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
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

MANAGEMENT CHALLENGES

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

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

*
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)
OFFICE AUTOMATION SYSTEMS 1/5

MANAGING DOCUMENTS:

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

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

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

>>
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

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)
CREATE KNOWLEDGE 4/4

KNOWLEDGE SYSTEMS:

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

**

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.
CAPABILITIES OF GROUPWARE

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

ARTIFICIAL INTELLIGENCE (AI) SYSTEMS:

AI: COMPUTER-BASED SYSTEMS WITH ABILITIES TO LEARN LANGUAGE, ACCOMPLISH TASKS, USE PERCEPTUAL APPARATUS, EMULATE HUMAN EXPERTISE & DECISION MAKING
AI FAMILY

- ARTIFICIAL INTELLIGENCE
  - NATURAL LANGUAGE
  - ROBOTICS
  - PERCEPTIVE SYSTEMS
  - EXPERT SYSTEMS
  - INTELLIGENT MACHINES

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

*
An expert system is a 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)

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

EXPERT SYSTEMS 4/5

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

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
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

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
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

[Diagram showing temperature scale with categories: cold, warm, hot]

GENETIC ALGORITHMS

• Search technique to find \textit{exact} or \textit{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

*
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

INTELLIGENT AGENT 2/2

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

- Individual
- Business process
- Software application

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DIKW Hierarchy / Wisdom Hierarchy / Knowledge Hierarchy / Information Hierarchy / Knowledge Pyramid

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Chapter 12

Managing Knowledge: Knowledge Work and Artificial Intelligence

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