



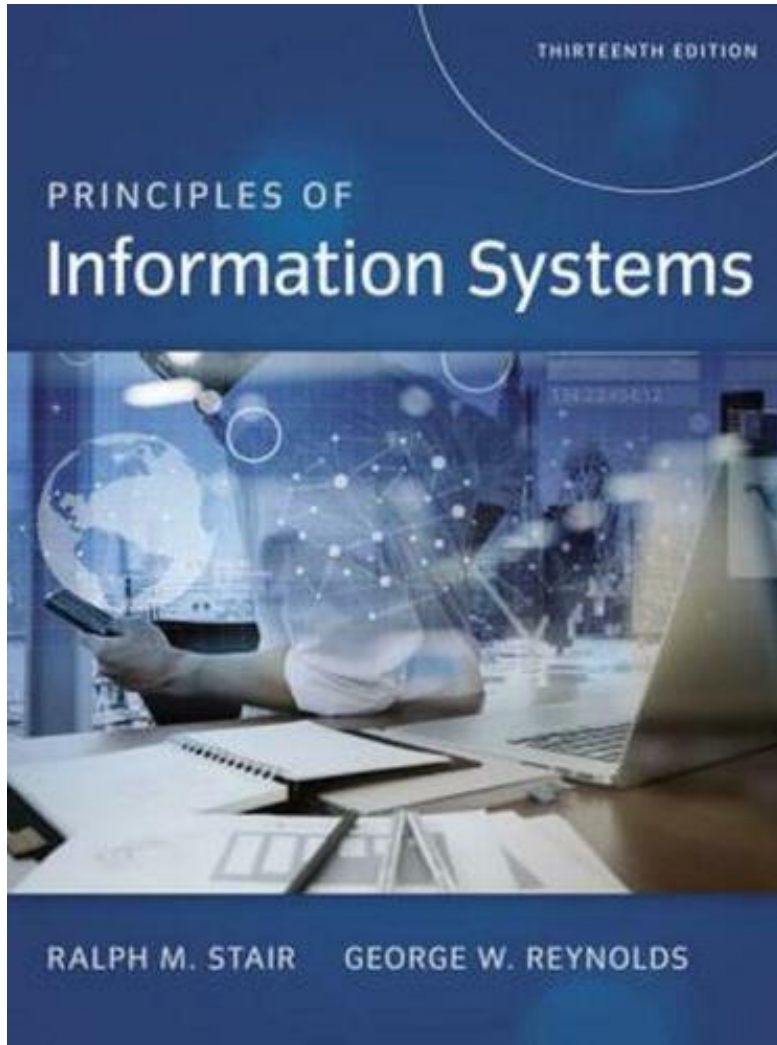
SHERIDAN
INSTITUTE OF HIGHER EDUCATION

IS101 Principles of Information Systems

Knowledge Management and Specialized Information Systems

Lecturer: Dr Maya Krayneva

Textbook: Stair, R., & Reynolds, G. (2016). *Principles of information systems* (13th ed.). Cengage Learning.



Chapter 10: Knowledge Management and Specialized Information Systems

Knowledge Management

Artificial Intelligence

- Expert Systems
- Robotics
- Vision Systems
- Natural Language Processing
- Learning Systems
- Neural Networks
- Genetic Algorithms
- Intelligent Agents

Multimedia

Virtual Reality

Other Specialized Systems

- Assistive technology systems
- Game theory
- Informatics

Knowledge Management

Knowledge management (KM) comprises a range of practices concerned with:

- increasing **awareness**
- fostering **learning**
- speeding **collaboration** and **innovation**, and
- exchanging **insights**

FIGURE 10.1

Knowledge management processes

Knowledge management comprises a number of practices.

Source: From Reynolds, Information Technology for Managers, 2E. © 2016 Cengage Learning.

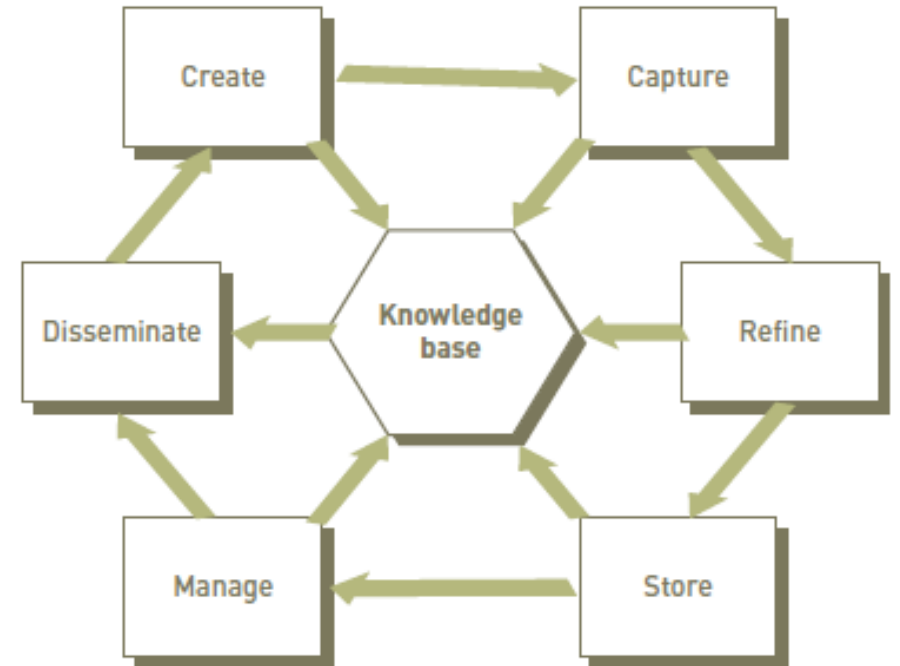


TABLE 10.1 Explicit and tacit knowledge

Asset Type	Description	Examples
Explicit knowledge	Knowledge that is documented, stored, and codified	Customer lists, product data, price lists, a database for telemarketing and direct mail, patents, best practices, standard procedures, and market research results
Tacit knowledge	Personal knowledge is not documented but embedded in individual experience	Expertise and skills unique to individual employees, such as how to close a sale or troubleshoot a complex piece of equipment

Explicit and Tacit Knowledge

Knowledge Management Benefits

- **Innovation:** Foster Innovation by Encouraging the Free Flow of Ideas
- **Expertise:**
 - Leverage the Expertise of People across the Organization
 - Capture the Expertise of Key Individuals before They Retire

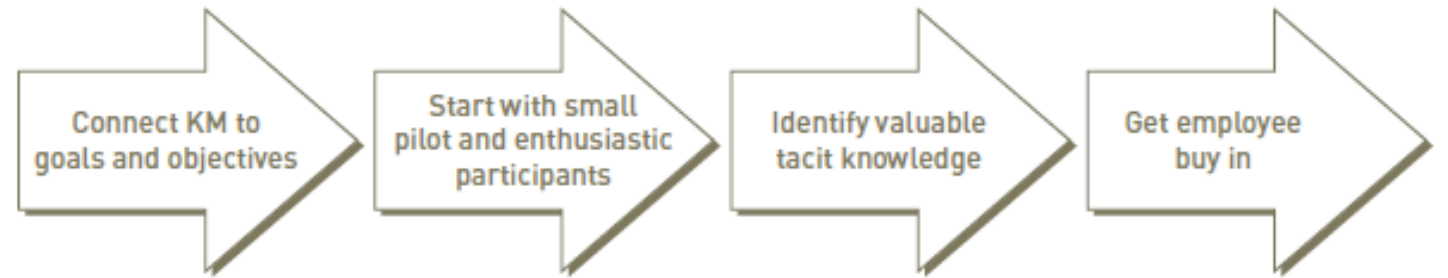


FIGURE 10.2

Steps in selling and implementing a knowledge management project

The key challenges have to do with human nature and how people work together.

Source: From Reynolds, Information Technology for Managers, 2E. © 2016 Cengage Learning.

Artificial Intelligence

Artificial intelligence (AI): computers with the ability to mimic or duplicate the functions of the human brain

[Artificial Intelligence](#)

[Augmented Intelligence](#)

Artificial intelligence systems include:

- People,
- Procedures
- Hardware
- Software
- Data, and
- Knowledge

Needed to develop

- Computer systems
- Machines

That can simulate human intelligence processes including:

- Learning
- Reasoning
- Self-correction

Nature of Intelligence

Intelligent behavior includes the ability to:

- Handle complex situations
- Solve problems when important information is missing
- Determine what is important
- React quickly and correctly to a new situation
- Understand visual images
- Process and manipulate symbols
- Be creative and imaginative
- Learn from experiences and apply knowledge acquired from experience
- Use heuristics (“rules” learned from personal experience)



The Turing Test

The Turing Test attempts to determine whether a computer can successfully impersonate a human

- Designed by Alan Turing, a British mathematician

- Interesting read:

[Eugene Goostman](#)

[Google duplex](#)

[Overview](#)

idea used in Ex Machina movie



AI specialty areas

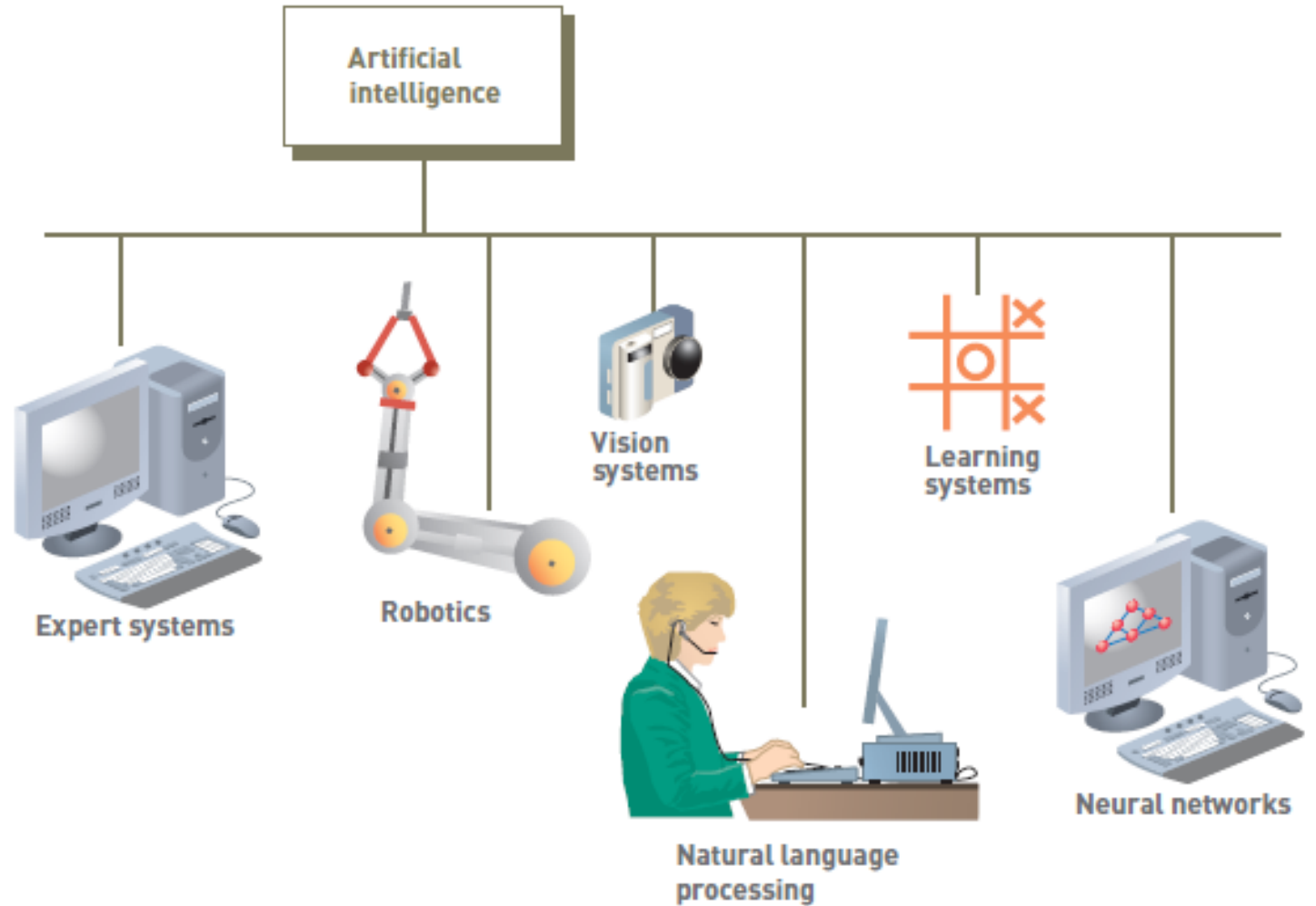


FIGURE 10.7

Conceptual model of artificial intelligence

AI is a broad field that includes several specialty areas.

Expert Systems (example of an AI specialty area)

An **Expert System** consists of a collection of integrated and related **components**

FIGURE 10.8

Components of an expert system

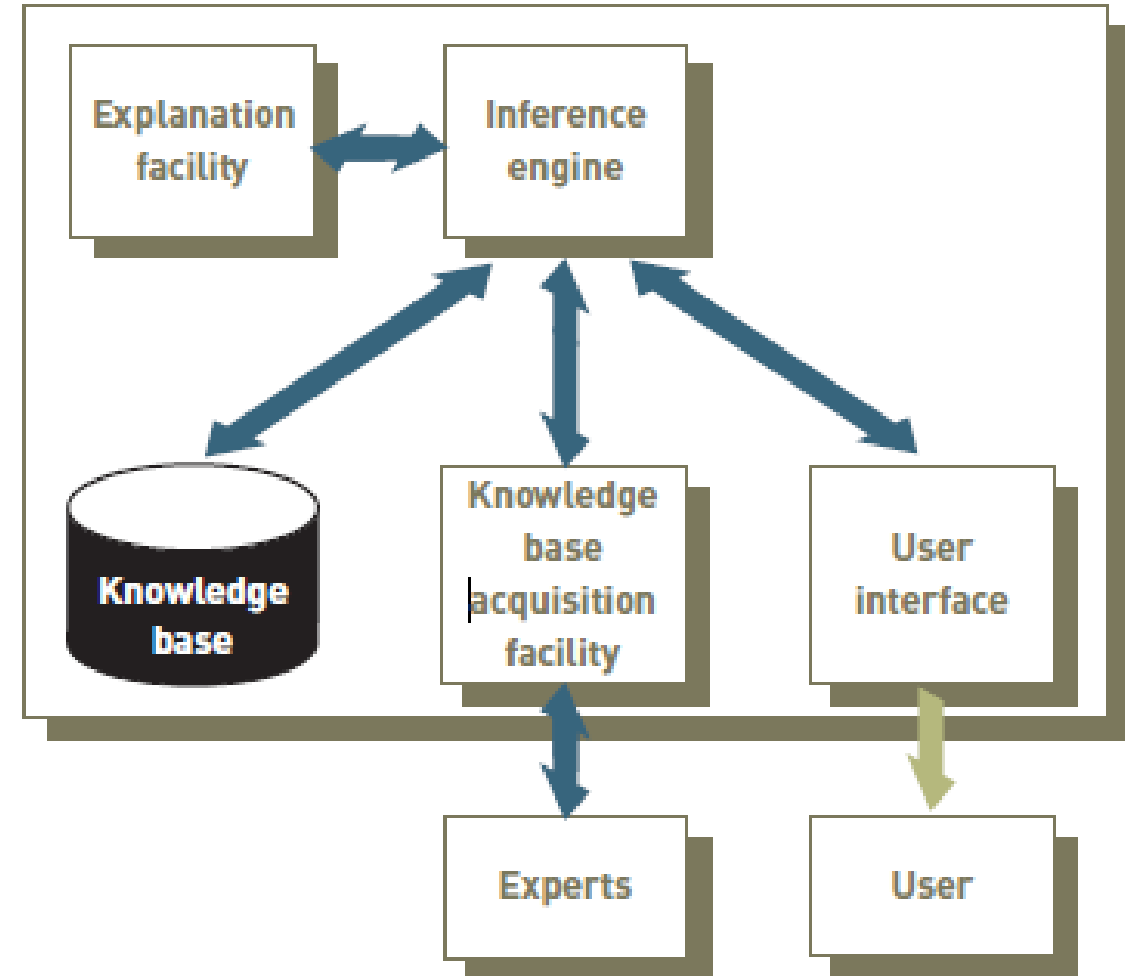
An expert system includes a knowledge base, an inference engine, an explanation facility, a knowledge base acquisition facility, and a user interface.

1. Inference Engine

- To provide answers, predictions, and suggestions like a human expert

2. Explanation Facility

- Allows a user or decision maker to understand how the expert system arrived at certain conclusions or results

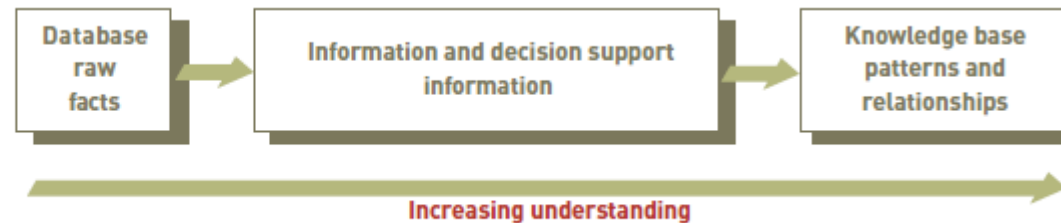


Expert Systems

3. Knowledge Base

- Stores all relevant information, data, rules (e.g. IF-THEN statements), cases, and relationships that the expert system uses

FIGURE 10.9
Relationships between data, information, and knowledge
A knowledge base stores all relevant information, data, rules, cases, and relationships that an expert system uses.



4. Knowledge Acquisition Facility

- Provides convenient and efficient means of capturing and storing all components of the knowledge base

5. User Interface

- Makes an expert system easier for users and decision makers to develop and use

Robotics

Robotics is a branch of engineering that involves developing and manufacturing mechanical devices that can:

- Paint cars, make precision welds, and perform other tasks that require a high degree of precision

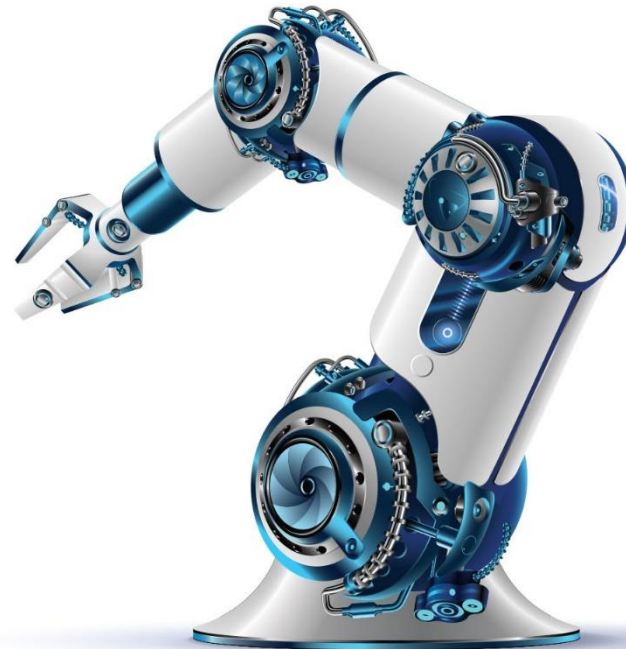
Most commonly, organizations use robots to perform dull, dirty, and/or dangerous jobs

- Example: autonomous vehicles will displace truck drivers, chauffeurs, and cab drivers

Selective Compliance Assembly Robot Arm (SCARA) robots are faster and can have both lateral and rotary movements; SCARA robots can print faster than a standard 3D printer and are used widely in the healthcare field.



Articulated robotic arms mimic the movement of a human arm; Articulated robotic arms are used widely on manufacturing production lines because they can function much like a human arm.



Vision Systems

Vision Systems

- Hardware and software that permit computers to capture, store, and manipulate visual images and pictures

Examples:

- Increased accuracy and speed in industrial inspections of parts
- Identifying people based on facial features

Gemini Man movie example

Natural Language Processing

Natural Language Processing

- Involves the computer understanding, analyzing, manipulating, and/or generating “natural” languages such as English

Example: Voice recognition

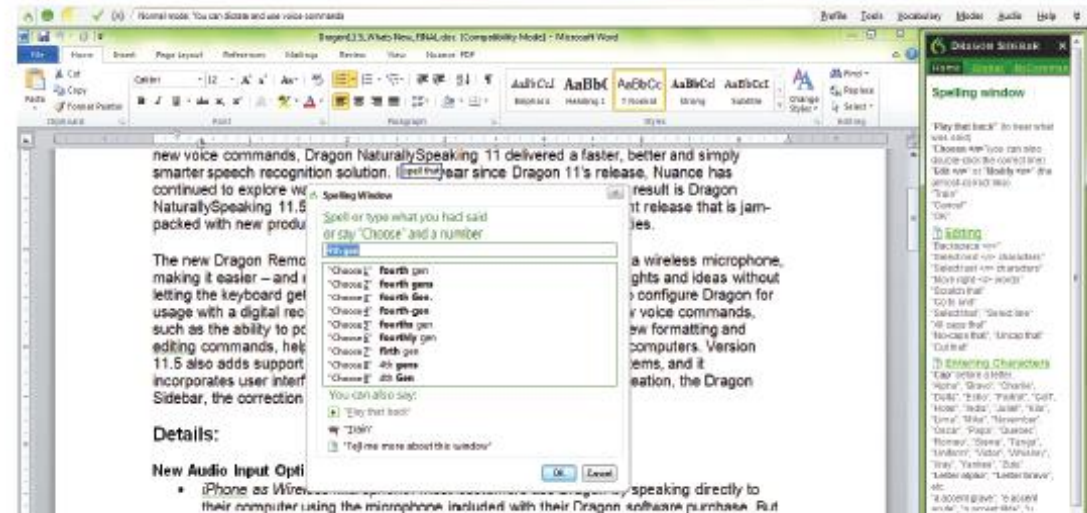
1. Converting sound waves into words
2. After the conversion, natural language-processing systems react to words by performing a variety of tasks

FIGURE 10.11

Voice recognition software

With the NaturallySpeaking application from Dragon Systems, computer users can speak and have their words transcribed into text for input to software such as Microsoft Word.

Source: Nuance Communications.



Natural Language Processing

Learning Systems

Learning Systems

- A combination of software and hardware that allows the computer to change how it functions or reacts to situations based on feedback it receives

Learning systems software

- Feedback on results of actions or decisions is required (so that computer can “learn”)
- Feedback must indicate whether results are desirable or undesirable

Machine Learning

Neural Networks

Neural networks

- Computer systems that can recognize and act on patterns or trends that it detects in large sets of data

Employs massively parallel processors in a meshlike architectural structure

AI Trilogy is a neural network software program that can run on a standard PC (Fig 10.12)

Neural Networks

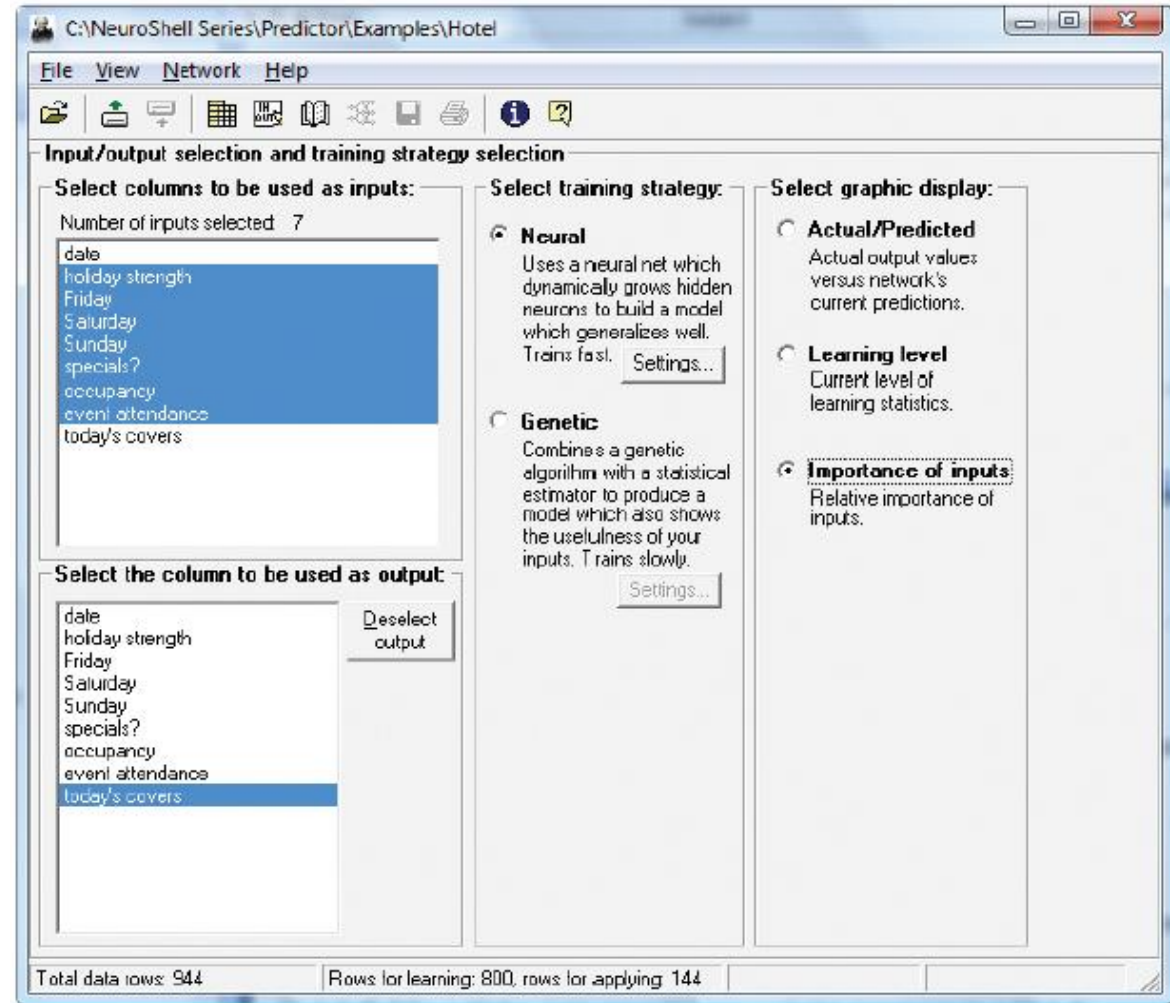


FIGURE 10.12
Neural network software

NeuroShell Predictor uses recognized forecasting methods to look for future trends in data.

Source: Ward Systems Group, Inc.

Genetic algorithms

Genetic algorithm

- An approach to solving complex problems in which a number of related operations or models change and evolve until the best one emerges

Intelligent agents

Intelligent agent

- Programs and a knowledge base used to perform a specific task for a person, a process, or another program

Multimedia

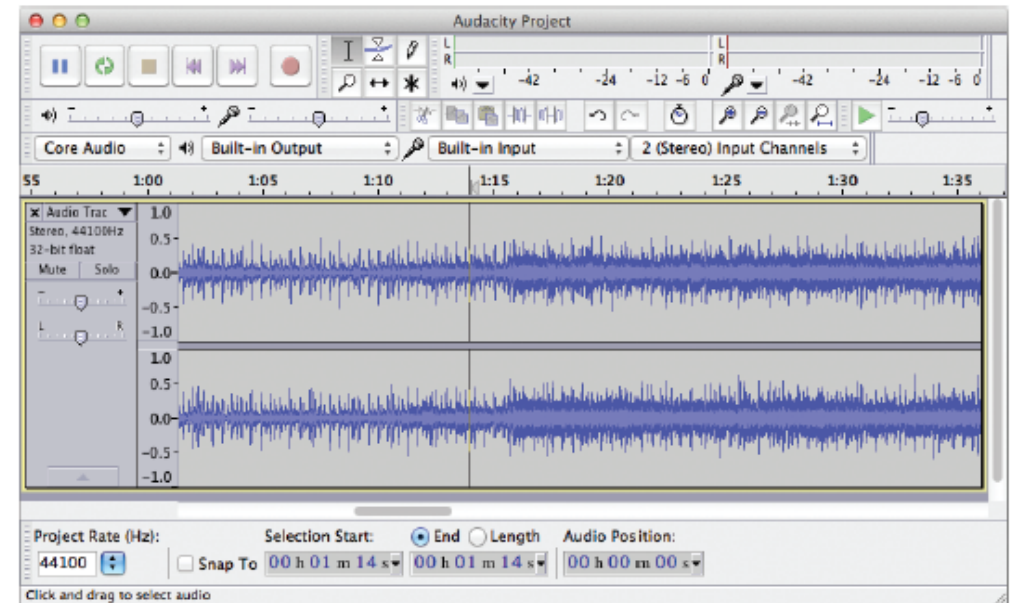
Multimedia

- Text and graphics
- Audio
- Video and animation
- File conversion and compression

FIGURE 10.13
Audio-editing software

Audacity provides tools for editing and producing audio files in a variety of formats.

Source: Audacity.



Virtual Reality

Virtual Reality

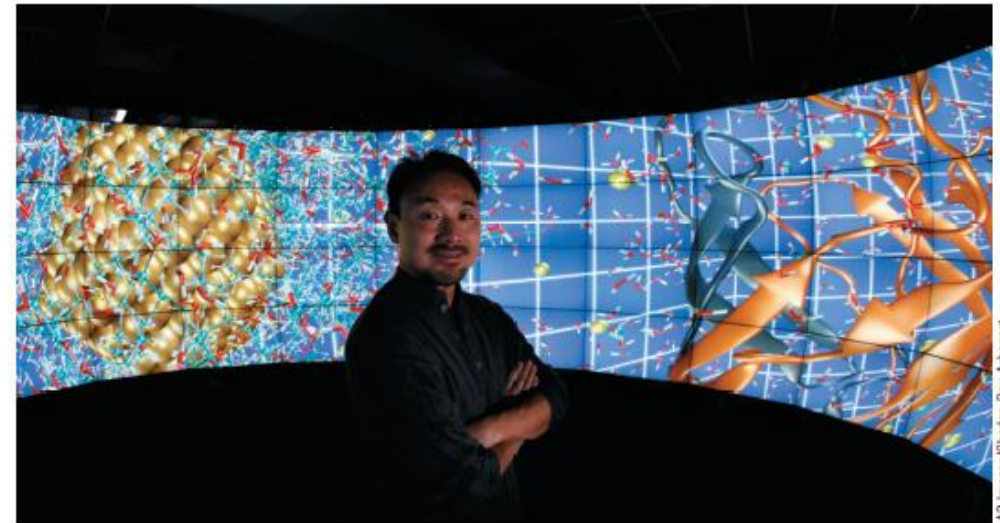
- A virtual reality system enables one or more users to move and react in a computer-simulated environment
- Virtual reality simulations require special interface devices that transmit the sights, sounds, and sensations of the simulated world to the user

Digital art museum

FIGURE 10.14

Large-scale virtual reality environment

The CAVE2 virtual reality system has 72 stereoscopic LCD panels encircling the viewer 320 degrees and creates a 3D environment that can simulate the bridge of the Starship U.S.S. Enterprise, a flyover of the planet Mars, or a journey through the blood vessels of the brain.



AP Images/Charles Rex Arbogast

Other Specialized Systems

Assistive technology systems

- Wide range of assistive, adaptive, and rehabilitative devices to help people with disabilities perform tasks

Game theory

- A mathematical theory for developing strategies that maximize gains and minimize losses while adhering to a given set of rules and constraints

Informatics

- The combination of information technology with traditional disciplines, e.g., medicine or science, while considering the impact on individuals, organizations, and society

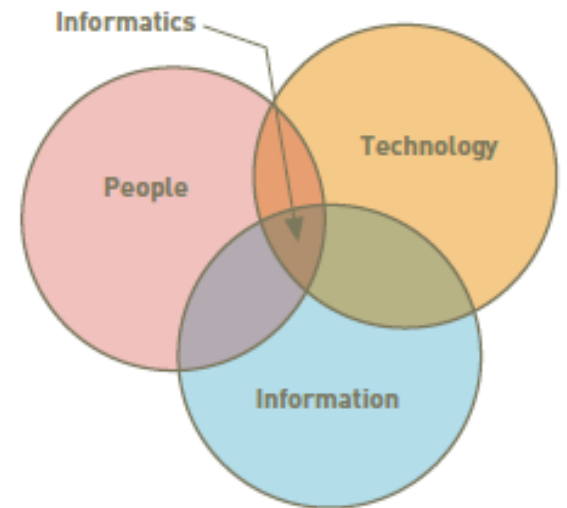


FIGURE 10.16

Informatics

Informatics represents the intersection of people, information, and technology.



KM Experiment pp. 420 - 421

IBM Watson p. 432

Google Expeditions p. 439

Allina Health p. 442