

c h a p t e r

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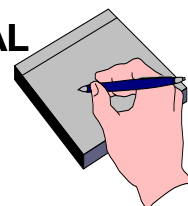
**MANAGING
KNOWLEDGE:
KNOWLEDGE WORK
AND ARTIFICIAL
INTELLIGENCE**

12.1

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LEARNING OBJECTIVES 1/2

- **EXPLAIN ORGANIZATIONAL KNOWLEDGE MANAGEMENT (Data/Knowledge)**
- **DESCRIBE USEFUL APPLICATIONS FOR DISTRIBUTING, CREATING, SHARING KNOWLEDGE**
- **EVALUATE ROLE OF ARTIFICIAL INTELLIGENCE IN KNOWLEDGE MANAGEMENT**



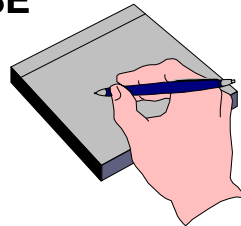
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LEARNING OBJECTIVES 2/2

- **DEMONSTRATE HOW ORGANIZATIONS USE EXPERT SYSTEMS, CASE-BASED REASONING TO CAPTURE KNOWLEDGE**
- **DEMONSTRATE HOW NEURAL NETWORKS & OTHER TECHNIQUES IMPROVE KNOWLEDGE BASE**

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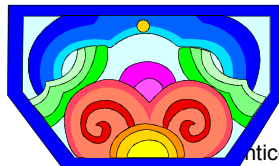


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MANAGEMENT CHALLENGES

- **KNOWLEDGE MANAGEMENT IN THE ORGANIZATION**
- **INFORMATION & KNOWLEDGE WORK SYSTEMS**
- **ARTIFICIAL INTELLIGENCE (AI)**
- **OTHER INTELLIGENT TECHNIQUES**



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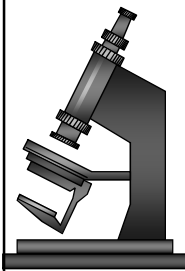
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KNOWLEDGE MANAGEMENT IN THE ORGANIZATION 1/3

KNOWLEDGE MANAGEMENT:

Systematically & actively managing and leveraging stores of knowledge in an organization

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KNOWLEDGE MANAGEMENT IN THE ORGANIZATION 2/3

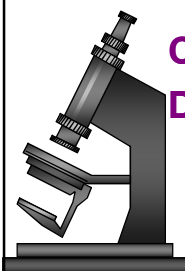
KNOWLEDGE MANAGEMENT:

**Organizational learning mechanisms
Processes to create, gather, store,
maintain, disseminate knowledge**

CHIEF KNOWLEDGE OFFICER (CKO)

**DIGITAL FIRM: Substantial use of info
technology enhances ability to sense,
respond to environment**

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KNOWLEDGE MANAGEMENT IN THE ORGANIZATION 3/3

KNOWLEDGE MANAGEMENT:

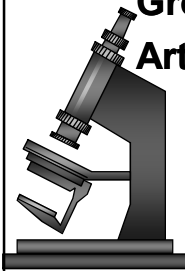
Office Automation Systems (OAS)

Knowledge Work Systems (KWS)

Group Collaboration Systems (GCS)

Artificial Intelligence Applications (AI)

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INFORMATION AND KNOWLEDGE WORK SYSTEMS

INFORMATION WORK: Work consists primarily of creating, processing information

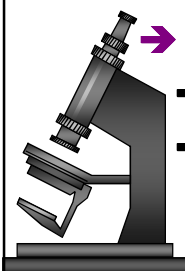
→ **DATA WORKERS:** People who process & disseminate organization's 'paperwork'

→ **KNOWLEDGE WORKERS:** People who:

→ Design products or services or

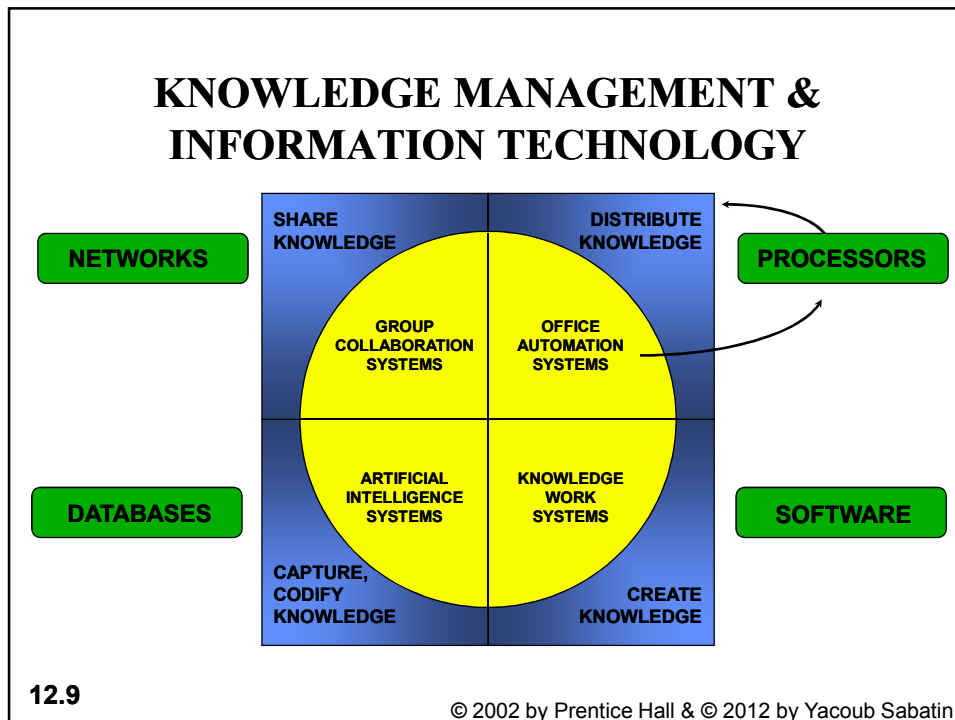
→ Create new knowledge for organization

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MAJOR ROLES OF OFFICES (Office Activities)



- ***Coordinate* work of local professionals and information workers**
- **Coordinate work across levels and functions**
- **Couple organization to external environment and operators (vendors, customers)**

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OFFICE AUTOMATION SYSTEMS 1/5

MANAGING DOCUMENTS:



- CREATION
- STORAGE
- RETRIEVAL
- DISSEMINATION
- **TECHNOLOGY:** Word processing, desktop publishing, document imaging, Web publishing, work flow managers

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OFFICE AUTOMATION SYSTEMS 2/5

SCHEDULING:



For individuals & groups:

- **Electronic Calendars (Desktop/Web)**
- **Groupware**
- **Intranets**
- **Events planning SW**
- **To-Do lists**

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OFFICE AUTOMATION SYSTEMS 3/5 COMMUNICATING:



INITIATING, RECEIVING, MANAGING:

- VOICE
- DIGITAL
- DOCUMENTS
- **TECHNOLOGY:** E-mail, voice mail, digital answering systems, GroupWare, intranets, contact management systems, Web 2.0 applications

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OFFICE AUTOMATION SYSTEMS 4/5 MANAGING DATA (a):



Employees, customers, vendors:

- Desktop databases
- Spreadsheets
- User-friendly interfaces to mainframe databases
- Cloud/non-cloud based HR Systems

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OFFICE AUTOMATION SYSTEMS 5/5 MANAGING DATA (b):



- **DOCUMENT IMAGING SYSTEMS:** Systems convert documents, images into digital form (e.g.: optical character recognition; microfiche)
- **OCR Systems**
- **JUKEBOX:** Storage & retrieving device for CD-ROMs & other optical disks
- **INDEX SERVER:** Imaging system to store / retrieve document

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CREATE KNOWLEDGE 1/4 KNOWLEDGE WORK SYSTEMS:

Information systems that aid
knowledge workers to:

→ Create

→ Integrate

New knowledge in organization

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CREATE KNOWLEDGE 2/4

KNOWLEDGE WORKERS:

- **KEEP ORGANIZATION UP-TO-DATE IN KNOWLEDGE:** Technology; science; thought; the arts
- **INTERNAL CONSULTANTS IN THEIR AREAS**
- **CHANGE AGENTS:** Evaluating; initiating; promoting change projects

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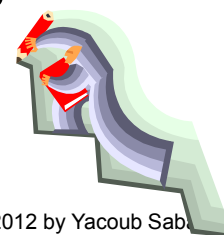
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CREATE KNOWLEDGE 3/4

KNOWLEDGE SYSTEMS:

- **CAD/CAM:** Computer Aided Design/Computer Aided Manufacturing: Provides precise control over industrial design, manufacturing
- **VIRTUAL REALITY:** Interactive software creates photorealistic simulations of real world objects (Virtual Reality Modeling Language: **VRML**)

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CREATE KNOWLEDGE 4/4

KNOWLEDGE SYSTEMS:

- **INVESTMENT WORKSTATIONS:**
High-end PCs used in finance
to analyze trading situations,
facilitate portfolio management



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SHARE KNOWLEDGE

GROUP COLLABORATION SYSTEMS:

- **GROUPWARE:** Allows interactive concurrent collaboration, approval of documents, and so on
- **INTRANETS/Web:** Good for relatively stable information in central repository
- **TEAMWARE:** Group collaborative software to customize team efforts
- **Web/Wikis.**

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CAPABILITIES OF GROUPWARE

- **Publishing, Replication**
- **Discussion Tracking (Legal Documentation) → Record**
- **Document Management**
- **Work-flow Management**
- **Portability (Formats/Web/Integration)**
- **Security**
- **Application Development**



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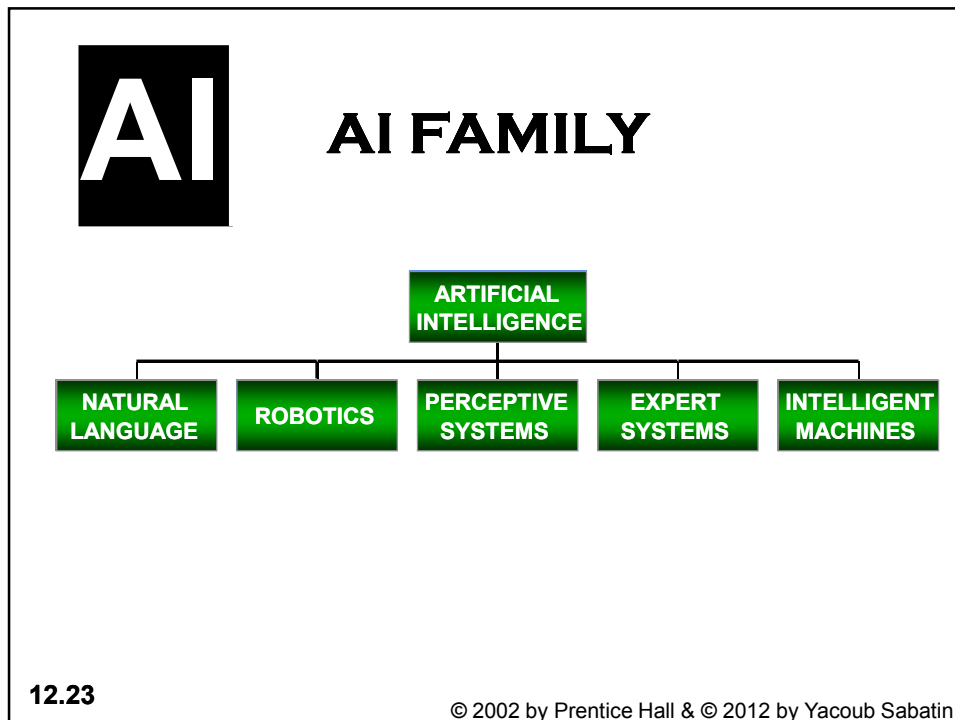
ARTIFICIAL INTELLIGENCE (AI) SYSTEMS:

AI: COMPUTER-BASED SYSTEMS WITH ABILITIES TO *LEARN LANGUAGE, ACCOMPLISH TASKS, USE PERCEPTUAL APPARATUS (إدراك صناعي), EMULATE HUMAN EXPERTISE & DECISION MAKING*

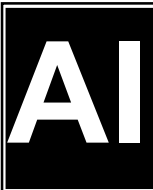
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-
- AI** **BUSINESS INTERESTS IN AI**
- **PRESERVE EXPERTISE**
 - **CREATE KNOWLEDGE BASE**
 - **MECHANISM NOT SUBJECT TO FEELINGS, FATIGUE, WORRY, CRISIS**
 - **ELIMINATE ROUTINE / UNSATISFYING JOBS**
 - **ENHANCE KNOWLEDGE BASE (Continuous Evolution)**
 - **Machine vs. Human**
- *
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EXPERT SYSTEMS 1/5

An expert system is subfield of AI, that attempts to provide an answer to a problem, or clarify uncertainties where normally one or more human experts would need to be consulted, usually in a specific problem domain.

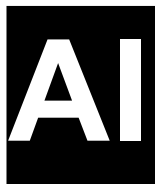
So..

**KNOWLEDGE - INTENSIVE CAPTURES
HUMAN EXPERTISE IN LIMITED DOMAINS
OF KNOWLEDGE (EXPERTISE)**

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EXPERT SYSTEMS 2/5

- **KNOWLEDGE BASE:** Model of Human Knowledge
- **RULE-BASED EXPERT SYSTEM :** AI system based on IF - THEN statements (Bifurcation تشعبات); Rule Base: Collection of IF - THEN knowledge
- **KNOWLEDGE FRAMES:** Knowledge organizes in chunks based on shared relationships

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EXPERT SYSTEMS 3/5

- **AI SHELL:** Programming environment of expert system
- **INFERENCE ENGINE:** Search through rule base
 - **FORWARD CHAINING:** Uses input; searches rules for answer
 - **BACKWARD CHAINING:** Begins with hypothesis, seeks information until hypothesis accepted or rejected

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EXPERT SYSTEMS 4/5

EXAMPLES:

- **BLUE CROSS BLUE SHIELD:** Automated medical underwriting system
- **COUNTRYWIDE FUNDING CORP.:** Loan underwriting expert system
- **UNITED NATIONS:** Employee salary calculations

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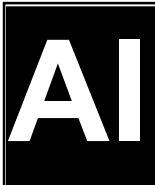
EXPERT SYSTEMS 5/5

LIMITATIONS:

- Often reduced to problems of classification for different cases
- Can be large, lengthy, expensive to implement
- Maintaining knowledge base critical
- Many managers unwilling to trust such systems (in DSS)

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CASE-BASED REASON (CBR)

CBR: Process of solving new problems based on the sol'ns of similar past problems.

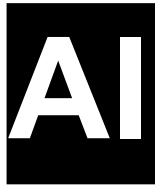
4 Steps: Retrieve, Reuse, Revise, Retain

AI uses database of cases:

- User describes problem
- System searches database for similar cases
- System asks more questions
- Finds closest fit
- Modified as required

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OTHER APPROACHES

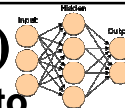
- **NEURAL NETWORKS:** Software attempts to emulate brain processes
- **FUZZY LOGIC:** Tolerates ambiguity using nonspecific **MEMBERSHIP FUNCTIONS**
- **GENETIC ALGORITHMS**
- **INTELLIGENT AGENTS**
- **HYBRID AI SYSTEMS:** Combinations

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NEURAL NETWORKS (ANN)



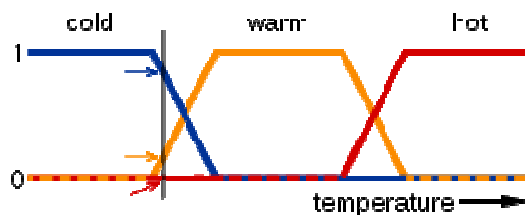
- **Mathematical/computational model that tries to simulate the structure and/or functional aspects of biological neural networks.**
- **ANN consists of an interconnected group of artificial neurons, and it processes information using a connectionist approach to computation.**
- **Usually it's adaptive system (changes its structure based on external or internal information that flows through the network during the learning phase) → learn=usage**
- **ANN are usually models complex relationships bet'n i/p's and o/p's to find patterns in data.**
- **App'ns in real life: classifications, e-learning, DSS**

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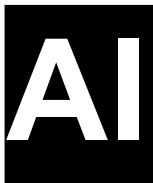
FUZZY LOGIC

- A form of many-valued logic
- To deal with reasoning that is fluid or approximate rather than precise
- In contrast with "crisp logic" → 0/1
- Fuzzy logic variables may have a truth value that ranges in degree between 0 and 1



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GENETIC ALGORITHMS

- Search technique to find *exact* or *approximate* solutions to optimization and search problems.
- They are evolutionary algorithms (EA) that use techniques such as inheritance, mutation, & selection, and crossover.
- Use models of organisms to promote evolution of solution

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AI **INTELLIGENT AGENT 1/2**

- **Autonomous entity which observes and acts upon an environment (it's agent) and directs its activity towards achieving goals (it is rational).**
- **IA may also learn or use knowledge to achieve their goals.**
- **The meaning is general (a human being, a community of human beings working together towards a goal).**
- **So in CS they are usually referred to as Abstract IA's**

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AI **INTELLIGENT AGENT 2/2**

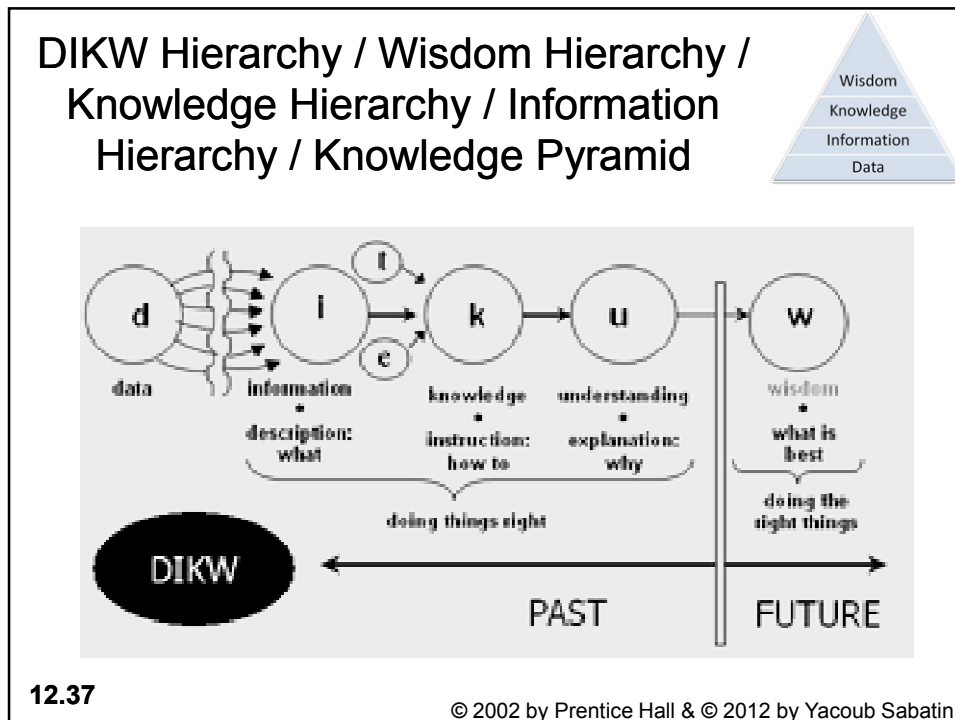
Program with built-in, learned knowledge base to do specific, repetitive, predictable tasks for:

- **Individual**
- **Business process**
- **Software application**

*

```
graph TD
    subgraph AGENT
        Sensors --> W[What is the world like now?]
        W --> A[Action to be done]
        C[Condition-action (if-then) rules] --> A
        A --> Actuators
    end
    subgraph ENVIRONMENT
        E[ENVIRONMENT]
    end
    E -- percepts --> Sensors
    Actuators -- actions --> E
```

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chapter
12

**MANAGING
KNOWLEDGE:
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