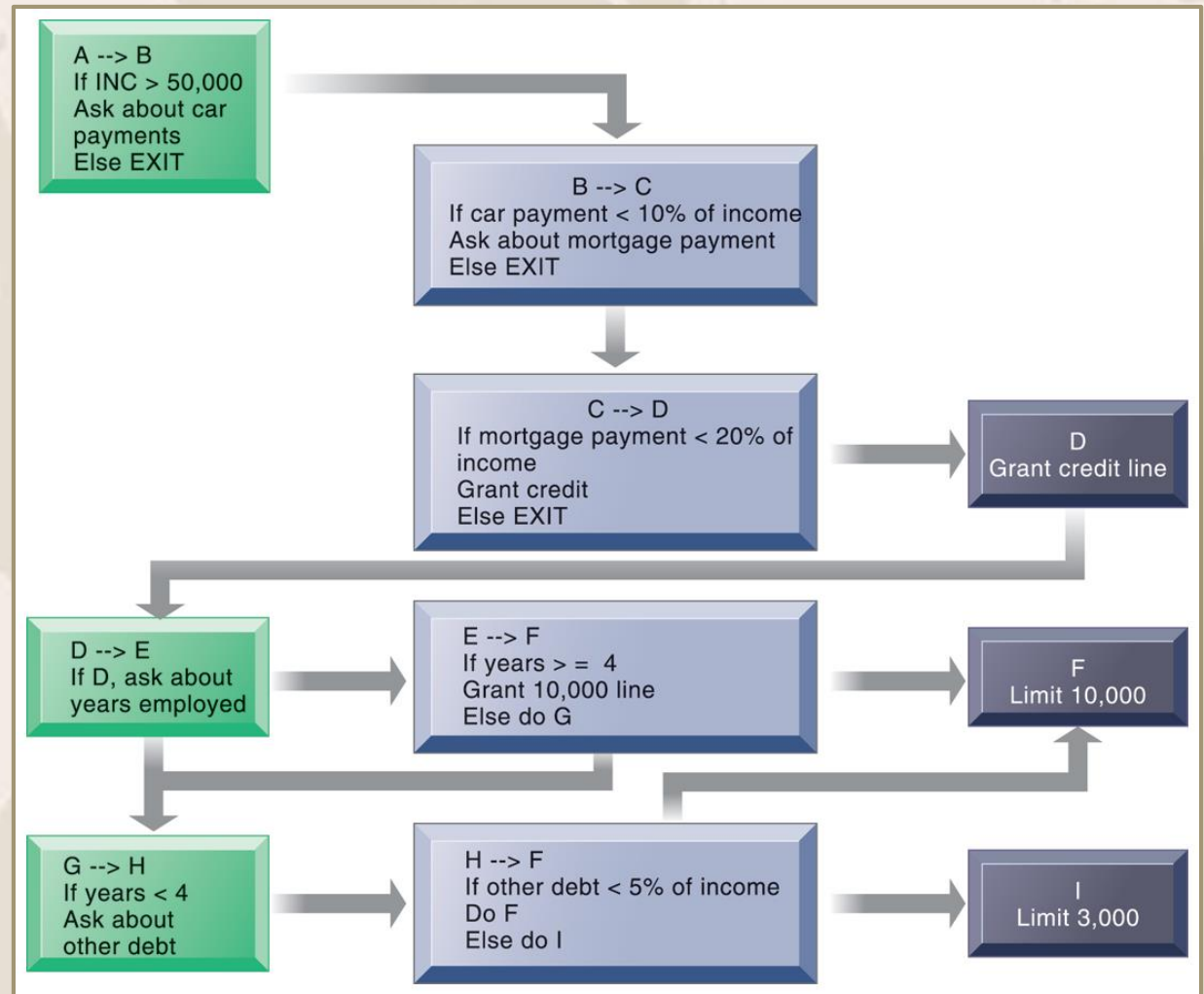
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### Intelligent Techniques

#### RULES IN AN EXPERT SYSTEM

An expert system contains a number of rules to be followed. 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 simple credit-granting expert systems.

FIGURE 11-6







### Intelligent Techniques

- **How expert systems work**
  - **Knowledge base:** Set of hundreds or thousands of rules
  - **Inference engine:** Strategy used to search knowledge base
    - **Forward chaining:** Inference engine begins with information entered by user and searches knowledge base to arrive at conclusion
    - **Backward chaining:** Begins with hypothesis and asks user questions until hypothesis is confirmed or disproved

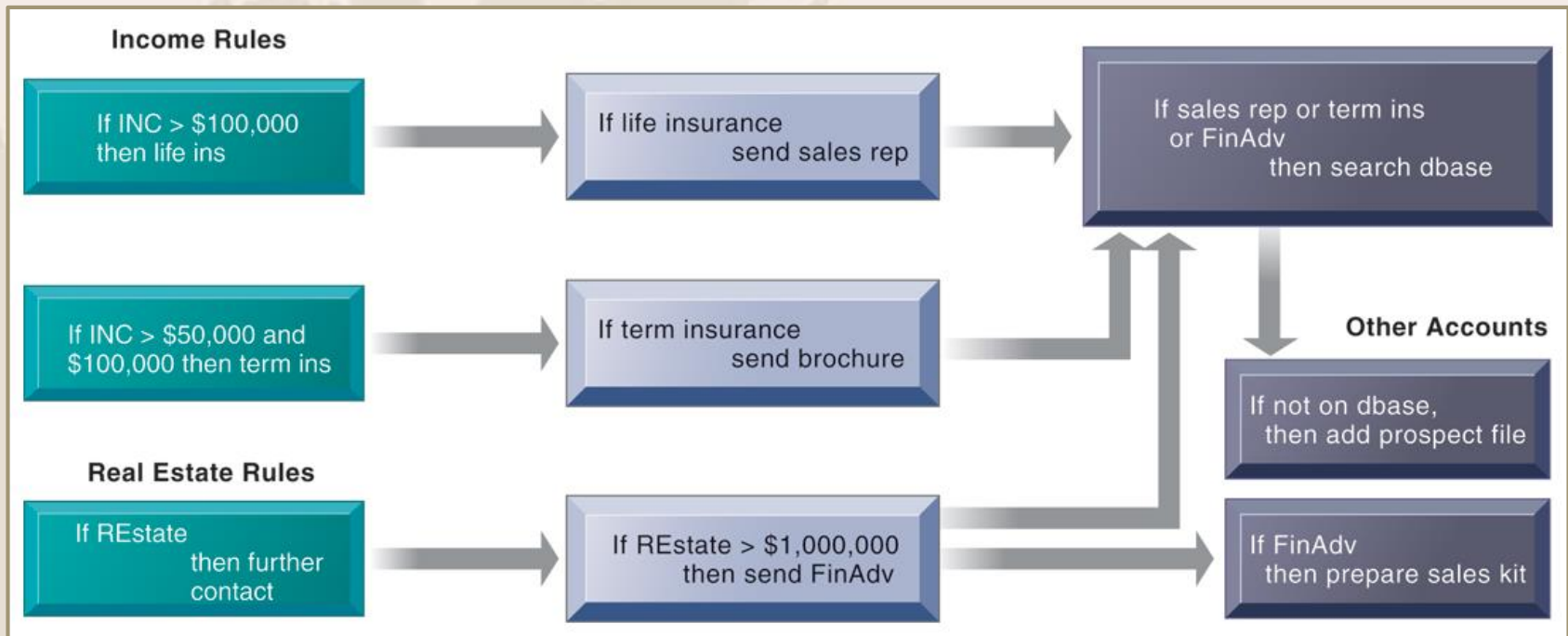


# Management Information Systems

## CHAPTER 11: MANAGING KNOWLEDGE

### Intelligent Techniques

#### INFERENCE ENGINES IN EXPERT SYSTEMS



**FIGURE 11-7**

An inference engine works by searching through the rules and “firing” those rules that are triggered by facts gathered and entered by the user. Basically, a collection of rules is similar to a series of nested IF statements in a traditional software program; however, the magnitude of the statements and degree of nesting are much greater in an expert system.



### Intelligent Techniques

- **Successful expert systems**
  - Con-Way Transportation built expert system to automate and optimize planning of overnight shipment routes for nationwide freight-trucking business
- **Most expert systems deal with problems of classification**
  - Have relatively few alternative outcomes
  - Possible outcomes are known in advance
- **Many expert systems require large, lengthy, and expensive development and maintenance efforts**
  - Hiring or training more experts may be less expensive



### Intelligent Techniques

- **Case-based reasoning (CBR)**
  - Descriptions of past experiences of human specialists (cases), stored in knowledge base
  - System searches for cases with problem characteristics similar to new one, finds closest fit, and applies solutions of old case to new case
  - Successful and unsuccessful applications are grouped with case
  - Stores organizational intelligence: Knowledge base is continuously expanded and refined by users
  - CBR found in
    - Medical diagnostic systems
    - Customer support



# Management Information Systems

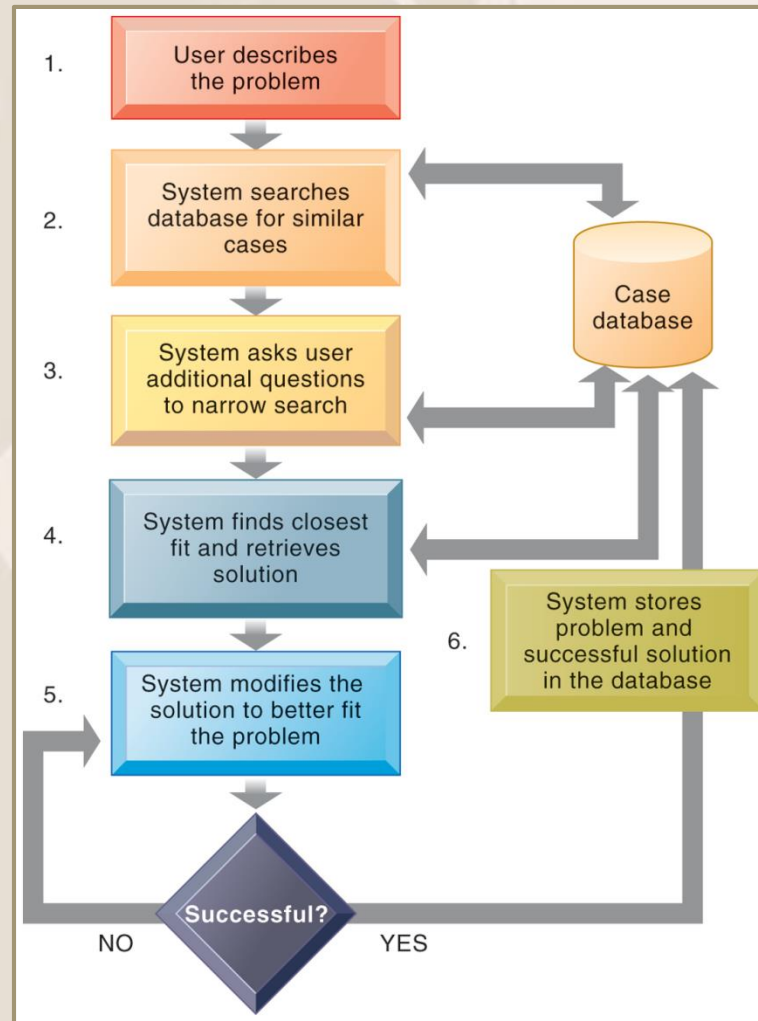
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### Intelligent Techniques

#### HOW CASE-BASED REASONING WORKS

Case-based reasoning represents knowledge as a database of past cases and their solutions. The system uses a six-step process to generate solutions to new problems encountered by the user.

FIGURE 11-8







### Intelligent Techniques

- **Fuzzy logic systems**
  - Rule-based technology that represents imprecision used in linguistic categories (e.g., “cold,” “cool”) that represent range of values
  - Describe a particular phenomenon or process linguistically and then represent that description in a small number of flexible rules
  - Provides solutions to problems requiring expertise that is difficult to represent with IF-THEN rules
    - Autofocus in cameras
    - Detecting possible medical fraud
    - Sendai’s subway system acceleration controls

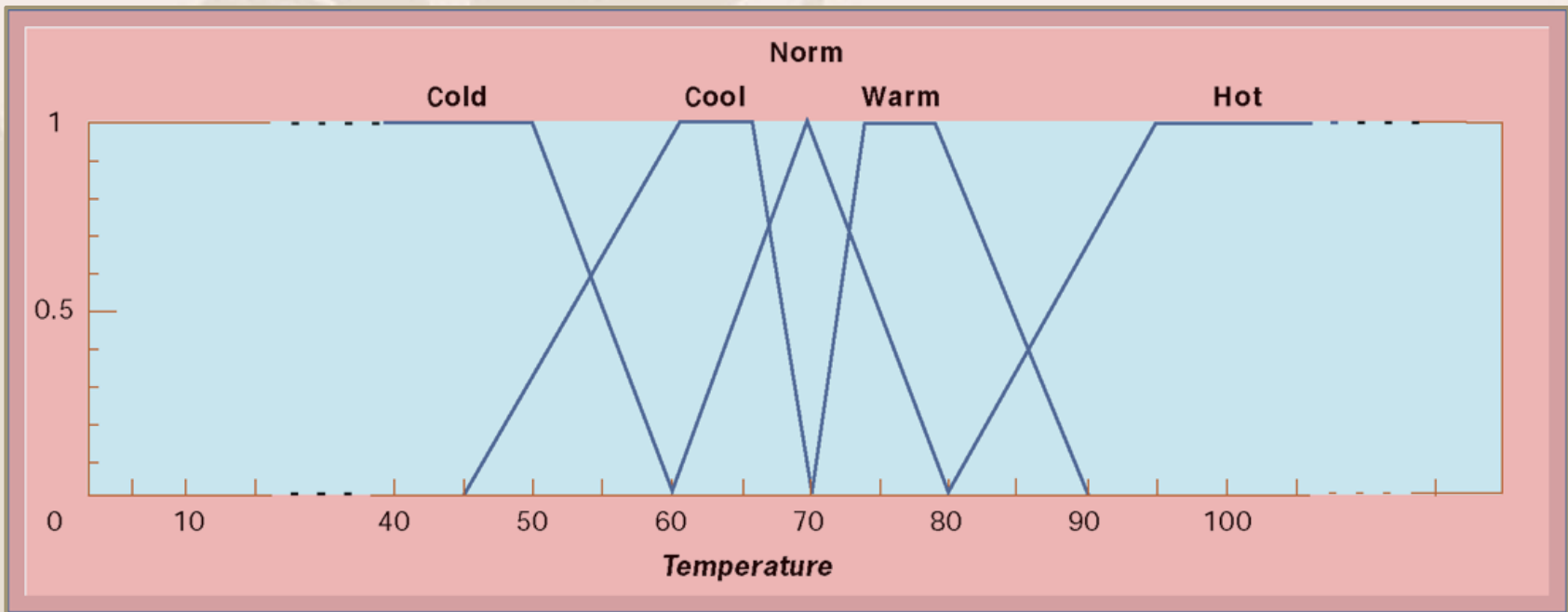


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## CHAPTER 11: MANAGING KNOWLEDGE

### Intelligent Techniques

#### FUZZY LOGIC FOR TEMPERATURE CONTROL



**FIGURE 11-9**

The membership functions for the input called temperature are in the logic of the thermostat to control the room temperature. Membership functions help translate linguistic expressions such as warm into numbers that the computer can manipulate.



### Intelligent Techniques

- **Neural networks**
  - Find patterns and relationships in massive amounts of data too complicated for humans to analyze
  - “Learn” patterns by searching for relationships, building models, and correcting over and over again
  - Humans “train” network by feeding it data inputs for which outputs are known, to help neural network learn solution by example
  - Used in medicine, science, and business for problems in pattern classification, prediction, financial analysis, and control and optimization
  - **Machine learning:** Related AI technology allowing computers to learn by extracting information using computation and statistical methods



### Intelligent Techniques

#### THE FLASH CRASH: MACHINES GONE WILD?

*Read the Interactive Session and discuss the following questions*

- **Describe the conditions that preceded the flash crash.**
- **What are some of the benefits of electronic trading?**
- **What features of electronic trading and automated trading programs contributed to the crash?**
- **Could this crash have been prevented? Why or why not?**

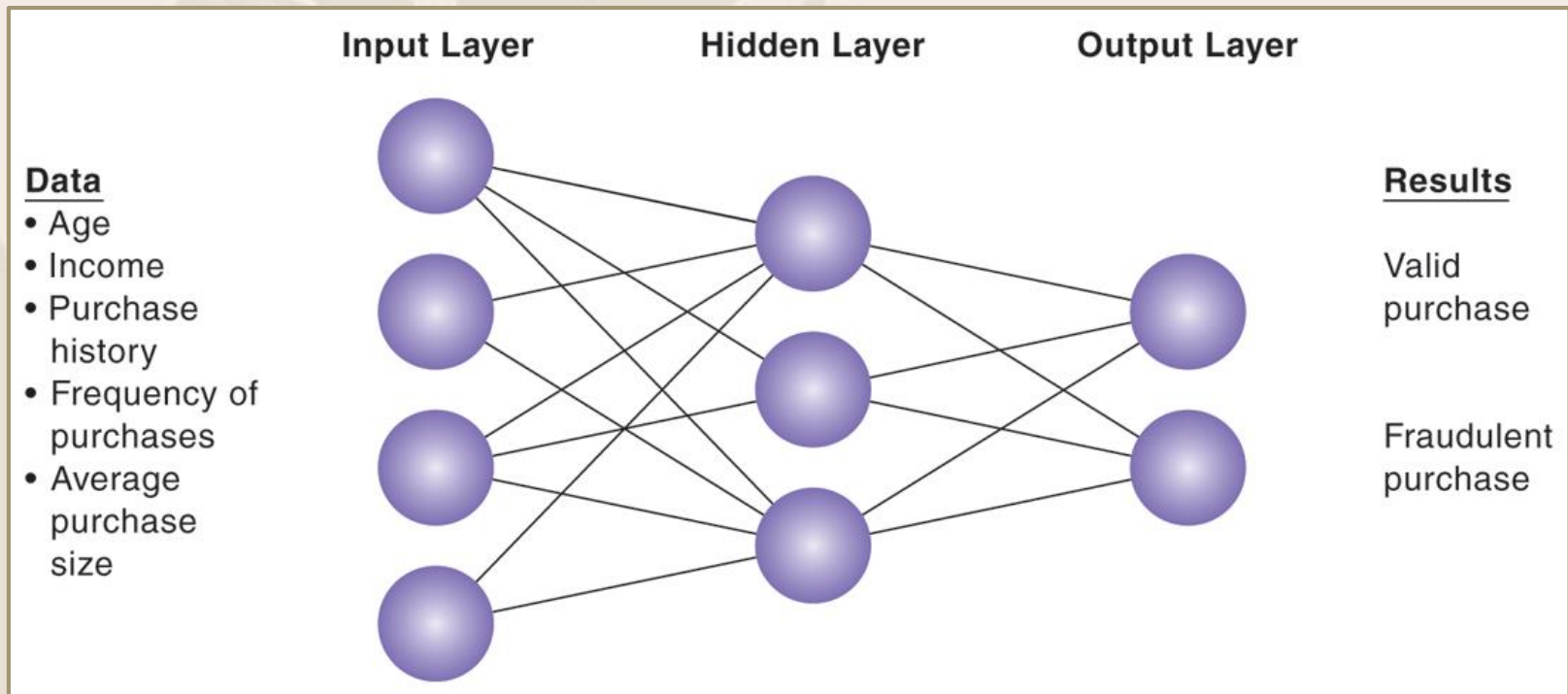


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## CHAPTER 11: MANAGING KNOWLEDGE

### Intelligent Techniques

#### HOW A NEURAL NETWORK WORKS



**FIGURE 11-10**

A neural network uses rules it “learns” from patterns in data to construct a hidden layer of logic. The hidden layer then processes inputs, classifying them based on the experience of the model. In this example, the neural network has been trained to distinguish between valid and fraudulent credit card purchases





### Intelligent Techniques

- **Genetic algorithms**
  - Useful for finding optimal solution for specific problem by examining very large number of possible solutions for that problem
  - Conceptually based on process of evolution
    - Search among solution variables by changing and reorganizing component parts using processes such as inheritance, mutation, and selection
  - Used in optimization problems (minimization of costs, efficient scheduling, optimal jet engine design) in which hundreds or thousands of variables exist
  - Able to evaluate many solution alternatives quickly

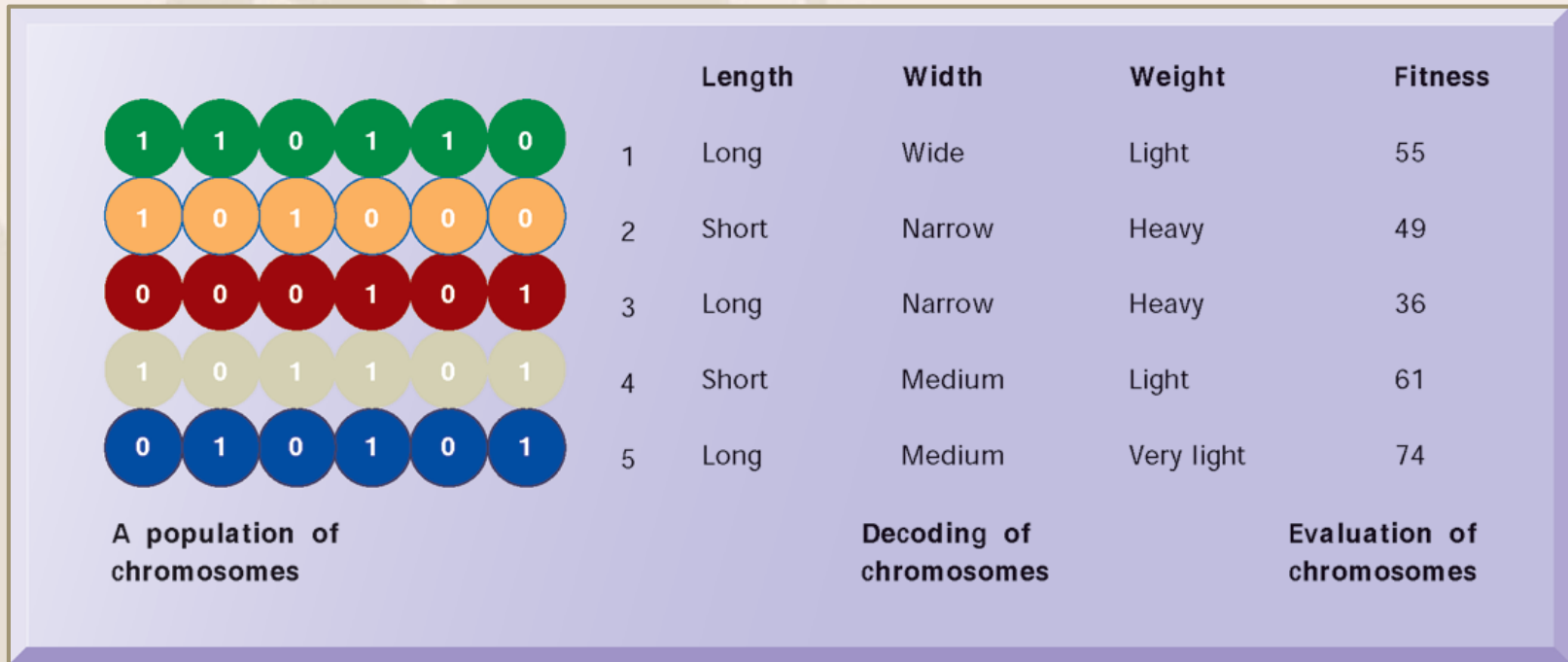


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### Intelligent Techniques

#### THE COMPONENTS OF A GENETIC ALGORITHM



**FIGURE 11-11**

This example illustrates an initial population of “chromosomes,” each representing a different solution. The genetic algorithm uses an iterative process to refine the initial solutions so that the better ones, those with the higher fitness, are more likely to emerge as the best solution.



### Intelligent Techniques

- **Hybrid AI systems**
  - Genetic algorithms, fuzzy logic, neural networks, and expert systems integrated into single application to take advantage of best features of each
  - E.g., Matsushita “neurofuzzy” washing machine that combines fuzzy logic with neural networks



### Intelligent Techniques

- **Intelligent agents**
  - Work in background to carry out specific, repetitive, and predictable tasks for user, process, or application
  - Use limited built-in or learned knowledge base to accomplish tasks or make decisions on user's behalf
    - Deleting junk e-mail
    - Finding cheapest airfare
  - **Agent-based modeling applications:**
    - Systems of autonomous agents
    - Model behavior of consumers, stock markets, and supply chains; used to predict spread of epidemics



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### Intelligent Techniques

#### INTELLIGENT AGENTS IN P&G'S SUPPLY CHAIN NETWORK

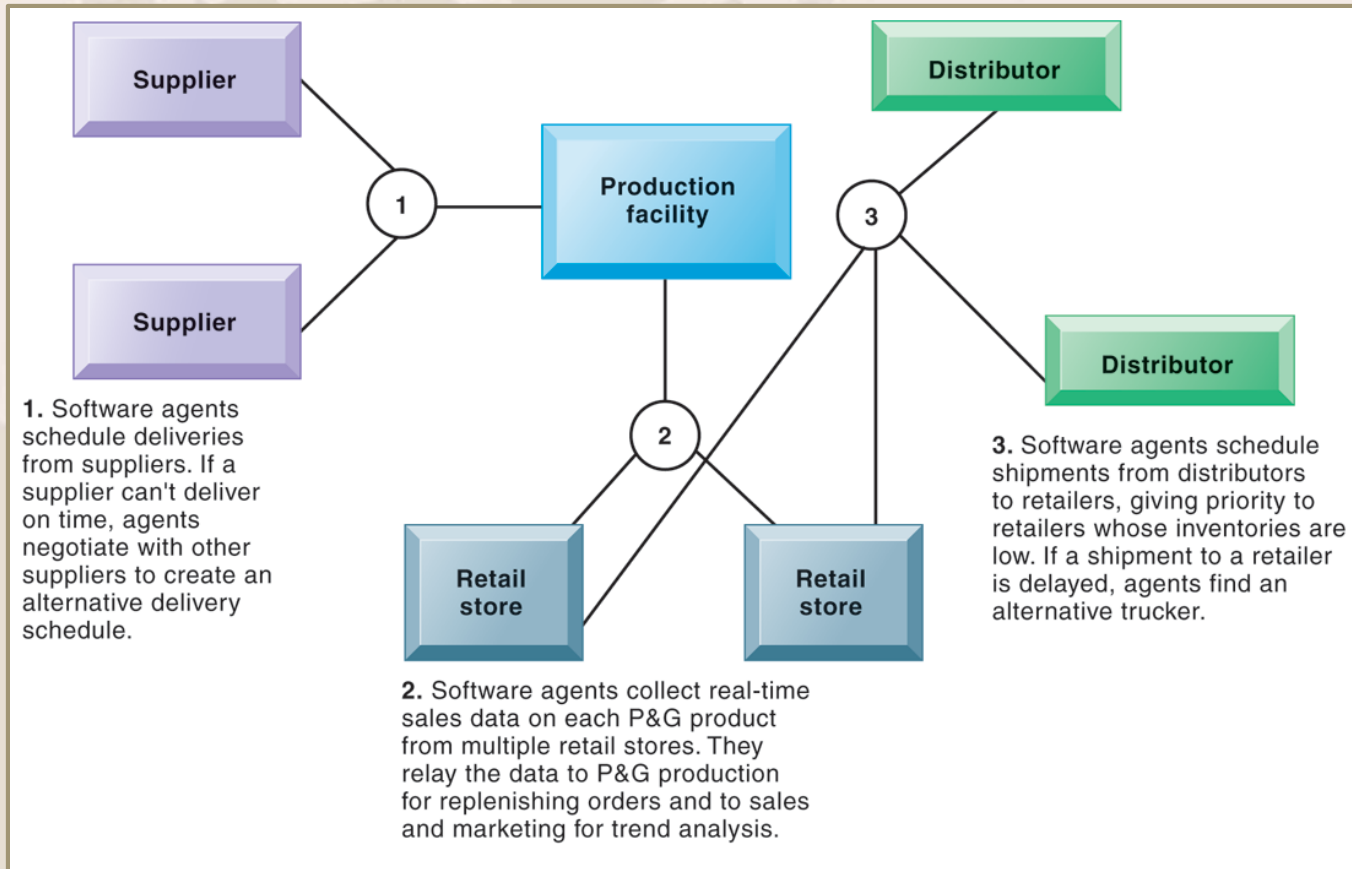


FIGURE 11-12

Intelligent agents are helping P&G shorten the replenishment cycles for products, such as a box of Tide.





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