



Chapter 12

Managing Knowledge in the Digital Firm



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Chapter 12 Managing Knowledge in the Digital Firm

OBJECTIVES

- **Assess the role of knowledge management and knowledge management programs in business**
- **Define and describe the types of systems used for enterprise-wide knowledge management and demonstrate how they provide value for organizations**
- **Define and describe the major types of knowledge work systems and assess how they provide value for firms**



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OBJECTIVES (Continued)

- **Evaluate the business benefits of using intelligent techniques for knowledge management**
- **Identify the challenges posed by knowledge management systems and management solutions**



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REVIEW Chapter 2 Information Systems in the Enterprise

INTEGRATING FUNCTIONS AND BUSINESS PROCESSES:

REVIEW: Enterprise Application Architecture





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REVIEW Chapter 2 Information Systems in the Enterprise

INTEGRATING FUNCTIONS AND BUSINESS PROCESSES:



REVIEW: Enterprise Application Architecture

- **Enterprise systems:** Interdependent software modules with a common central database that support basic internal business processes for finance and accounting, human resources, manufacturing and production, and sales and marketing
- **Supply chain management systems:** Automate flow of information between company and supply chain partners
- **Customer relationship management systems** Business and technology discipline for managing customer relationships to optimize revenue, profitability, customer satisfaction, and customer retention
- **Knowledge management systems** Collects relevant knowledge and make it available wherever and whenever it is needed to support business processes and management decisions. Also link the firm to external sources of knowledge. Support processes for acquiring, storing, distributing, applying/utilizing, and retaining knowledge

We talk
about this
now...



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Cott Corporation Case

- **Challenge:** Coordinating the flow of unstructured information and documents among multiple product development groups
- **Solutions:** Documentum eRoom software to manage product development documents
- Develop new business processes for document routing
- Illustrates the role of knowledge and document management systems for coordinating teams and achieving operational excellence

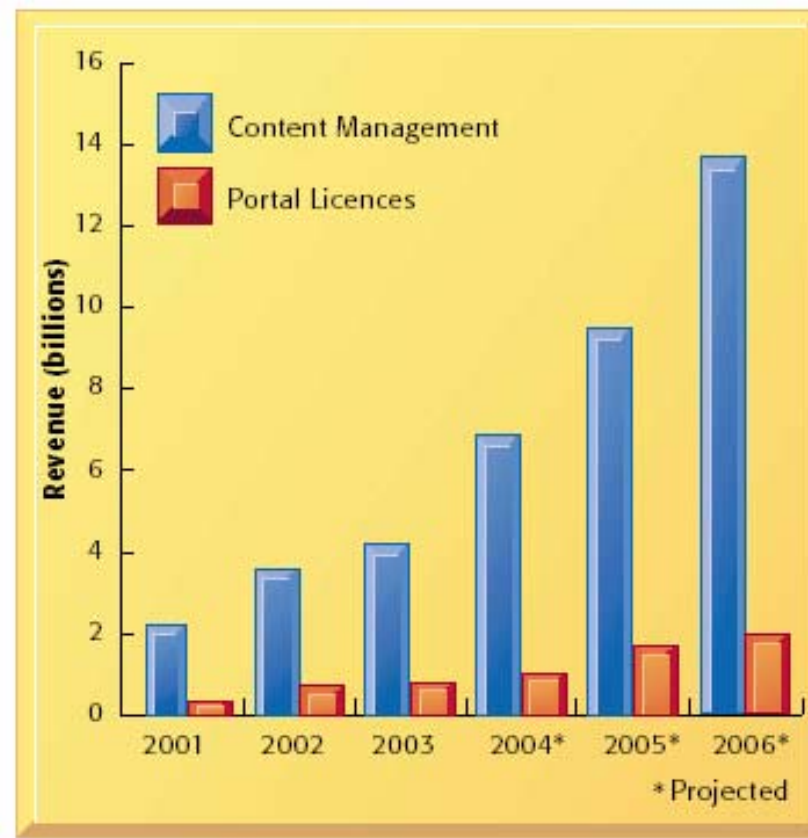


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THE KNOWLEDGE MANAGEMENT LANDSCAPE

U.S Enterprise Knowledge Management Software Revenues 2001-2006



Source: Based on the data in eMarketer, "Portals and Content Management Solutions," June 2003.



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Important Dimensions of Knowledge

- **Data:** Flow of captured events or transactions
- **Information:** Data organized into categories of understanding
- **Knowledge:** Concepts, experience, and insight that provide a framework for creating, evaluating, and using information. Can be tacit (undocumented) or explicit (documented)
- **Wisdom:** The collective and individual experience of applying knowledge to the solution of problem; knowing when, where, and how to apply knowledge



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Important Dimensions of Knowledge (Continued)

Knowledge is a Firm Asset:

- **Intangible asset**
- **Requires organizational resources to transform data into useful information and knowledge**
- **Value increases as more people share it**



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Important Dimensions of Knowledge (Continued)

Knowledge has Different Forms:

- **Tacit or explicit (codified)**
- **Know-how, craft, and skill**
- **Knowing how to follow procedures;**
- **Knowing why things happen**

Knowledge has a Location:

- **Cognitive event involving mental model**
- **Social and individual bases of knowledge**
- **Sticky, situated, contextual (not universally applicable or easily moved)**



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Important Dimensions of Knowledge (Continued)

Knowledge is Situational:

- **Conditional → knowing when to apply a procedure is just as important as knowing the procedure**
- **Contextual → knowing how to use a certain tool and under what circumstances**



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Organizational Learning and Knowledge Management

- **Organizational learning:** the change process of an organization adjust their knowledge, behavior, and skill by creating new business processes and by changing patterns of management decision making gained through information and experience gathered



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THE KNOWLEDGE MANAGEMENT LANDSCAPE

The Knowledge Management Value Chain

Knowledge Management is the set of process developed in an organization that consists of:

- **Knowledge acquisition**
- **Knowledge storage**
- **Knowledge dissemination**
- **Knowledge application**
- **Building organizational and management capital: collaboration, communities of practice, and office environments**

- *Notes: organization and management capital: process, culture, behavior required to obtain value from investment in IS*

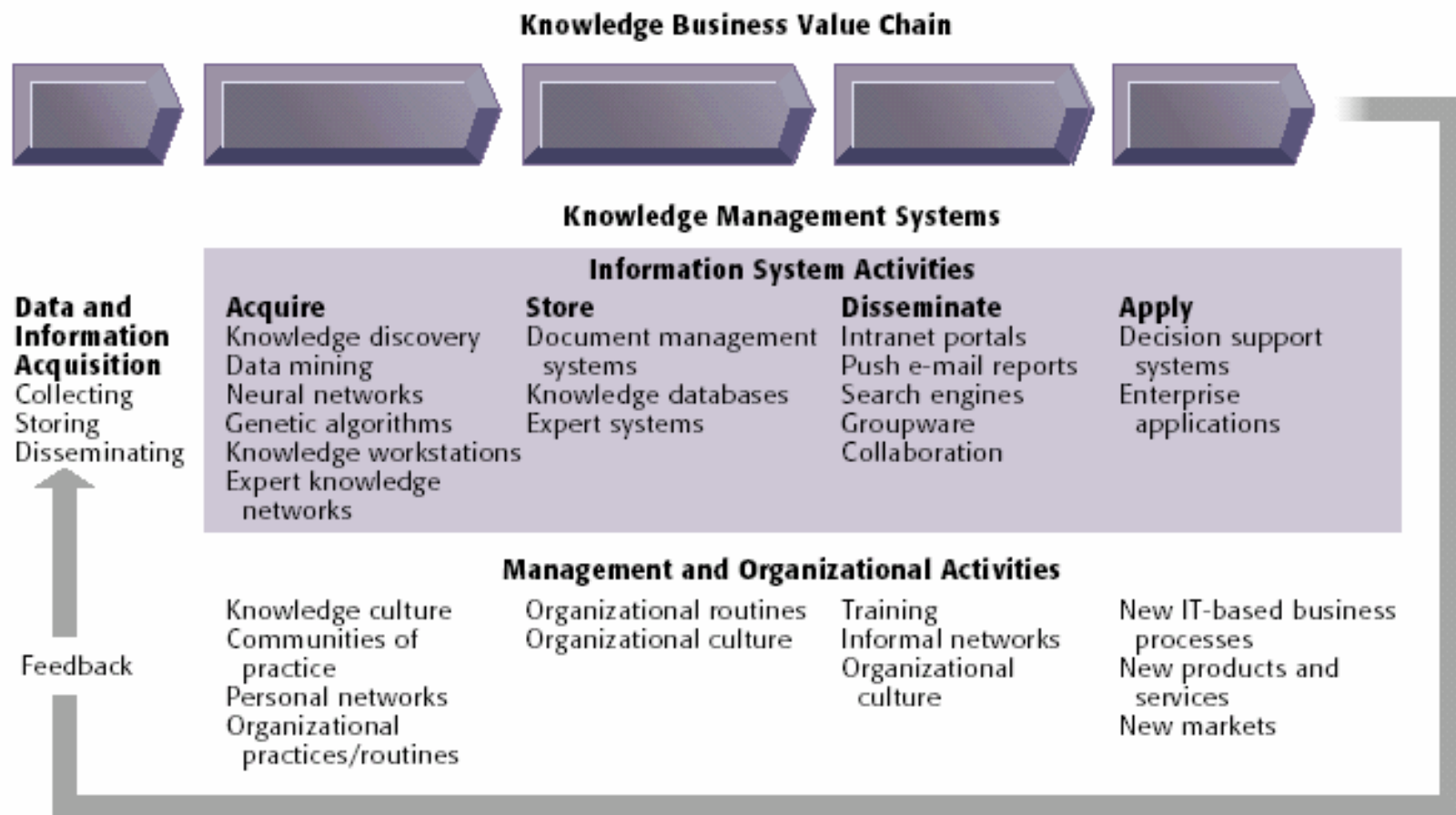


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The Knowledge Management Value Chain



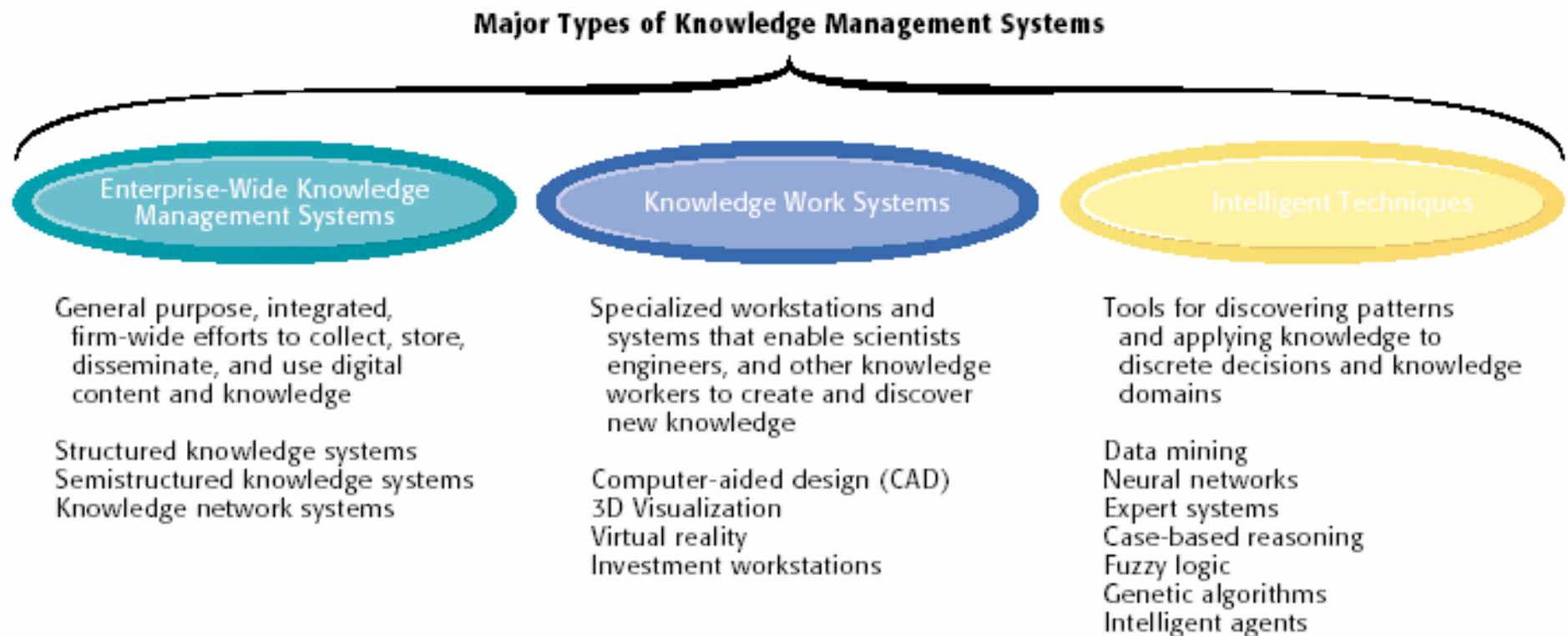


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THE KNOWLEDGE MANAGEMENT LANDSCAPE

Types of Knowledge Management Systems





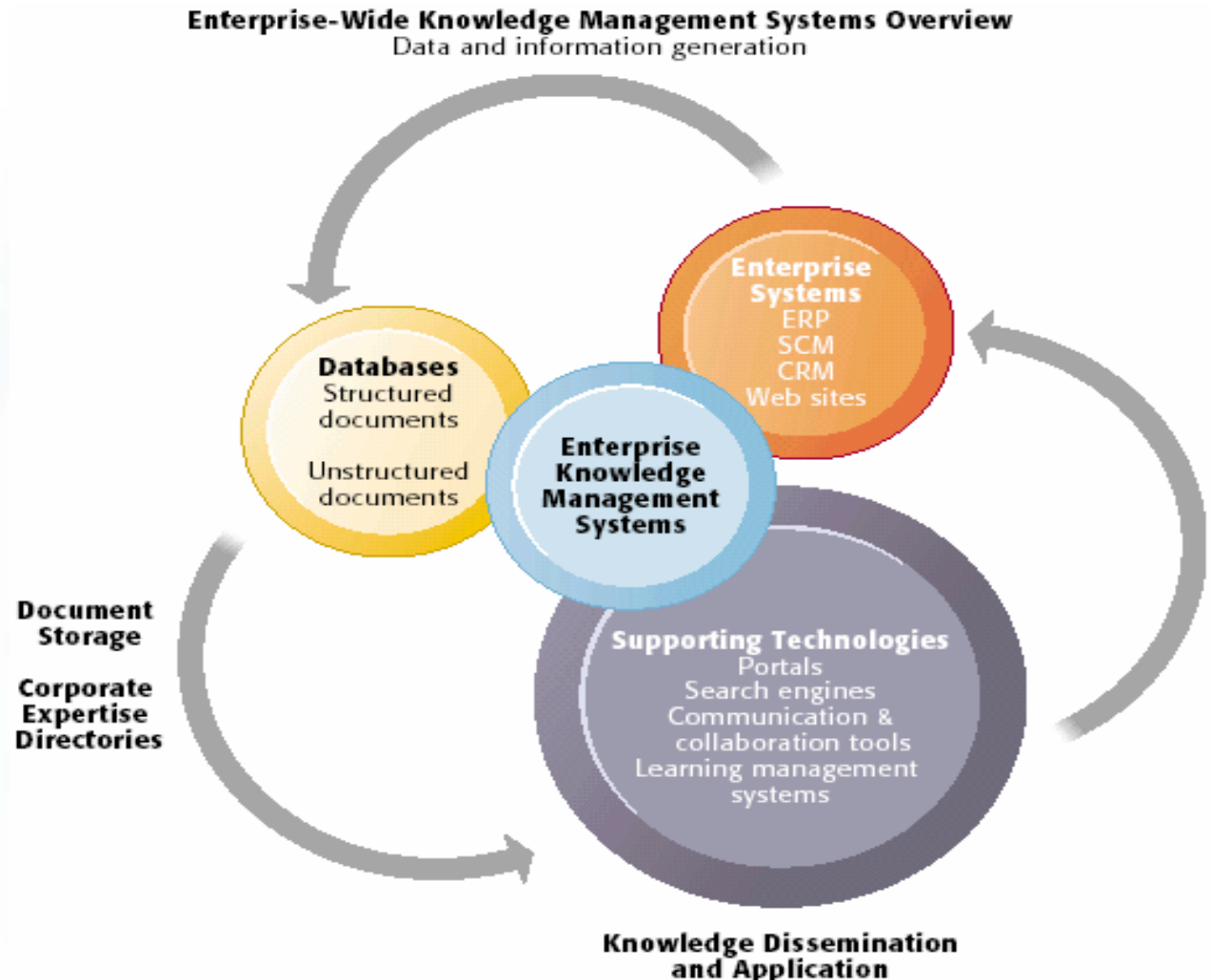
I. Enterprise Wide Knowledge Management System



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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS





Categories of Enterprise-wide KMS

TABLE 12-2 *Categories of Enterprise-Wide Knowledge Management Systems*

Type of Knowledge	Knowledge Content	Category of Enterprise Knowledge Management System
Structured knowledge	Formal documents	Structured knowledge systems
Semistructured knowledge	E-mail, voice mail, memos, brochures, digital pictures, bulletin boards, and other unstructured documents Digital asset management systems	Semistructured knowledge systems
Network (tacit) knowledge	Expertise of individuals	Knowledge network systems



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Structured Knowledge System

- **Structured knowledge is explicitly knowledge that exists in formal documents and formal rules**
- **Knowledge repository for formal, structured text documents and reports or presentations**
- **Also known as content management system**
- **Require appropriate database schema and tagging of documents**
- **Examples: Database of case reports of consulting firms; tax law accounting databases of accounting firms**



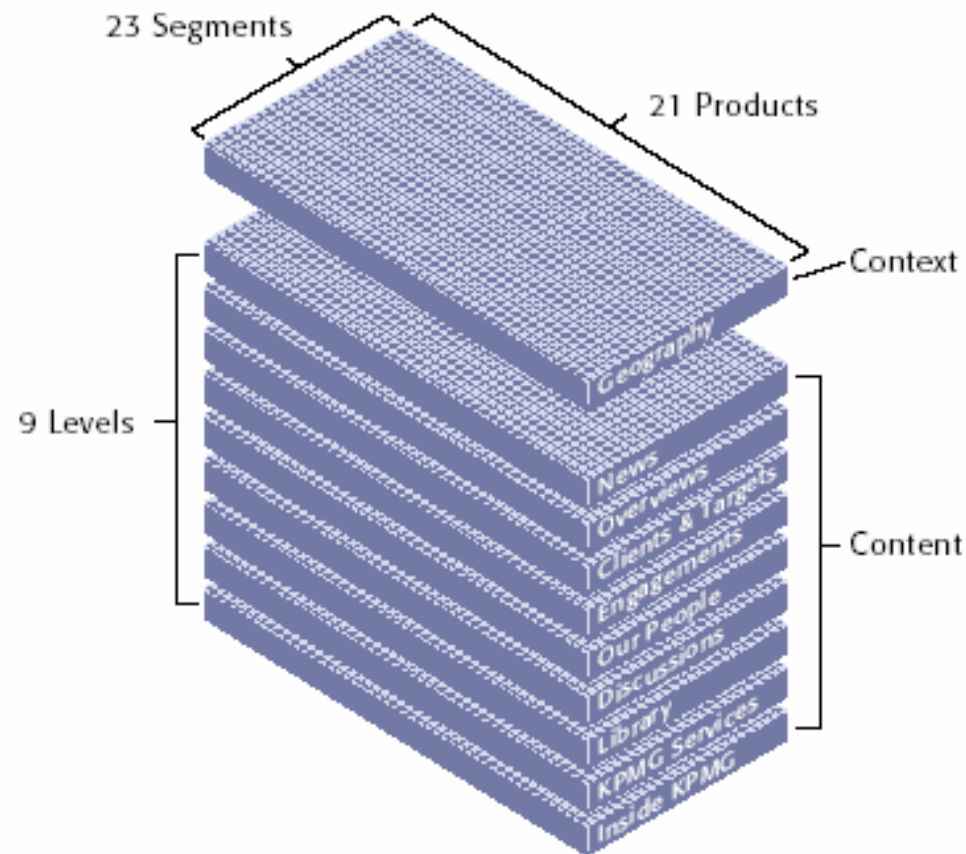
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KWorld's Knowledge Domains

Content in Context





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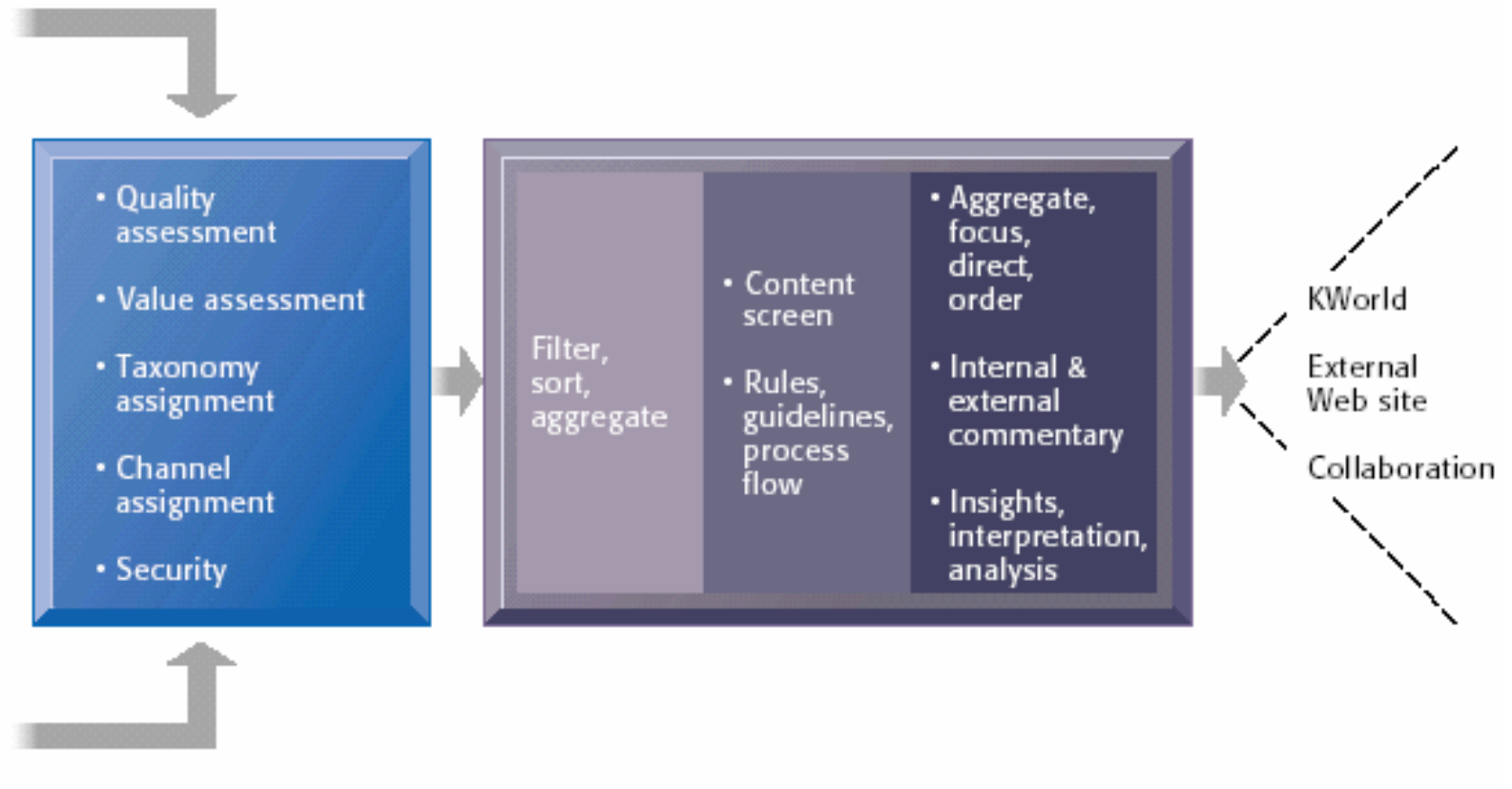
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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

KPMG Knowledge System Processes

Internal Content

- Work products
- Practice specific





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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

Semistructured Knowledge Systems

- Semistructured Knowledge is all the digital information in a firm that does not exist in a formal document
- Knowledge repository for less-structured documents, such as e-mail, voicemail, chat room exchanges, videos, digital images, brochures, bulletin boards
- Also known as digital asset management systems
- **Taxonomy:** Scheme of classifying information and knowledge for easy retrieval
- **Tagging:** Marking of documents according to knowledge taxonomy

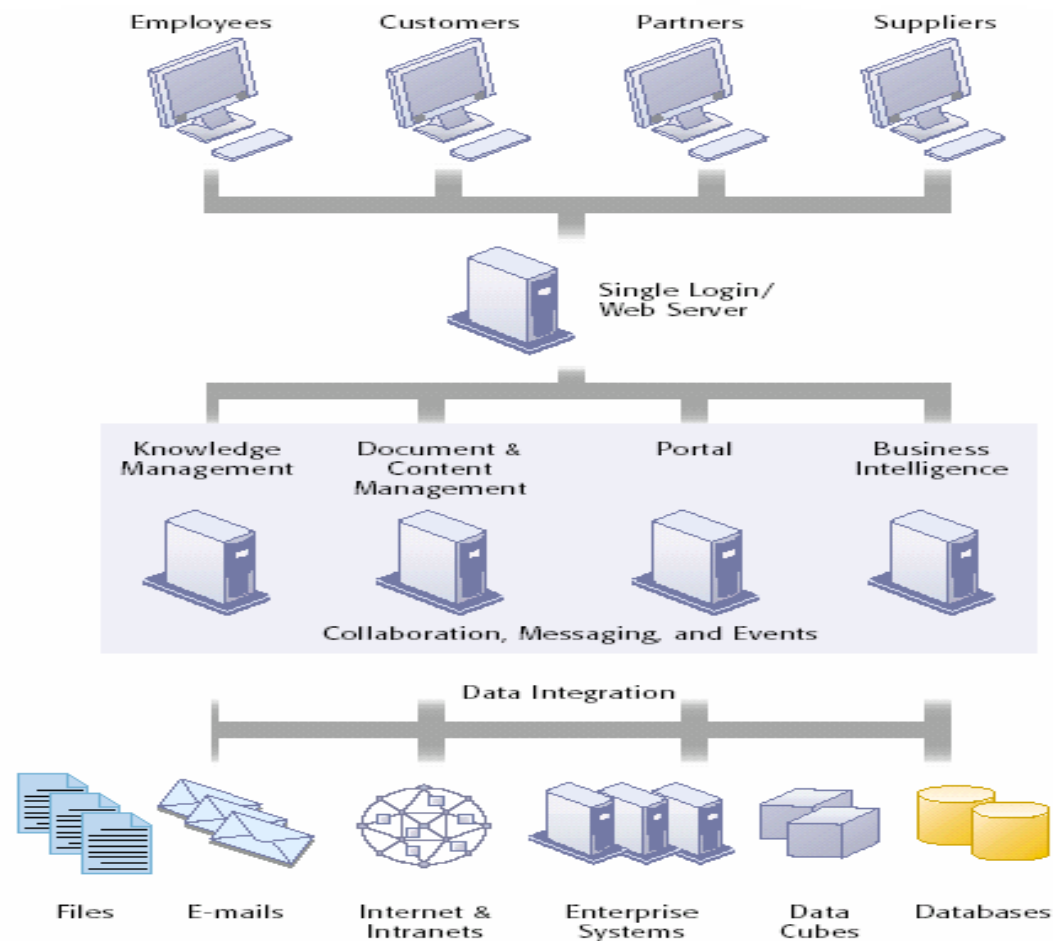


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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

Hummingbird's Integrated Knowledge Management System





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Knowledge Network Systems

- **KNS address the problem that arises when the appropriate knowledge is not in the form of a digital document but instead reside in the memory of expert individuals in the firm**
- **Online directory of corporate experts, solutions developed by in-house experts, best practices, FAQs**
- **Document and organize “tacit” knowledge**
- **Also known as expertise location and management systems**



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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

Knowledge Network Systems (Continued)

Key features can include:

- **Knowledge exchange services**
- **Community of practice support**
- **Autoprofiling capabilities**
- **Knowledge management services**



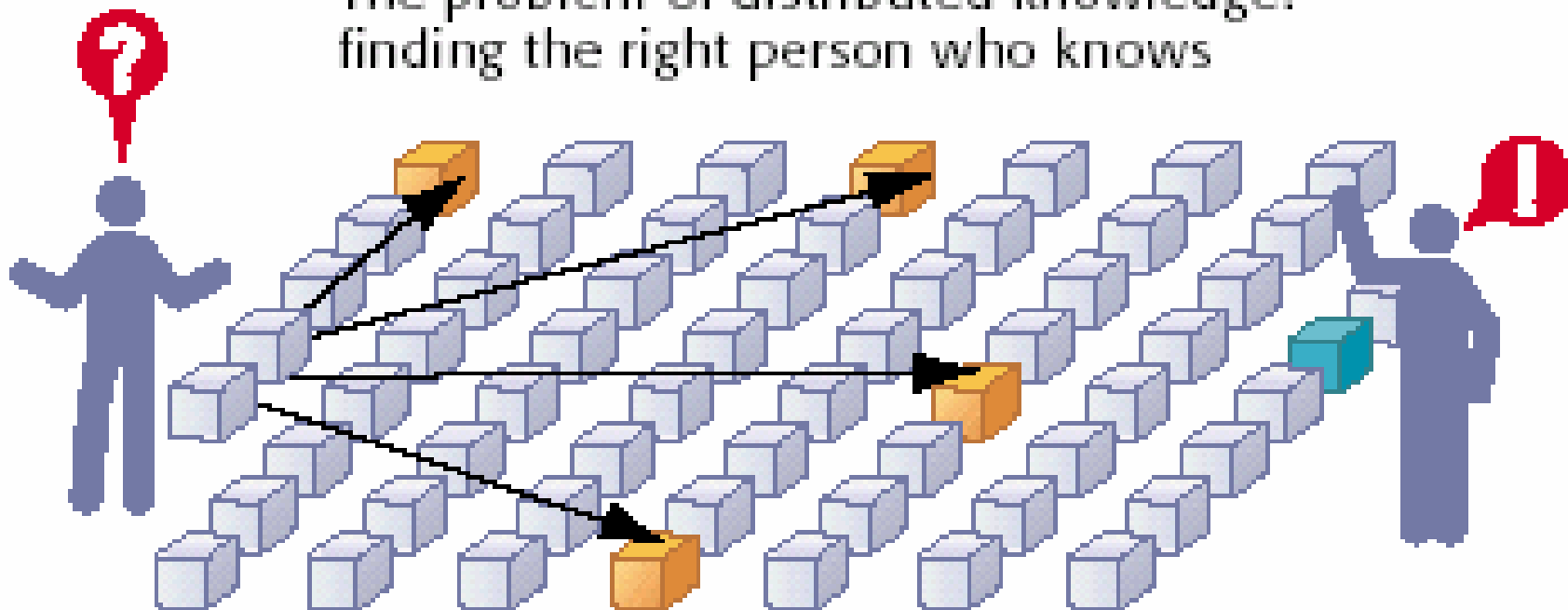
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The Problem of Distributed Knowledge

The problem of distributed knowledge:
finding the right person who knows



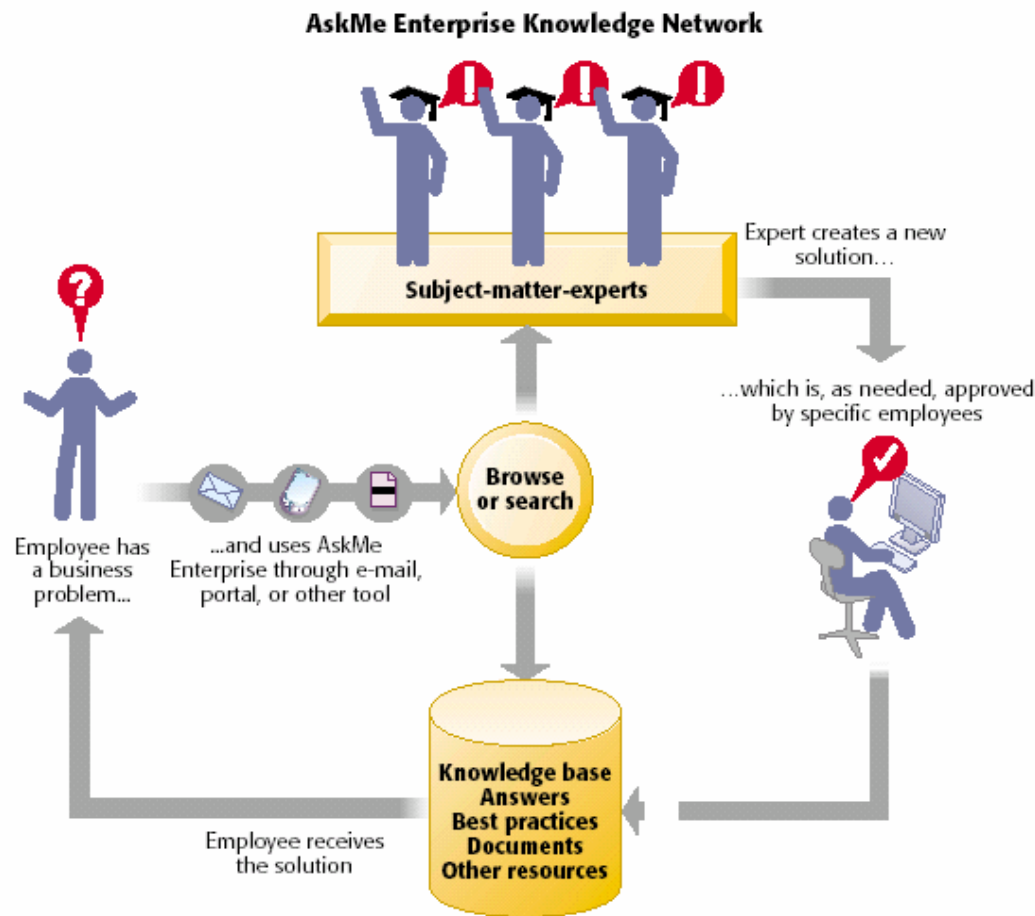


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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

AskMe Enterprise Knowledge Network System





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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

Supporting Technologies: Portals, Collaboration Tools, and Learning Management Systems

Enterprise knowledge portals:

- **Access to external sources of information**
- **Access to internal knowledge resources**
- **Capabilities for e-mail, chat, discussion groups, videoconferencing**



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ENTERPRISE-WIDE KNOWLEDGE MANAGEMENT SYSTEMS

Learning Management System (LMS):

- **Provides tools for the management, delivery, tracking, and assessment of various types of employee learning and training**
- **Integrates systems from human resources, accounting, sales in order to identify and quantify business impact of employee learning programs**



II. Knowledge Work System



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KNOWLEDGE WORK SYSTEMS

Knowledge Workers and Knowledge Work

Knowledge workers: Create knowledge and information for organization such as researcher, designer, architects, scientists, and engineers



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KNOWLEDGE WORK SYSTEMS

Knowledge Workers and Knowledge Work (Continued)

Knowledge workers have three key roles:

- 1. Keeping the organization current in knowledge as it develops in the external world—in technology, science, social thought, and the arts**
- 2. Serving as internal consultants regarding the areas of their knowledge, the changes taking place, and opportunities**
- 3. Acting as change agents, evaluating, initiating, and promoting change projects**



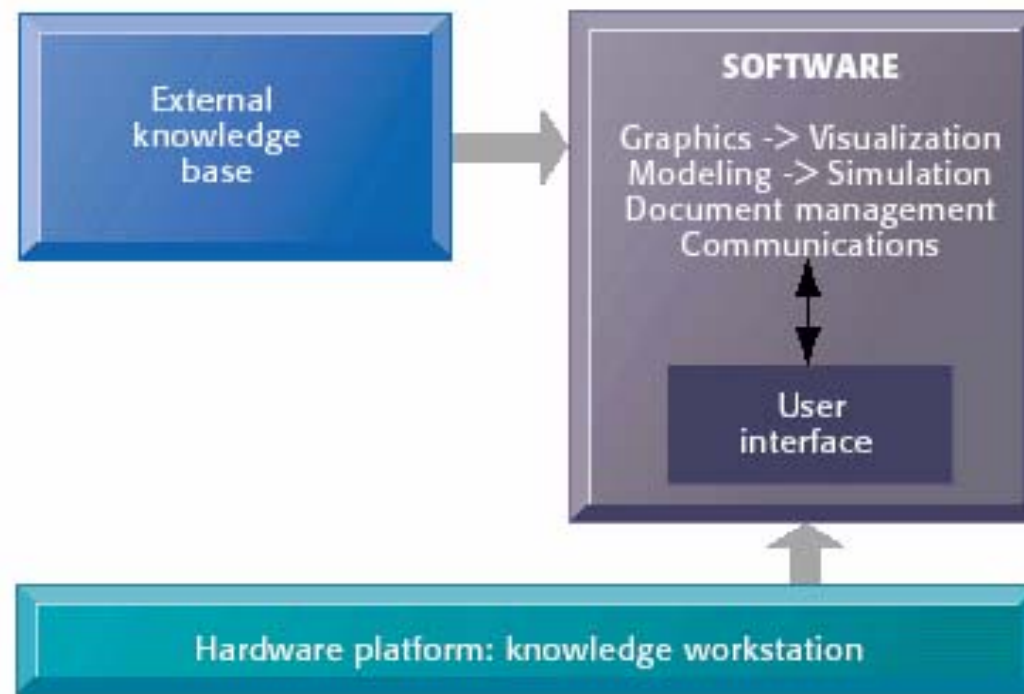
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KNOWLEDGE WORK SYSTEMS

Requirements of Knowledge Work Systems

Knowledge Work Systems are specifically designed systems to promote the creation of knowledge and to ensure that new knowledge and technical expertise are properly integrated into the business





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KNOWLEDGE WORK SYSTEMS

Examples of Knowledge Work Systems

Computer-Aided Design (CAD):

- **Information system that automates the creation and revision of industrial and manufacturing designs using sophisticated graphics software**

Virtual Reality Systems:

- **Interactive graphics software and hardware that create computer-generated simulations that emulate real-world activities or photorealistic simulations**



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KNOWLEDGE WORK SYSTEMS

Examples of Knowledge Work Systems (Continued)

Investment Workstation:

- **Powerful desktop computer for financial specialists, which is optimized to access and manipulate massive amounts of financial data**
- **Used in financial sector to analyze trading situations and facilitate portfolio management**



III. Intelligent Technique



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INTELLIGENT TECHNIQUES

Knowledge Discovery:

- Identification of underlying patterns, categories, and behaviors in large data sets, using techniques such as neural networks and data mining

Artificial Intelligence (AI) technology:

- Computer-based systems based on human behavior, with the ability to learn languages, accomplish physical tasks, use a perceptual apparatus, and emulate human expertise and decision making



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INTELLIGENT TECHNIQUES

Capturing Knowledge: Expert Systems

Expert system:

- An intelligent technique for capturing tacit knowledge in a very specific and limited domain of human expertise

Knowledge base:

- Model of human knowledge that is used by expert systems
- Series of 200-10,000 IF-THEN rules to form a rule base

AI shell: The programming environment of an expert system



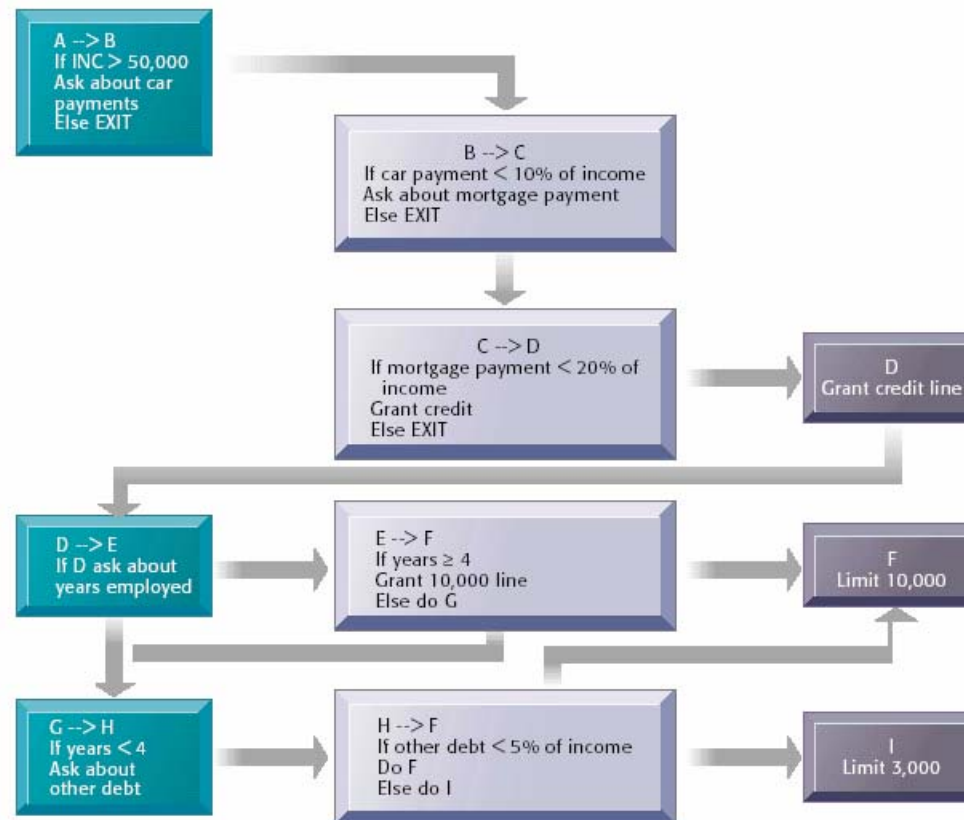
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How Expert Systems Work:

Rules in an AI Program





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INTELLIGENT TECHNIQUES

Inference engine:

- The strategy used to search through the rule base in an expert system. Common strategies are forward chaining and backward chaining

Forward chaining:

- A strategy for searching the rule base in an expert system that begins with the information entered by the user and searches the rule base to arrive at a conclusion



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INTELLIGENT TECHNIQUES

Backward chaining:

- A strategy for searching the rule base in an expert system that acts like a problem solver by beginning with hypothesis and seeking out more information until the hypothesis is either proved or disproved

Knowledge engineer:

- A specialist who elicits information and expertise from other professionals and translates it into a set of rules for an expert system

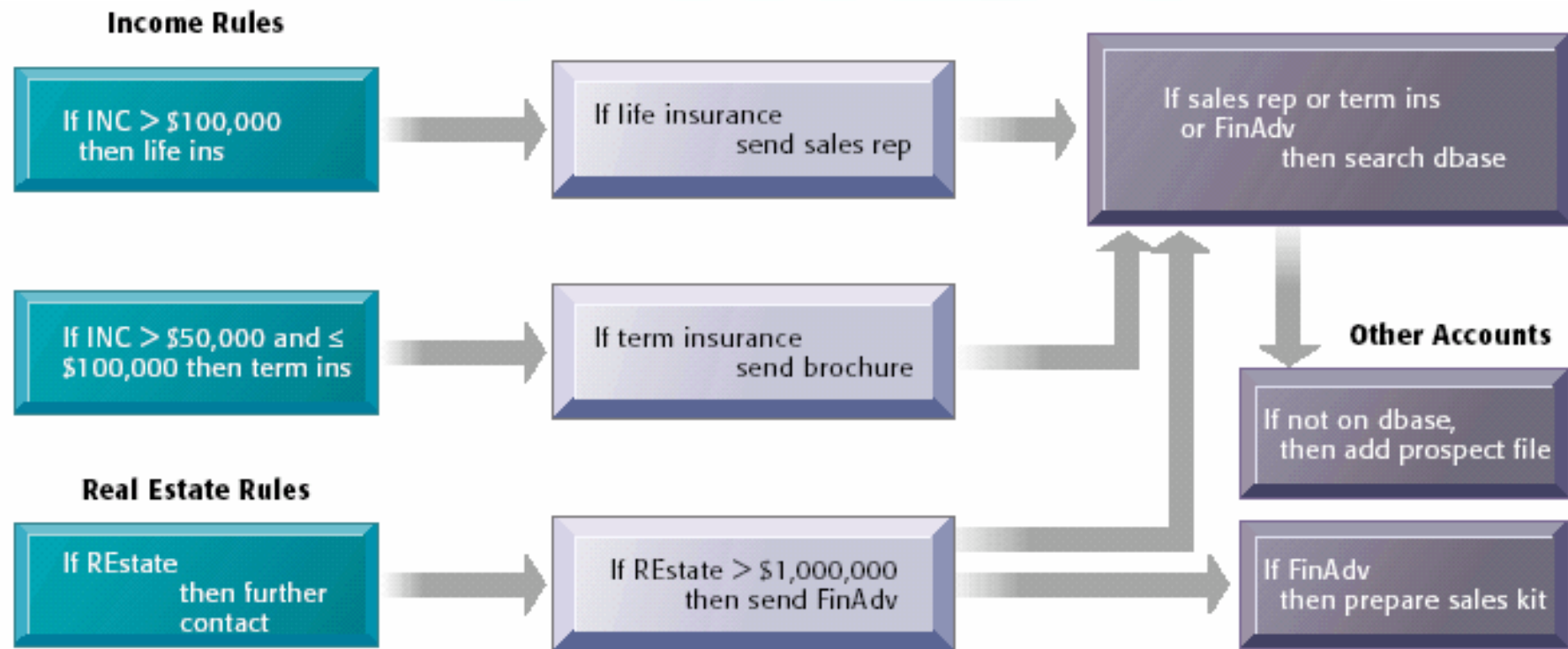


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INTELLIGENT TECHNIQUES

Inference Engines in Expert Systems





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INTELLIGENT TECHNIQUES

Organizational Intelligence

Case-Based Reasoning (CBR):

- **Knowledge system that represents knowledge as a database of cases and solutions**
- **Searches for stored cases with problem characteristics similar to the new case and applies solutions of the old case to the new case**



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INTELLIGENT TECHNIQUES

Fuzzy Logic Systems

- **Rule-based technology that can represent imprecise values or ranges of values by creating rules that use approximate or subjective values**
- **Used for problems that are difficult to represent by IF-THEN rules**



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INTELLIGENT TECHNIQUES

How Case-based Reasoning Works

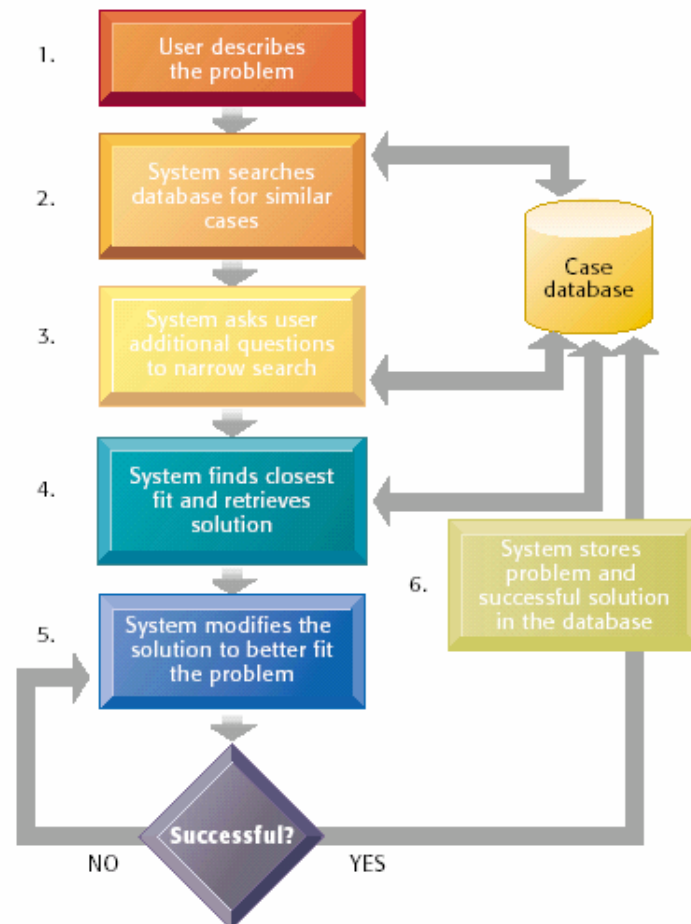


Figure 12-13

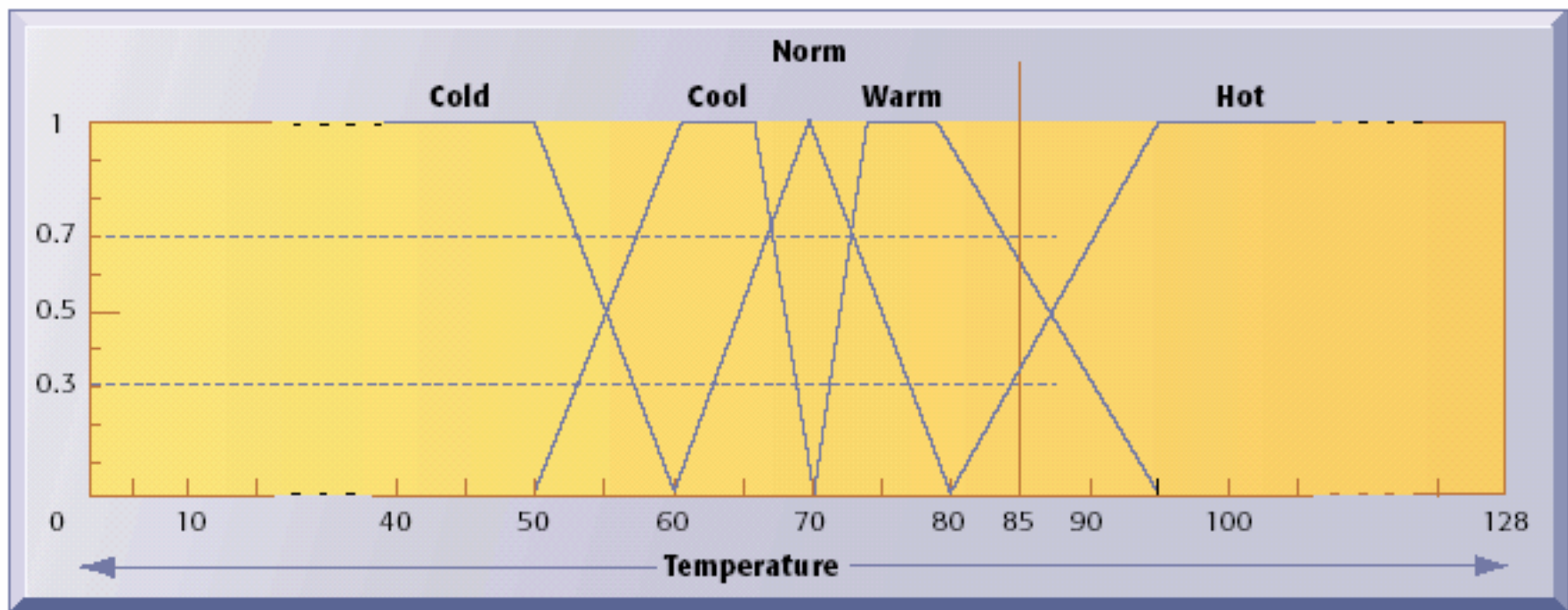


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INTELLIGENT TECHNIQUES

Implementing Fuzzy Logic Rules in Hardware



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INTELLIGENT TECHNIQUES

Neural Networks

Neural Network:

- **Hardware or software that emulates the processing patterns of the biological brain to discover patterns and relationships in massive amounts of data**
- **Use large numbers of sensing and processing nodes that interact with each other**



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INTELLIGENT TECHNIQUES

Neural Networks (Continued)

- **Uses rules it ‘learns’ from patterns in data to construct a hidden layer of logic that can be applied to model new data**
- **Applications are found in medicine, science, and business**



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INTELLIGENT TECHNIQUES

How a Neural Network Works

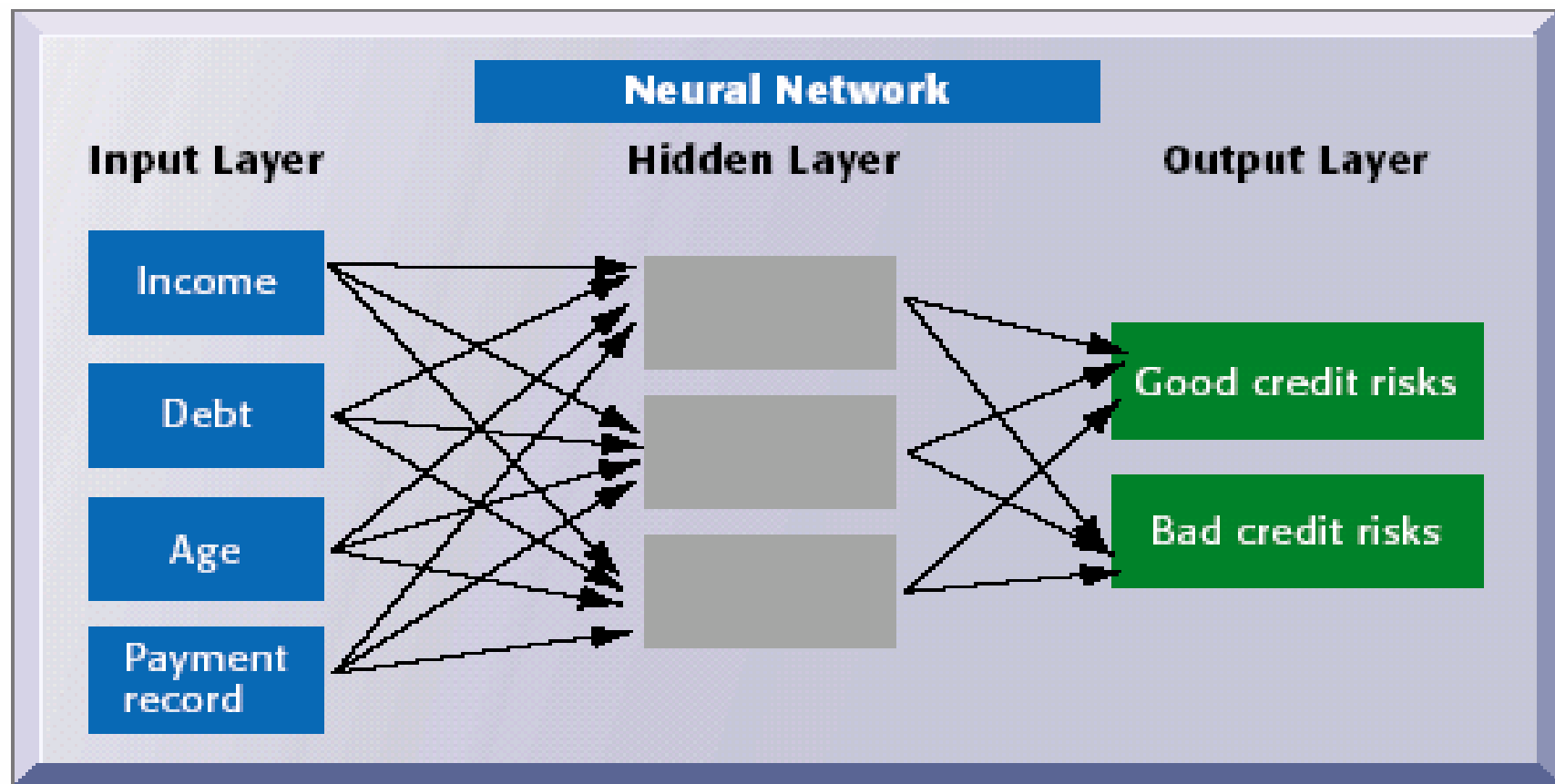


Figure 12-15

Source: Herb Edelstein, "Technology How-To: Mining Data Warehouses," *InformationWeek*, January 8, 1996. Copyright 1996 CMP Media, Inc., 600 Community Drive, Manhasset, NY 12030. Reprinted with permission.



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INTELLIGENT TECHNIQUES

Genetic Algorithms

- Adaptive computation that examines very large number of solutions for a problem to find optimal solution
- Programmed to “evolve” by changing and reorganizing component parts using processes such as reproduction, mutation, and natural selection: worst solutions are discarded and better ones survive to produce even better solutions

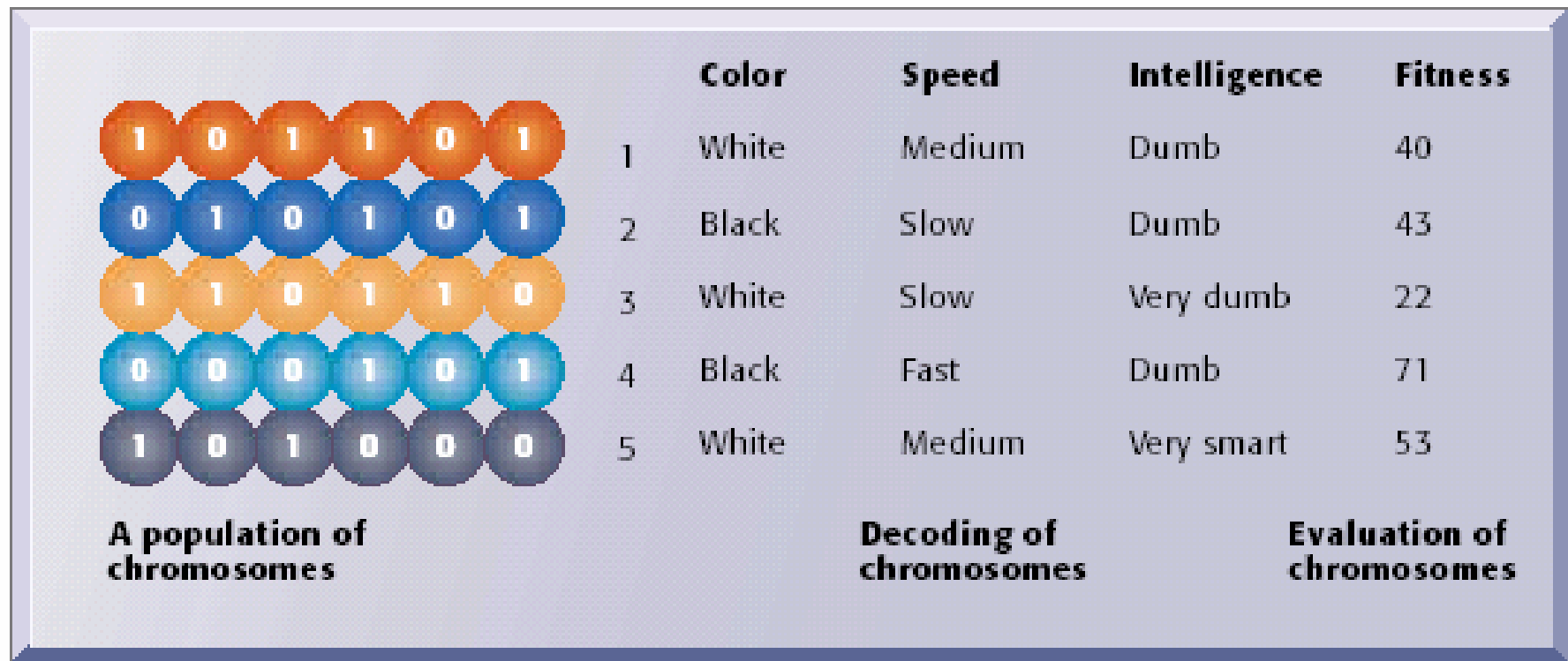


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INTELLIGENT TECHNIQUES

The Components of a Genetic Algorithm



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Figure 12-16



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INTELLIGENT TECHNIQUES

Hybrid AI system:

- Integration of multiple AI technologies (genetic algorithms, fuzzy logic, neural networks) into a single application to take advantage of the best features of these technologies

Intelligent Agents:

- Software programs that work in the background without direct human intervention to carry out specific, repetitive, and predictable tasks for an individual user, business process, or software application

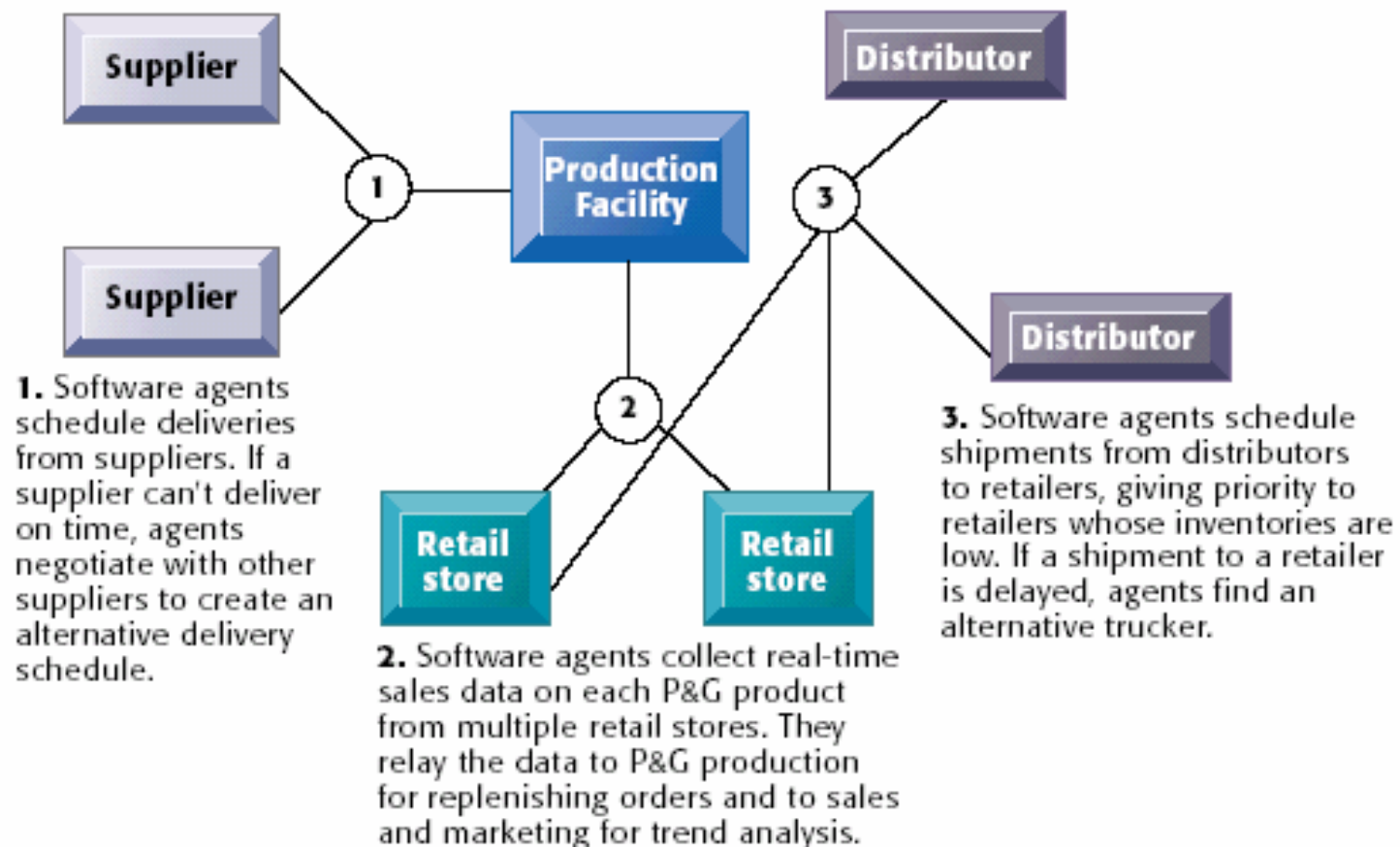


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INTELLIGENT TECHNIQUES

Intelligent Agents in P&G's Supply Chain Network





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MANAGEMENT OPPORTUNITIES, CHALLENGES AND SOLUTIONS

Management Opportunities:

- **Proprietary knowledge can create an “invisible competitive advantage”**



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MANAGEMENT OPPORTUNITIES, CHALLENGES AND SOLUTIONS

Management Challenges:

- **Insufficient resources are available to structure and update the content in repositories.**
- **Poor quality and high variability of content quality results from insufficient validating mechanisms.**
- **Content in repositories lacks context, making documents difficult to understand.**



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MANAGEMENT OPPORTUNITIES, CHALLENGES AND SOLUTIONS

Management Challenges: (Continued)

- **Individual employees are not rewarded for contributing content, and many fear sharing knowledge with others on the job.**
- **Search engines return too much information, reflecting lack of knowledge structure or taxonomy.**



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MANAGEMENT OPPORTUNITIES, CHALLENGES AND SOLUTIONS

Solution Guidelines:

Five important steps in developing a successful knowledge management project:

- **Develop in stages**
- **Choose a high-value business process**
- **Choose the right audience**
- **Measure ROI during initial implementation**
- **Use the preliminary ROI to project enterprise-wide values**

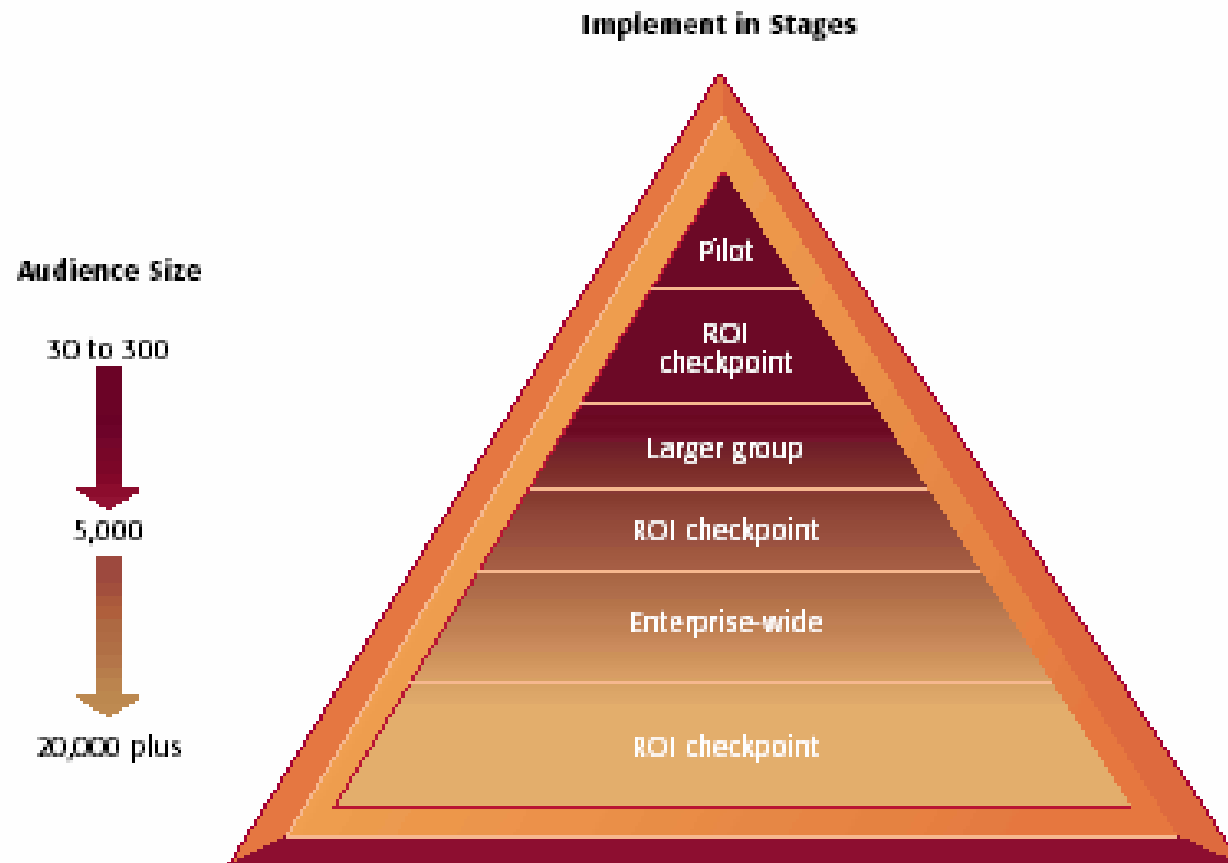


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MANAGEMENT OPPORTUNITIES, CHALLENGES AND SOLUTIONS

Implementing Knowledge Management Projects in Stages





~END~