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ROYAL UNIVERSITY OF PHNOM PENH

CHAPTER
10

Knowledge Management and Specialized Information Systems

MIS

Chea Daly



Why Learn about Knowledge Management and Specialized Information Systems?

- Knowledge management and specialized information systems are used in almost every industry.
- As a manager, you might use a knowledge management system to obtain advice on how to approach a problem that others in your organization have already encountered.



Why Learn about Knowledge Management and Specialized Information Systems?

- As a stock trader, you might use a special system called a neural network to uncover patterns to make investment decisions.
- Learning about these systems will help you discover new ways to use information systems in your day-to-day work.



Knowledge Management Systems

- Data consists of raw facts
- Information:
 - Collection of facts organized so that they have additional value beyond the value of the facts themselves
- Knowledge:
 - Awareness and understanding of a set of information and the ways that information can be made useful to support a specific task or reach a decision



Knowledge Management Systems

Data

There are 20 PCs in stock at the retail store.

Information

The store will run out of inventory in a week unless more is ordered today.

Knowledge

Call 800-555-2222 to order more inventory.

Figure 11.1

The Differences Among Data,
Information, and Knowledge



What Is Knowledge Management?

- **Knowledge management (KM)** comprises a range of practices concerned with increasing awareness, fostering learning, speeding collaboration and innovation, and exchanging insights.
- Knowledge management is used by organizations to enable individuals, teams, and entire organizations to collectively and systematically create, share, and apply knowledge in order to achieve their objectives.



Knowledge Management System

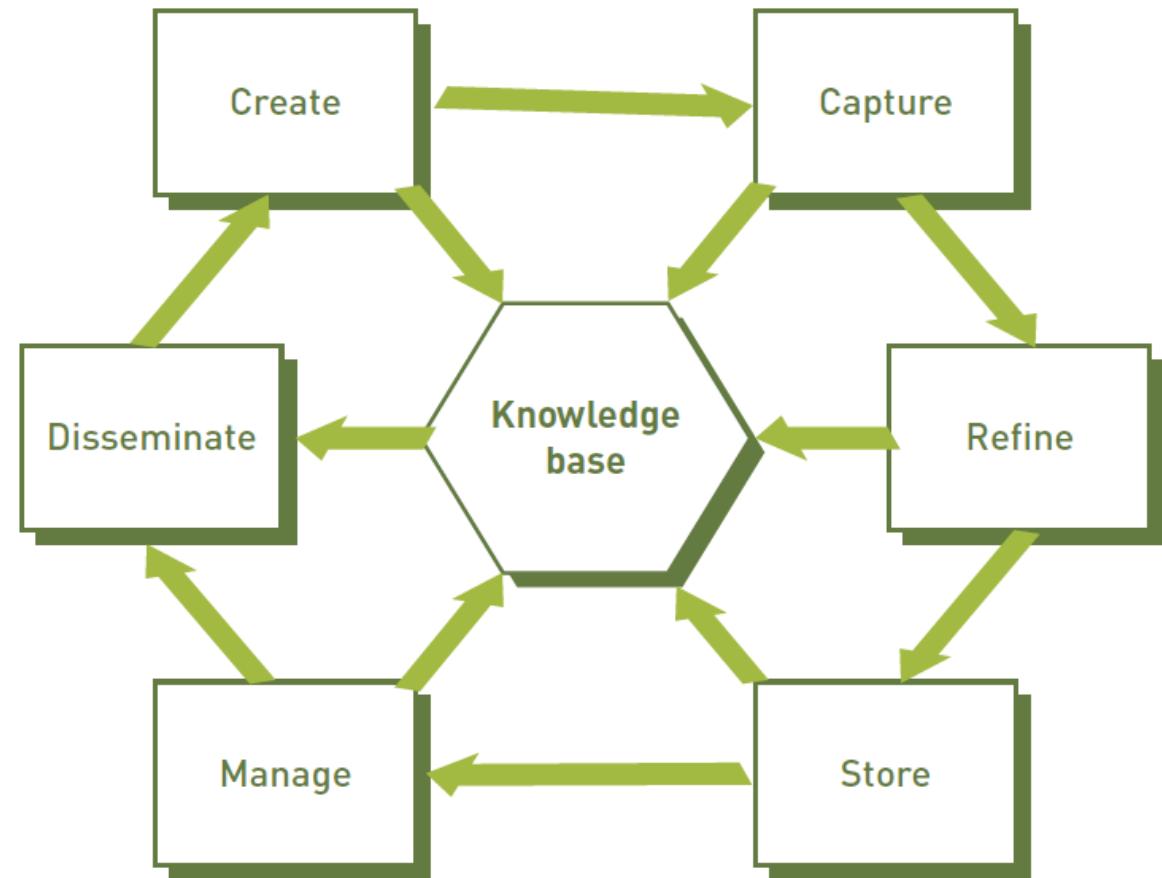
- **Knowledge Management System** is an organized collection of people, procedures, software, databases, and devices that creates, captures, refines, stores, manages, and disseminates knowledge.

FIGURE 10.1

Knowledge management processes

Knowledge management comprises a number of practices.

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





Knowledge Management System

- An organization's knowledge assets often are classified as either **Explicit knowledge** or **Tacit knowledge**.



Knowledge Management System

□ **Explicit knowledge:**

- Knowledge that is documented, stored, and codified.
- such as standard procedures, product formulas, customer contact lists, market research results, and patents.



Knowledge Management System

□ Tacit knowledge:

- The know-how that someone has developed as a result of personal experience.
- Such as how to ride a bike, and a physician's technique for diagnosing a rare illness.
- This knowledge cannot be documented easily; yet, tacit knowledge is key to high performance and competitive advantage because it's difficult for others to copy.



Knowledge Management System

- Much of the tacit knowledge that people carry with them is extremely useful but cannot be shared with others easily.
- This means that new employees might spend years learning things from experienced coworkers.
- In some cases, this valuable knowledge is lost forever when experienced employees retire, and others never learn them.



Knowledge Management System

- A major goal of knowledge management is to somehow capture and document the valuable work-related tacit knowledge of others and to turn it into explicit knowledge that can be shared with others. This is much easier said than done, however.



Knowledge Management System

- Over time, experts develop their own processes for their areas of expertise. Their processes become second nature and are so internalized that they are sometimes unable to write down step-by-step instructions to document the processes.



Knowledge Management System

Two processes are frequently used to capture tacit knowledge:

- **Shadowing** involves a novice observing an expert executing her job to learn how she performs. This technique is often used in the medical field to help young interns learn from experienced physicians.



Knowledge Management System

- With **joint problem solving**, the novice and the expert work side by side to solve a problem so that the expert's approach is slowly revealed to the observant novice.



Knowledge Management Applications and Associated Benefits

- Organizations employ KM to foster innovation, leverage the expertise of people across the organization, and capture the expertise of key individuals before they retire.



Knowledge Management Applications and Associated Benefits

- Foster Innovation by Encouraging the Free Flow of Ideas.
- Organizations must continuously innovate to evolve, grow, and prosper.
- Organizations that fail to innovate will soon fall behind their competition.



Knowledge Management Applications and Associated Benefits

- TMW Systems, a provider of logistics operations and fleet management systems.
- TMW implemented a KM system which places an emphasis on decentralized information sharing, allows employees to easily share new ideas, expertise, and best practices with other employees no matter where they are based.



Knowledge Management Applications and Associated Benefits

- Leverage the Expertise of People across the Organization
- It is critical that an organization enables its employees to share and build on one another's experience and expertise.
- Workers can share thoughts and experiences about what works well and what does not, thus preventing new employees from repeating some of the mistakes of others.



Knowledge Management Applications and Associated Benefits

- This enables employees to deliver valuable results more quickly, improve their productivity, and get products and new ideas to market faster.
- White & Case, an international law firm headquartered in New York City, represents well-known organizations around the world through its offices in more than 20 countries.



Knowledge Management Applications and Associated Benefits

- The firm's employees have diverse backgrounds and speak more than 60 different languages.
- One strength of the firm is that the lawyers truly operate as a team by constantly sharing know-how, experience, and market and client information.



Knowledge Management Applications and Associated Benefits

- The system enables lawyers to find all relevant knowledge within the firm about a case or subject, often within a matter of minutes.
- Using the enterprise search software, an attorney quickly determined that the company had experience in this area and that the best lawyer for the job.



Knowledge Management Applications and Associated Benefits

- Capture the Expertise of Key Individuals before They Retire.
 - In the United States, 3 to 4 million employees will retire each year for the next 20 years or so. Add to that a 5 to 7 percent employee turnover as workers move to different companies, and it is clear that organizations are facing a tremendous challenge in trying to avoid the loss of valuable experience and expertise.



Knowledge Management Applications and Associated Benefits

- Many organizations are using KM to capture this valuable expertise before it is lost forever.
- The state of New Hampshire has developed a KM and transfer model. The process begins by identifying what critical tasks the individual performs and assessing whether others can perform these tasks.



Knowledge Management Applications and Associated Benefits

- To do this, the employee is asked to answer questions such as the following:
 - If you left your position today, what wouldn't get done because no one else knows how to do it?
 - How important is this work? What is the impact of it not getting done?
 - If this work is important, what resources exist to help others learn this task?



Knowledge Management Applications and Associated Benefits

- If this work is important, how should we plan to address this knowledge gap? Who will learn this? How and when?



Best Practices for Selling and Implementing a KM Project

- Establishing a successful KM program is challenging, but most of the challenges involved have nothing to do with the technologies or vendors employed.
- Instead they are challenges associated with human nature and the manner in which people are accustomed to working together.



Best Practices for Selling and Implementing a KM Project

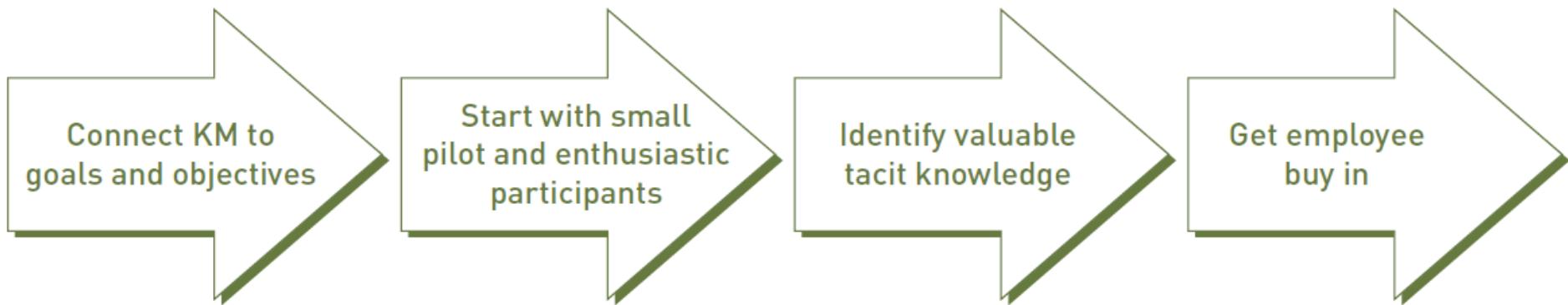


FIGURE 10.2

Steps in selling and implementing a knowledge management project

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



Best Practices for Selling and Implementing a KM Project

- Connect the KM Effort to Organizational Goals and Objectives.
- When starting a KM effort, you must clearly define how that effort will support specific organizational goals.



Best Practices for Selling and Implementing a KM Project

- Although many people may intuitively believe that sharing knowledge and best practices is a worthy idea, there must be an underlying business reason to do so. The fundamental business case for implementing knowledge management must be clearly defined.



Best Practices for Selling and Implementing a KM Project

- Start with a Small Pilot Involving Enthusiasts
 - With a small-scale project, you have more control over the outcome, and if the outcome is not successful, the organization will not be seriously impacted.
 - Targeting a group of people who are somewhat informed about KM and are enthusiastic about its potential reduces the problem of trying to overcome skepticism and unwillingness to change, which have doomed many projects.



Best Practices for Selling and Implementing a KM Project

- Identify Valuable Tacit Knowledge
 - Not all tacit knowledge is equally valuable, and priorities must be set in terms of what knowledge to go after.



Best Practices for Selling and Implementing a KM Project

- Get Employees to Buy In
 - In a highly competitive work environment, it can be especially difficult to get workers to surrender their knowledge and experience.
 - Some organizations believe that the most powerful incentive for experts to share their knowledge is to receive public recognition from senior managers and their peers.



Best Practices for Selling and Implementing a KM Project

- Many organizations provide incentives in a combination of ways—linking KM directly to job performance, creating a work environment where sharing knowledge seems like a safe and natural thing to do, and recognizing people who contribute.



Technologies That Support KM

- Organizations interested in piloting KM should be aware of the wide range of technologies that can support KM efforts.
- These include:
 - Communities of practice
 - Organizational network analysis
 - Web 2.0 technologies
 - Business rules management systems
 - Enterprise search tools



Communities of Practice

- A community of practice (CoP) is a group whose members share a common set of goals and interests and regularly engage in sharing and learning as they strive to meet those goals.
- A community of practice develops around topics that are important to its members.
- It is not uncommon for a CoP to include members from many different organizations.



Communities of Practice

- Members of an informal CoP typically meet with little advanced planning or formality to discuss problems of interest, share ideas, and provide advice and counsel to one another.
- Members of a more formal CoP meet on a regularly scheduled basis with a planned agenda and identified speakers.



Organizational Network Analysis

- Organizational network analysis (ONA): A technique used for documenting and measuring flows of information among individuals, workgroups, organizations, computers, Web sites, and other information sources.

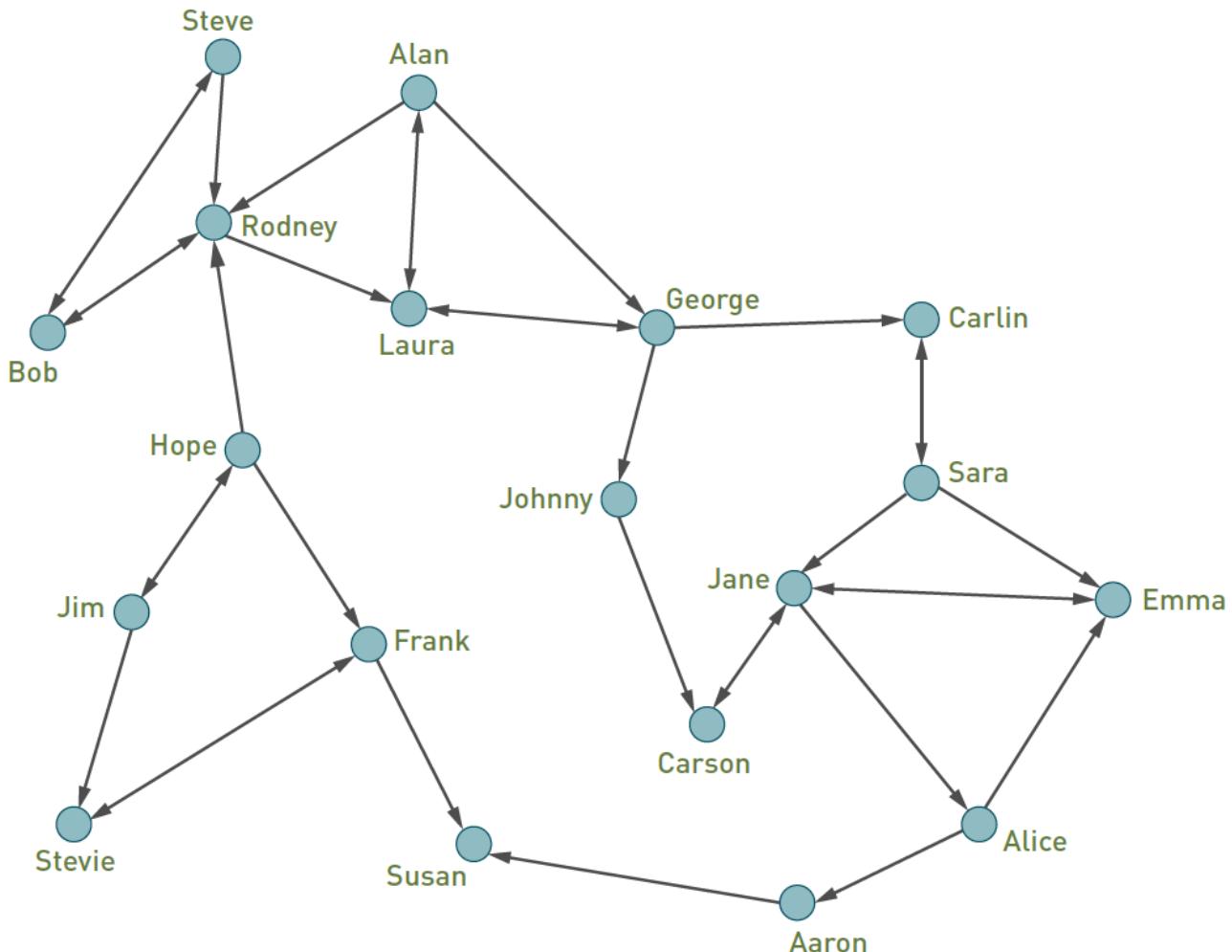


FIGURE 10.3
Organizational network analysis

Each node in the diagram represents a knowledge source; each link represents a flow of information between two nodes.



Organizational Network Analysis

- In analyzing social media communications from sources such as text, video, and chat as well as “likes” and “shares,” many experts agree that the most significant data is not the content itself, but rather the **metadata** (data that describes other data).



Organizational Network Analysis

- For instance, metadata about social media use could relate to properties of the message (e.g., whether the message is comical, sarcastic, or genuine) and of the author (e.g., gender, age, interests, ideological beliefs, and degree of influence on the audience).



Organizational Network Analysis

- The metadata enables analysts to make judgments about how to interpret and value the content of the message. Without the important metadata, it is not possible to know the value of the communications and how to take effective action.
- ONA provides a clear picture of how geographically dispersed employees and organizational units collaborate (or do not collaborate).



Organizational Network Analysis

- Organizations frequently employ ONA to identify subject experts and then set up mechanisms (e.g., communities of practice) to facilitate the passing of knowledge from those experts to colleagues.
- Software programs that track email and other kinds of electronic communications may be used to identify in-house experts.



Organizational Network Analysis

- Westwood Professional Services, an engineering and survey firm, recently conducted an organizational network analysis.
- Through the analysis, the company was able to determine which employees within the business unit were connecting most frequently and the extent to which members of different subteams were collaborating.



Organizational Network Analysis

- The company used the results of the analysis to develop targeted teambuilding initiatives and reevaluate its organizational structures to ensure they continued to support information sharing and creative problem solving



Web 2.0 Technologies

- Web 2.0 is designed to enhance information sharing and collaboration.
- Many organizations are using Web 2.0 technologies such as podcasts and wikis to capture the knowledge of longtime employees, provide answers to cover frequently asked questions, and save time and effort in training new hires.



Business Rules Management Systems

- A business rule management system (BRMS) is software that enables business users to define, execute, monitor, and maintain organizational policies and the decisions flowing from those policies.
- The creation and maintenance of a BRMS can become an important part of an organization's knowledge management program.



Business Rules Management Systems

TABLE 10.2 Business rule management software

Software Manufacturer	Product
Appian Corporation	Business Process Management (BPM) Software Suite
Bosch Software Innovations	inubit BPM
CA Aion	Business Rules Expert
IBM	Operational Decision Manager
Open Source	Process Maker BPM
Oracle	Business Rules
Pegasystems	Pega Business Rules Platform
Progress	Corticon



Enterprise Search Software

- **Enterprise search** is the application of search technology to find information within an organization.
- **Enterprise search software** matches a user's query to many sources of information in an attempt to identify the most important content and the most reliable and relevant source.



Enterprise Search Software

- Enterprise search software indexes documents from a variety of sources— such as corporate databases, departmental files, email, corporate wikis, and document repositories.
- When a search is executed, the software uses the index to present a list of relevance-ranked documents from these various sources.



Enterprise Search Software

TABLE 10.3 Enterprise search solutions

Software Manufacturer	Software Product
Attivio	Active Intelligence Engine
BA Insight	Knowledge Integration Platform
Coveo	Enterprise Search & Relevance
Dassault Systemes	Exalead CloudView
Google	Google Search Appliance
HP	HP Autonomy
Mark Logic Corporation	Mark Logic



Overview of Artificial Intelligence

- In 1956, the term Artificial Intelligence (AI) is proposed to describe computers with the ability to mimic the functions of the human brain.
- IBM Watson is the first commercially available cognitive computing capability, a computer capable of processing information like a human.



Overview of Artificial Intelligence

- Now a cloud-based Watson system is being used by doctors to develop treatment options for a wide range of diseases, including a brain cancer that kills over 13,000 people in the United States each year.



Overview of Artificial Intelligence

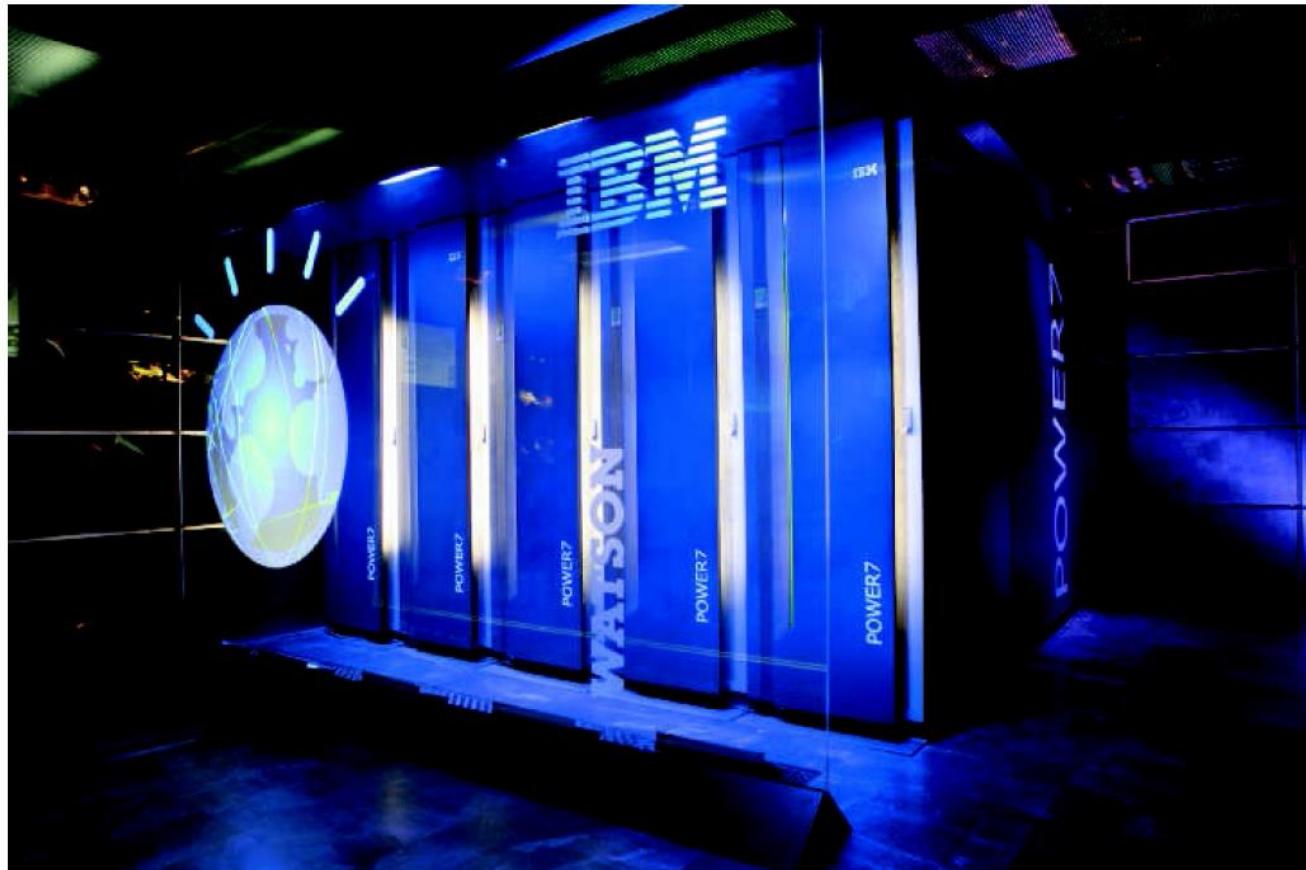


FIGURE 10.4

IBM Watson

IBM Watson is being used to develop treatment options for cancer patients based on the DNA of their disease



Artificial Intelligence in Perspective

- When it comes to performing mathematical operations quickly and accurately, computers beat humans' hands down.
- However, computers still have trouble recognizing patterns, adapting to new situations, and drawing conclusions when not provided complete information—all activities that humans can perform quite well.
- Artificial intelligence systems tackle these sorts of problems.



Artificial Intelligence in Perspective

AI systems include people, procedures, hardware, software, data, and knowledge needed to develop computer systems and machines that can simulate human intelligence processes, including:

- learning (the acquisition of information and rules for using the information),
- reasoning (using rules to reach conclusions),
- self-correction (using the outcome from one scenario to improve its performance on future scenarios).



Artificial Intelligence in Perspective

- Today, artificial intelligence systems are used in many industries and applications.
- Researchers, scientists, and experts on how human beings think are often involved in developing these systems.



Nature of Intelligence

- **Intelligent Behavior:** The ability to learn from experiences and apply knowledge acquired from those experiences; to handle complex situations; to solve problems when important information is missing; to determine what is important and to react quickly and correctly to a new situation; to understand visual images, etc.



Brain-Computer Interface

- Developing a link between the human brain and the computer is another exciting aspect of artificial intelligence research.
- The idea behind a brain-computer interface (BCI) is to directly connect the human brain to a computer so that human thought can control the activities of the computer.



Brain-Computer Interface

- One potential use of BCI technology would be to give people without the ability to speak or move the capability to communicate, control a computer, and move artificial limbs.
- Honda Motors has developed a BCI system that allows a person to complete certain operations, such as bending a leg, with 90 percent accuracy.



Brain-Computer Interface



FIGURE 10.6
Brain-machine interface

Honda Motors has developed a brain-machine interface that measures electrical current and blood flow change in the brain and uses the data to control ASIMO, the Honda robot.

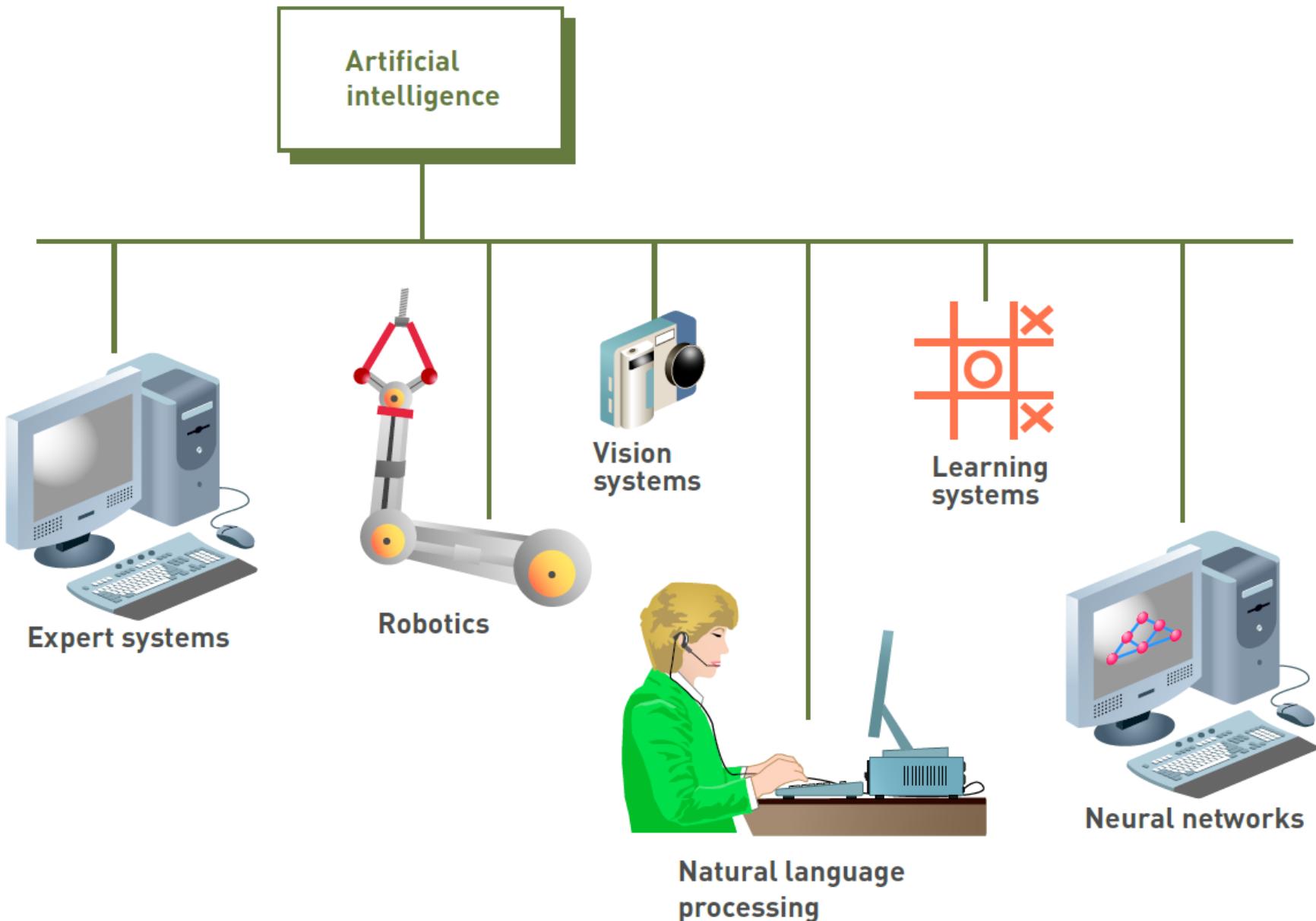


FIGURE 10.7
Conceptual model of artificial intelligence

AI is a broad field that includes several specialty areas.



Expert Systems

- An expert system consists of hardware and software that stores knowledge and makes inferences, enabling a novice to perform at the level of an expert.
- Theoretically, expert systems can be developed from any programming language.
- Since expert systems can be difficult, expensive, and time consuming to develop, they should be developed when there is a high potential payoff.



When to Use Expert Systems

- People and organizations should develop an expert system if it can:
 - Provide a high potential payoff or significantly reduce downside risk
 - Capture and preserve irreplaceable human expertise
 - Solve a problem that is not easily solved using traditional programming techniques
 - Develop a system more consistent than human experts



When to Use Expert Systems

- Provide expertise needed at a number of locations at the same time or in a hostile environment that is dangerous to human health
- Provide expertise that is expensive or rare
- Develop a solution faster than human experts can
- Provide expertise needed for training and development



Participants in Developing and Using Expert Systems

- Domain expert:
 - Person or group with the expertise or knowledge the expert system is trying to capture
- Knowledge engineer:
 - Person who has training or experience in the design, development, implementation, and maintenance of an expert system

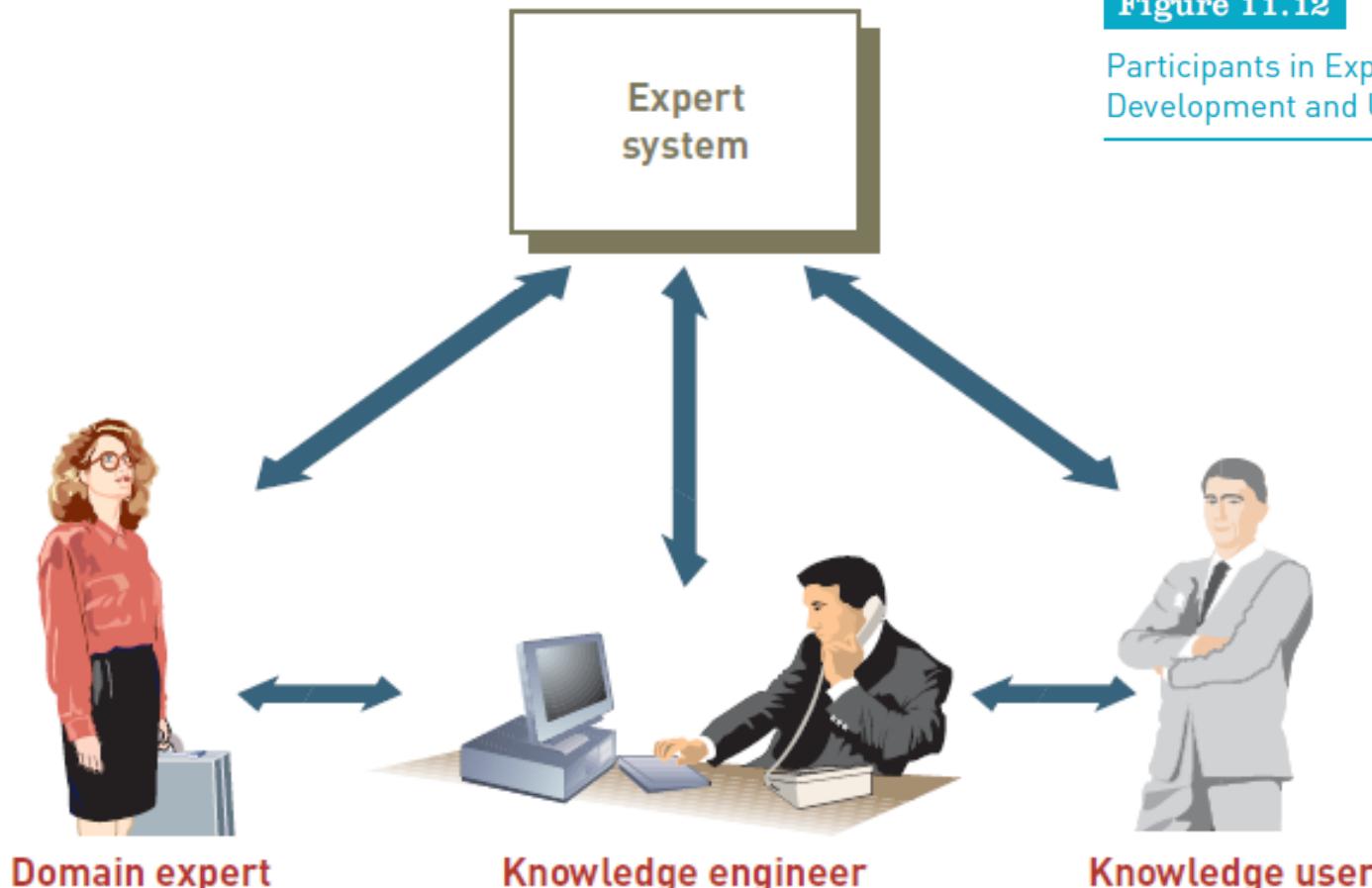


Participants in Developing and Using Expert Systems

- Knowledge user:
 - Person or group who uses and benefits from the expert system



Participants in Developing and Using Expert Systems





Popular Expert Systems

Name of Product	Application and Capabilities
Exsys Corvid	An expert system tool that simulates a conversation with a human expert from Exsys (www.exsys.com) ⁵³
EZ-Xpert	A rule-based expert system that results in complete applications in the C++ or Visual Basic programming languages by EZ-Xpert (www.ez-xpert.com) ⁵⁴
G2	Assists in oil and gas operations. Transco, a British company, uses it to help in the transport of gas to more than 20 million commercial and domestic customers.
HazMat Loader	Analyzes hazardous materials in truck shipments (http://hazmat.dot.gov)
Imprint Business Systems	This company has an expert system that helps printing and packaging companies manage their businesses (www.imprint-mis.co.uk)
Lantek Expert System	Helps metal fabricators reduce waste and increase profits (www.lantek.es)
RAMPART	Developed by Sandia National Laboratories, the U.S. General Services Administration (GSA) uses it to analyze risk to the approximately 8,000 federal buildings it manages (www.sandia.gov)

Table 11.2
Popular Expert System Products



Robotics

- Organizations today do indeed use robots to perform dull, dirty, and/or dangerous jobs.
- One area of particular interest is the use of robots as companions and caregivers for people who are sick, elderly, or physically challenged.
- The use of robots has expanded and is likely to continue to grow.
- Some experts have predicted that every home will have a robot of some sort by 2025.



Robotics

- Some people fear that robots will increasingly take jobs from human employees. For example, the use of autonomous vehicles may place millions of truck drivers and cab drivers out of work.



Robotics



FIGURE 10.10
Robotic surgery

The arms of the Da Vinci robot assist in a kidney transplant. A surgeon controls the robot remotely from a corner of the operating room.



Vision Systems

- Another area of AI involves vision systems, which include hardware and software that permit computers to capture, store, and process visual images.



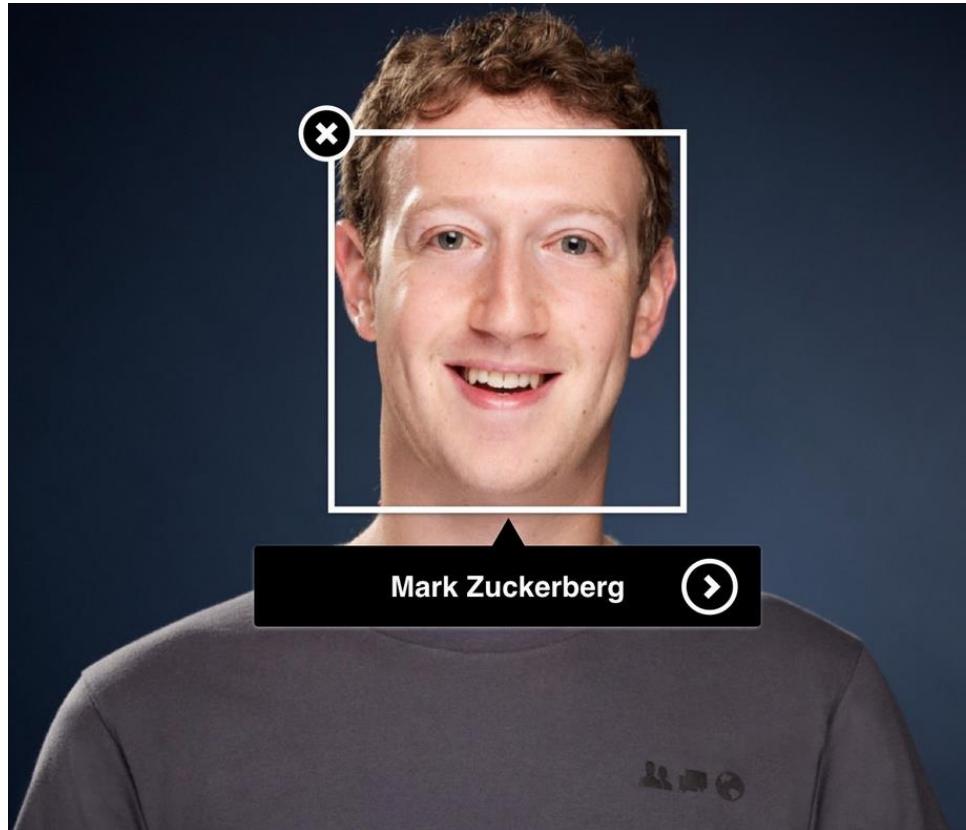
Vision Systems



Automated fruit-picking machines use a unique vacuum gripper combined with a vision system to pick fruit.



Vision Systems



Face Recognition with Facebook DeepFace



Vision Systems

- Facebook DeepFace can correctly tell if two photos show the same person with 97.25 percent accuracy. This nearly matches humans, who are correct 97.53 percent of the time.
- The technology can also recognize people whose faces are not showing with 83 percent accuracy, using features such as body shape, posture, hairstyle, and clothing.



Natural Language Processing

- **Natural language processing** is an aspect of artificial intelligence that involves technology that allows computers to understand, analyze, manipulate, and/or generate “natural” languages, such as English.
- Many companies provide natural language processing help over the phone.



Natural Language Processing

- The NaturallySpeaking application from Dragon Systems uses continuous voice recognition, or natural speech, that allows the user to speak to the computer. The spoken words are transcribed immediately onto the computer screen.



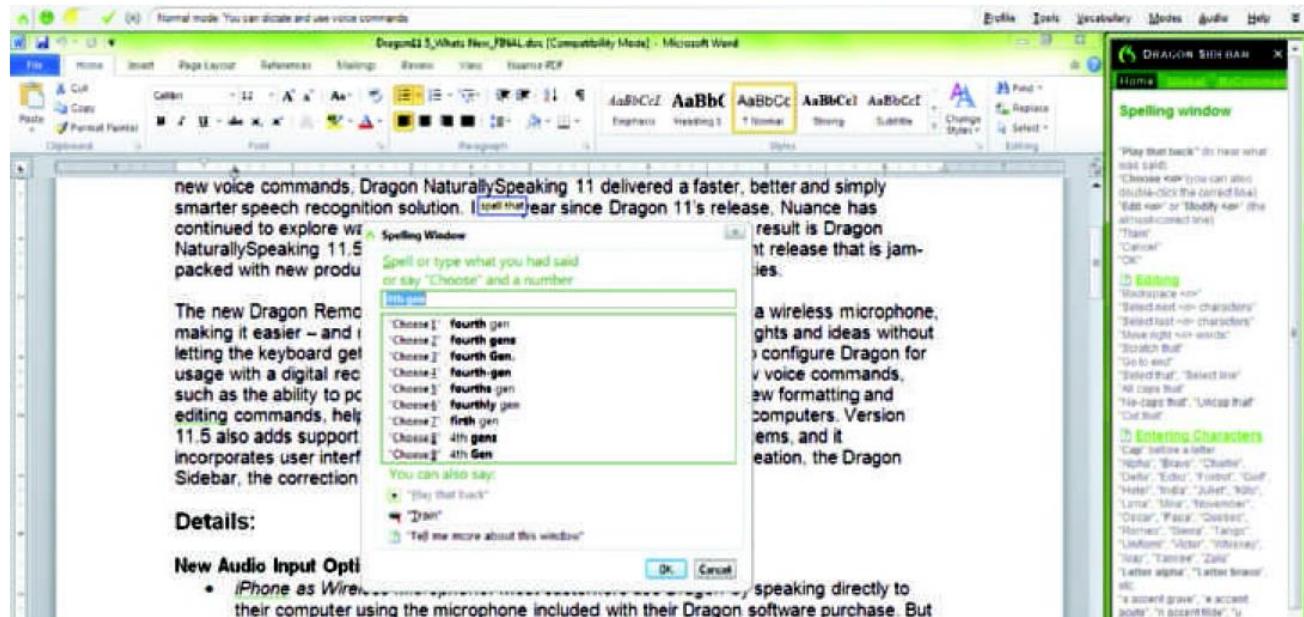
Natural Language Processing

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

- After converting sounds into words, natural language-processing systems react to the words or commands by performing a variety of tasks.
- Using voice recognition to convert recordings into text is also possible.
- Some companies claim that voice recognition and natural language-processing software is so good that customers forget they are talking to a computer and start discussing the weather or sports scores.



Learning Systems

- Another aspect of AI deals with learning systems, a combination of software and hardware that allows a computer to change how it functions or how it reacts to situations based on feedback it receives.
- For example, some computerized games have learning abilities. If the computer does not win a game, it remembers not to make the same moves under the same conditions again.



Learning Systems

- Learning systems software requires feedback on the results of actions or decisions.
- The feedback is used to alter what the system will do in the future.
- After Google combined natural language processing with learning systems in its Android smartphone operating system, it reduced word-recognition errors by 25 percent.

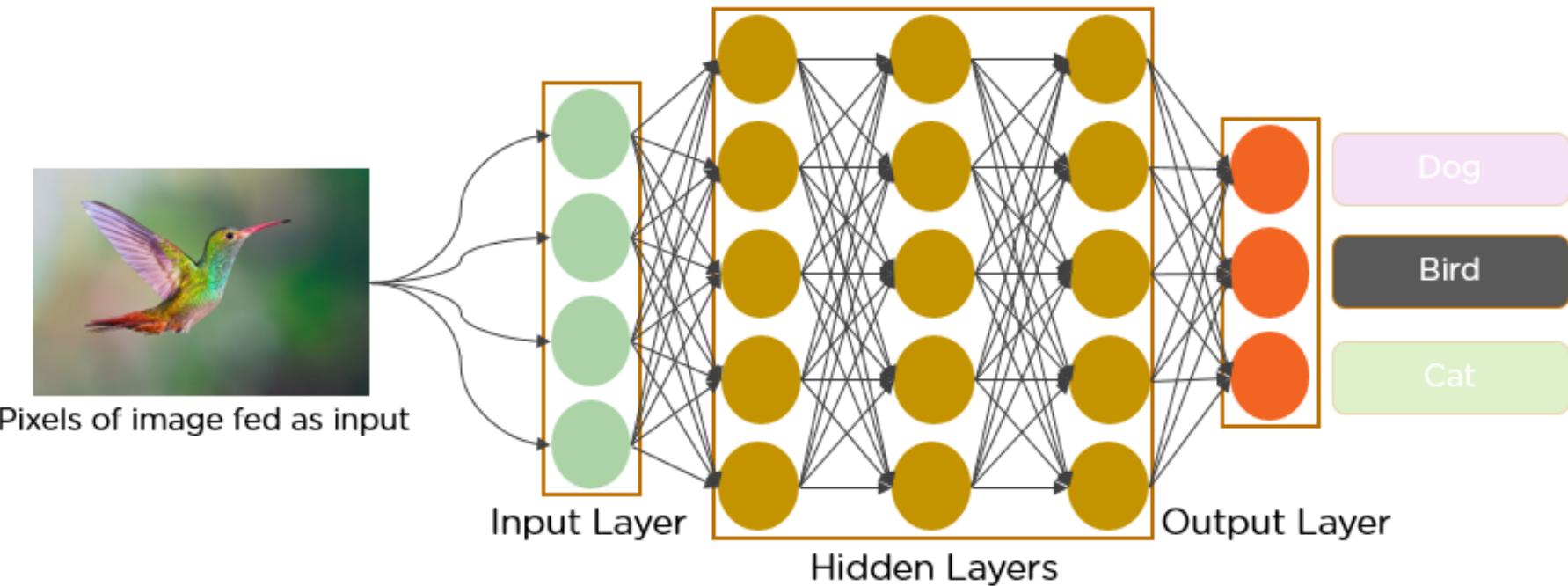


Neural Networks

- An increasingly important aspect of AI involves neural networks, also called neural nets.
- A **neural network** is a computer system that employs massively parallel processors in an architecture that is based on the human brain's own mesh-like structure.
- As a result, neural networks can process many pieces of data at the same time and learn to recognize patterns.



Neural Networks





Applications of Neural Networks

- Handwriting Recognition
- Signature Verification
- Stock Exchange Prediction
- Facial Recognition
- Object Recognition
- Speech recognition
- Clinical diagnosis
- ...



Multimedia and Virtual Reality

- The use of multimedia and virtual reality has helped many companies achieve a competitive advantage and increase profits.
- The approach and technology used in multimedia is often the foundation of virtual reality systems.



Overview of Multimedia

- Multimedia is content that uses more than one form of communication—such as text, graphics/images, audio, video and animation.
- Many companies use multimedia approaches to develop animations and video games to help advertise products and services.
- Although not all organizations use the full capabilities of multimedia, most use text and graphics capabilities.

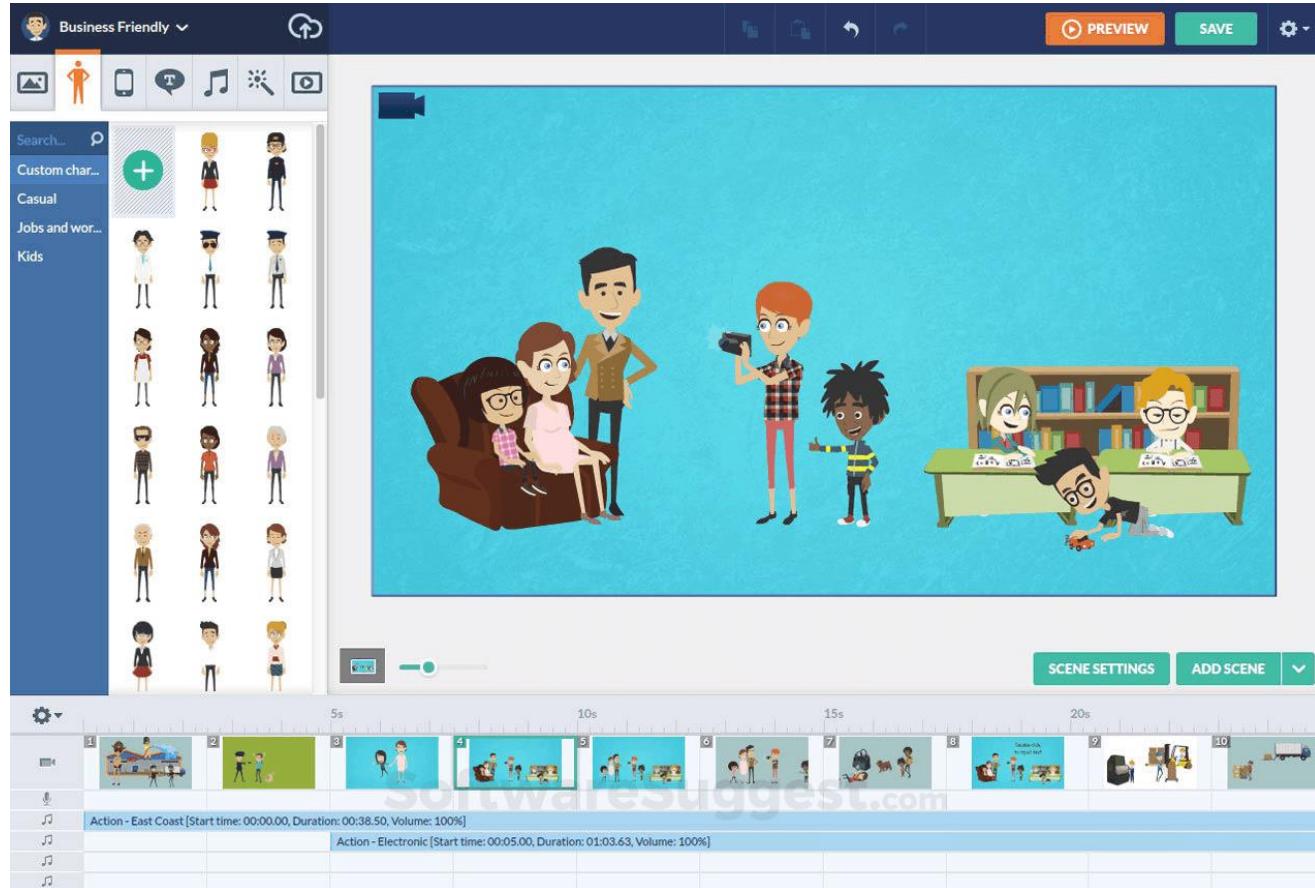


Overview of Multimedia

- Animation software, such as Vyond and Powtoon, offer tools for individuals and businesses looking to develop animations.



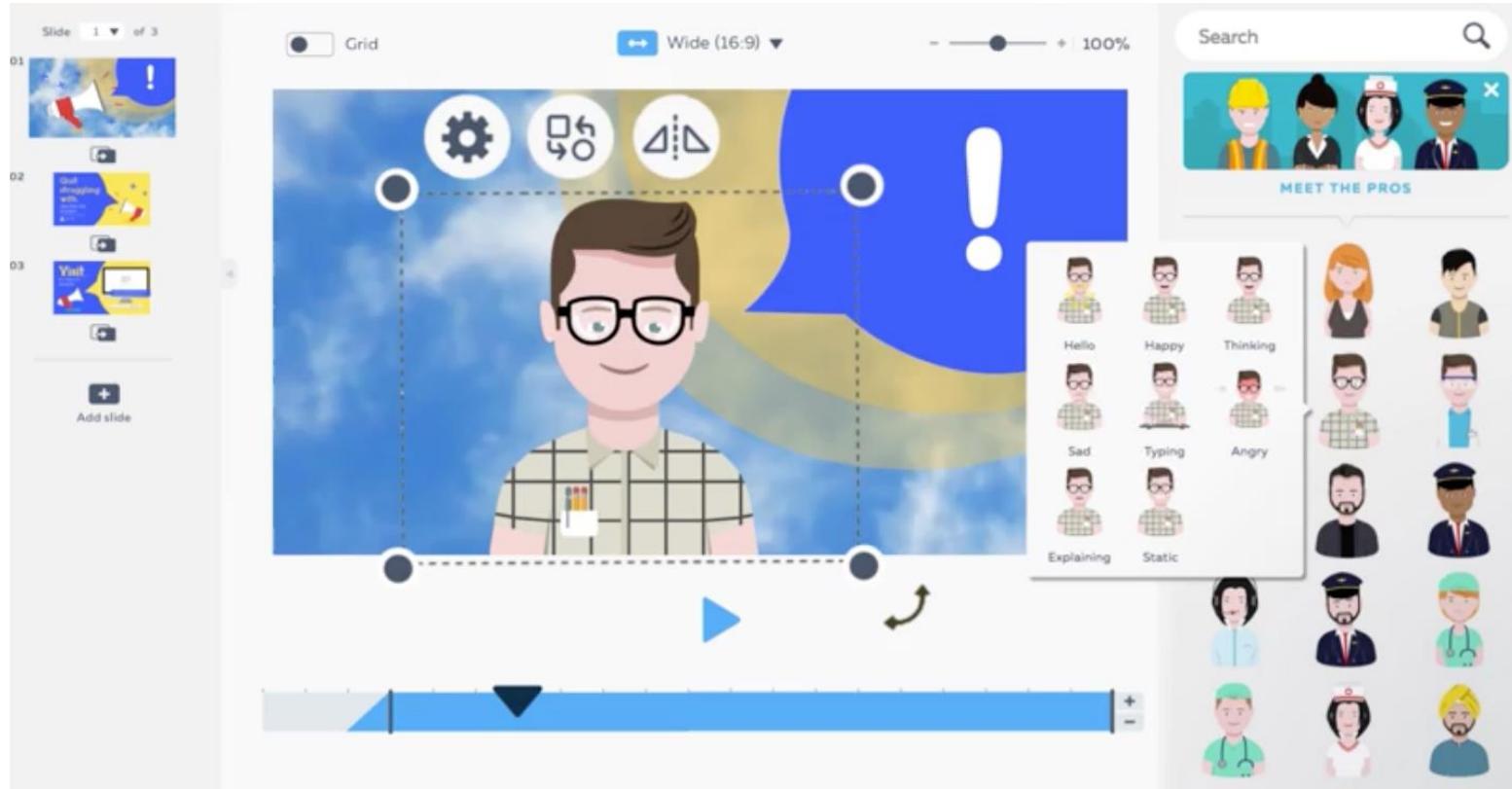
Overview of Multimedia



Vyond (formerly known as GoAnimate) is an American cloud-based animated video creation platform.



Overview of Multimedia



Powtoon: a cloud-based animation software for creating animated presentations and animated explainer videos.



File Compression

- Because multimedia files can be large, it is sometimes necessary to compress files to make them easier to download from the Internet or send as email attachments.
- Many of the multimedia software programs can be used to compress multimedia files such as ScriptPNG, WinZip, and Wondershare Video Converter Ultimate.



Designing a Multimedia Application

- Multimedia applications can be printed in brochures, placed into reports, uploaded to the Internet, or displayed on large screens for viewing.
- Because these applications are typically more expensive than preparing documents and files in a word-processing program, it is important to spend time designing the best possible multimedia application.



Designing a Multimedia Application

- For example,
 - Because different computers and Web browsers display information differently, it is a good idea to select styles, fonts, and presentations based on computers and browsers that are likely to display the multimedia application.



Designing a Multimedia Application

- For example,
 - Because large files can take much longer to load into a Web page, smaller files are usually preferred for Web-based multimedia applications.



Overview of Virtual Reality

- The term “virtual reality” was initially coined in 1989, which refers to immersive virtual reality in which the user becomes fully immersed in an artificial, 3D world that is completely generated by a computer.
- A **virtual reality system** enables one or more users to move and react in a computer-simulated environment.



Overview of Virtual Reality

- Users see, hear and manipulate virtual objects much as they would real objects.





Overview of Virtual Reality

- In 2014, Facebook bought the Oculus VR company for \$2 billion.
- In justifying, Mark Zuckerberg said “while mobile is the key platform for today, virtual reality will be one of the major platforms for tomorrow.”



Overview of Virtual Reality

“Imagine enjoying a courtside seat at a game, studying in a classroom of students and teachers all over the world or consulting with a doctor face-to-face, just by putting on goggles in your home.”





Interface Devices

- To see in a virtual world, the user often wears a head-mounted display (HMD) with screens directed at each eye.
- The HMD also contains a position tracker to monitor the location of the user's head and the direction that the user is looking.
- Employing this information, a computer generates images of the virtual world to match the direction in which the user is looking and displays these images on the HMD.





Interface Devices

- The haptic interface, which relays the sense of touch and other physical sensations in the virtual world, is the least developed and perhaps the most challenging virtual reality component to create.
- One virtual reality company has developed a haptic interface device that can be placed on a person's fingertips to give an accurate feel for game players, surgeons, and others.



Interface Devices

- Today, some virtual reality developers are even trying to incorporate taste and smell into virtual reality applications.



Interface Devices



SenseGlove Nova allows users to interact with digital objects in a virtual world just as they would in real-life.



Forms of Virtual Reality

Aside from immersive virtual reality, virtual reality can also refer to applications that are not fully immersive, such as:

- Mouse-controlled navigation through a 3D environment on a graphics monitor.
- Stereo viewing from the monitor via stereo glasses.
- Stereo projection systems.



3D PluraView monitor from Schneider Digital enables professional users to work comfortably in a 3D-stereo environment.



Augmented Reality

- Augmented reality, a newer form of virtual reality, has the ability to superimpose digital data over real photos or images.

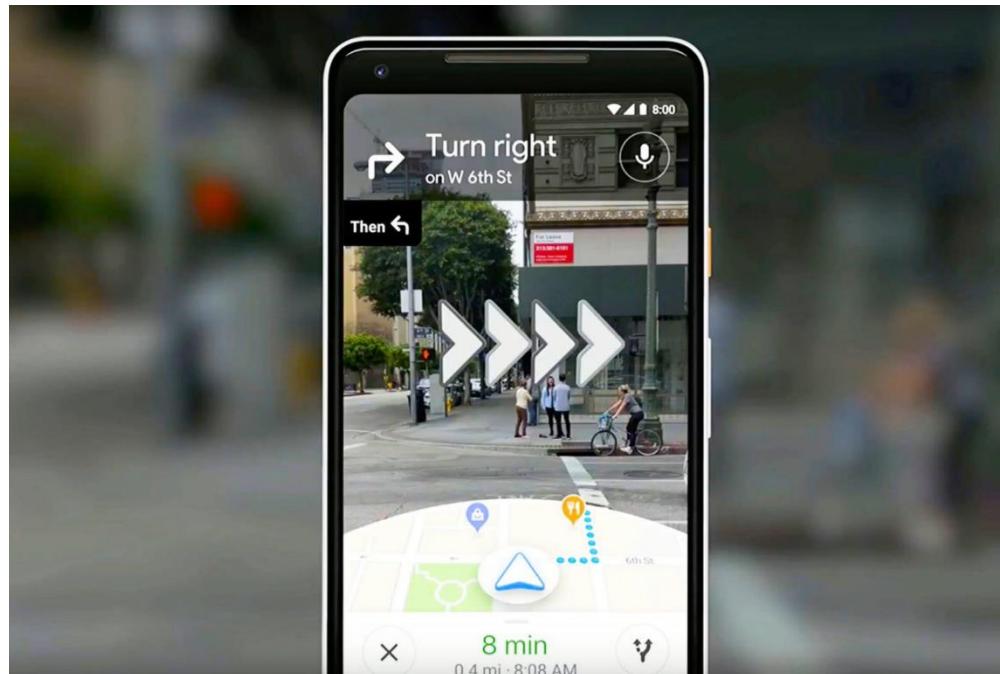


AR For Real Estate



Augmented Reality

- GPS maps can be combined with real pictures of stores and streets to help you locate your position or find your way to a new destination.





Augmented Reality

- Using augmented reality, you could point a smartphone camera at a historic landmark, such as a castle, museum, or other building, and have information about them appear on your screen.





Augmented Reality

- Although still in its early phases of implementation, augmented reality has the potential to become an important feature of tomorrow's smartphones.



Virtual Reality Applications

- Thousands of applications of virtual reality are available, with more being developed as the cost of hardware and software declines and as people's imaginations are opened to the potential of virtual reality.
- Virtual reality applications are being used in medicine, education and training, business, and entertainment, etc.



Virtual Reality Applications

□ Medicine

- Virtual reality has been successful in treating children with autism by helping them pick up on social cues, refine their motor skills, and acquire real-life skills, such as looking both ways before crossing the street.
- Virtual reality has also been used to help train medical students with simulations for many forms of surgery from brain surgery to delivery of a baby.



Virtual Reality Applications

- Education and Training
 - Google Expeditions lets students experience 360-degree views of outer space, caves in Slovakia, Antarctica, the Amazon rainforest, and more than 100 other locations.



Virtual Reality Applications

- Education and Training
 - Virtual technology is also being used to train members of the military.
 - The user sees, touches, and manipulates the various parts of the virtual aircraft during training.
 - Also, the Pentagon is using a virtual reality training lab to prepare for a military crisis. The virtual reality system simulates various war scenarios.



Virtual Reality Applications

- Business and Commerce
 - Virtual reality is being used in business for many purposes. For example,
 - Ford uses virtual reality technology to refine its auto designs.
 - Several teams within the National Football League (NFL) have begun using virtual reality applications to train players.



Virtual Reality Applications

- Business and Commerce
 - Virtual reality is being used in business for many purposes. For example,
 - Swedish furniture chain IKEA recently launched a virtual reality app that allows users to experiment with different kitchen design features. The app is intended to help consumers make design choices



Other Specialized Systems

In addition to artificial intelligence, expert systems, and virtual reality, other interesting specialized systems continue to be developed, including

- Assistive Technology Systems
- Game theory
- Informatics



Assistive Technology Systems

- Assistive technology systems includes a wide range of assistive, adaptive, and rehabilitative devices to help people with disabilities perform tasks that they were formerly unable to accomplish or had great difficulty accomplishing.
- Many assistive technology products are designed to enhance the human-computer interface.



Assistive Technology Systems

- Electronic pointing devices are available that enable users to control the pointer on the screen without the use of hands, using eye movements, and even nerve signals and brain waves, etc.



Assistive Technology Systems

- Sip-and-puff systems are activated by inhaling or exhaling.
- Screen readers can be used to speak everything displayed on the computer screen, including text, graphics, control buttons, and menus.
- Speech recognition software enables users to give commands and enter data using their voices rather than a mouse or keyboard.



Assistive Technology Systems

- Text-to-speech synthesizers can “speak” all data entered to the computer to allow users hear what they are typing.



Assistive Technology Systems

- Personal emergency response systems use electronic sensors connected to an alarm system to help maintain security, independence, and peace of mind for anyone who is living alone, at risk for falls, or recuperating from an illness or surgery.
- These systems include fall detectors, heart monitors, and unlit gas sensors.
- When an alert is triggered, a message is sent to a caregiver or contact center who can respond appropriately.



Game Theory

- **Game Theory:** A mathematical theory for developing strategies for dealing with competitive situations where the outcome of a participant's choice of action depends critically on the actions of other participants.
- Game theory has been applied to contexts in war, business, and computer science.
- Game theory involves the use of information systems to develop competitive strategies for people, organizations, or even countries.



Informatics

- Informatics is the combination of information technology with traditional disciplines, such as medicine or science.
- Informatics places a strong emphasis on the interaction between humans and technology—with the goal of engineering information systems that provide users with the best possible user experience.



Informatics

- Indeed, informatics represents the intersection of people, information, and technology.

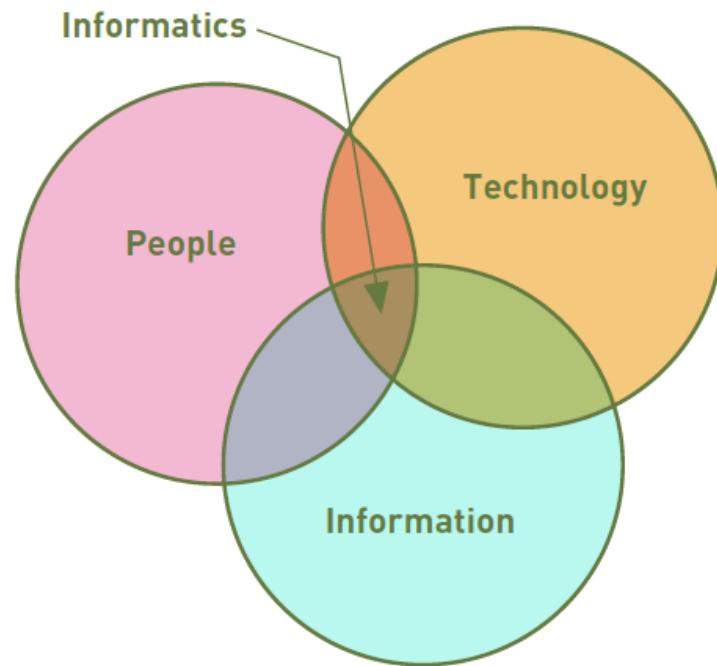


FIGURE 10.16

Informatics

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



Informatics

- Those who study informatics learn how to build new computing tools and applications. They gain an understanding of how people interact with information technology and how information technology shapes our relationships, our organizations, and our world.



Informatics

- Biomedical informatics (or bioinformatics) develops, studies, and applies theories, methods, and processes for the generation, storage, retrieval, use, and sharing of biomedical data, information, and knowledge.
- Healthcare Informatics apply computer systems and technology to increase efficiency, reduce medical errors, and improve health care.



References

- **Reynolds, George Walter, Stair, Ralph M.**
“Principles of information systems”, 13e – 2017