Introduction to Information Systems

CHAPTER OUTLINE

1. Why Should I Study Information Systems?
2. Overview of Computer-Based Information Systems
3. How Does IT Impact Organizations?
4. Importance of Information Systems to Society

LEARNING OBJECTIVES

1. Identify the reasons why being an informed user of information systems is important in today's world.
2. Describe the various types of computer-based information systems in an organization.
3. Discuss ways in which information technology can affect managers and non-managerial workers.
4. Identify positive and negative societal effects of the increased use of information technology.

Introduction

IS *IT* (handwritten diagram)
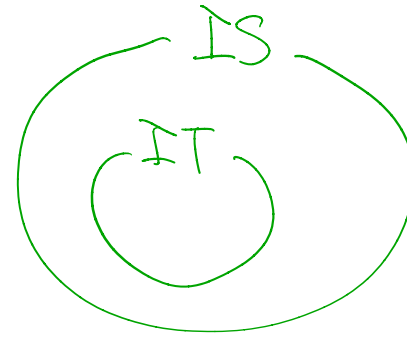
- **Information Technology (IT):** *focus on* any computer-based tool that people use to work with information and to support the information and information-processing needs of an organization. *HW SW DB Network*

- **Information System (IS):** collects, processes, stores, analyzes, and disseminates information for a specific purpose. *IT + process + people*

- **Informed User:** A person knowledgeable about information systems and information technology

1.1 Why Should I Study Information Systems

- The Informed User – You!
- IT Offers Career Opportunities
- Managing Information Resources

1.1 Why Should I Study Information Systems

- Most connected generation
- Smart devices(Mobile Phone, Laptop, Tablets, etc)
- Wired and Wireless Networks
- Web-based tools
- Registering for class, taking class, accessing syllabus, presenting report using PPT,
- shopping, banking, selling your stuffs,
- searching for, applying for, making reservation(hotel, airline, rent car), creating blog, posting podcasts and videocasts, printing digital photos, receiving news using RSS(rich site summary, really simple syndication), tweeting, sending message, sending Snaps, etc

Reasons Why You Should Be An Informed User…

1. You will benefit more from your organization's IT applications because you will understand what is "behind" those applications.
2. Your input can enhance your organization's IT applications.
3. As you enter the workforce, you can assist in selecting the IT applications your organization will use.
4. You will aware of both new information technologies and rapid developments in existing technologies.
5. You will understand how using IT can improve your organization's performance.
6. If you are entrepreneurial minded, you can use IT to start your own business.

IT Offers Career Opportunities

- Chief Information Officer (CIO)
  - The executive who is in charge of the IS function
- Substantial Demand for IT Staff
  - Programmers
  - Business Analysts
  - System Analysts
  - Designers
- $130,000 is the median salary in 2015 for IS Managers (US Dept of Labor)

IT Jobs

Position	Job Description
Chief Information Officer	Highest-ranking IS manager; responsible for all strategic planning in the organization
IS Director	Manages all systems throughout the organization and the day-to-day operations of the entire IS organization
Information Center Manager	Manages IS services such as help desks, hot lines, training, and consulting
Applications Development Manager	Coordinates and manages new systems development projects
Project Manager	Manages a particular new systems development project
Systems Manager	Manages a particular existing system
Operations Manager	Supervises the day-to-day operations of the data and/or computer center
Programming Manager	Coordinates all applications programming efforts
Systems Analyst	Interfaces between users and programmers; determines information requirements and technical specifications for new applications
Business Analyst	Focuses on designing solutions for business problems; interfaces closely with users to demonstrate how IT can be used innovatively
Systems Programmer	Creates the computer code for developing new systems software or maintaining existing systems software
Applications Programmer	Creates the computer code for developing new applications or maintaining existing applications
Emerging Technologies Manager	Forecasts technology trends; evaluates and experiments with new technologies
Network Manager	Coordinates and manages the organization's voice and data networks
Database Administrator	Manages the organization's databases and oversees the use of database-management software
Auditing or Computer Security Manager	Oversees the ethical and legal use of information systems
Webmaster	Manages the organization's Web site
Web Designer	Creates Web sites and pages

IT Jobs in Best Jobs(2015)

U.S. News & World Report (out of 25)

- #3 Software Developer
- #7 Computer System Analyst
- #8 Information Security Analyst
- #11 Web Developer
- #21 IT Manager

Money

- #1 Software Architect
- #2 Video Game Designer
- #8 Database Developer
- #9 Information Assurance (Security) Analyst
- #11 Clinical Applications Specialist (IT in healthcare)
- #14 User Experience Designer
- #17 IT Program Manager

Forbes (out of 10)

- #8 Software Engineer
- #10 Computer Systems Analyst

Managing Information Resources

- Managing information systems (IS) is difficult and complex
- Contributing Factors:
  - Strategic value of IS's
    - Firms rely on them so heavily that, in some cases, when these systems are not working, the firm cannot function.
  - Acquiring, operating, and maintaining IS's is very expensive
  - Evolution of the IS Function
    - Mainframe -> Client and Server -> Cloud

Managing Information Resources

- Traditional Functions of the MIS :
    - Managing systems development and systems project management
    - Managing computer operations, including the computer center
    - Staffing, training, and developing IS skills
    - Providing technical services
    - Infrastructure planning, development, and control

- New (Consultative) Functions of the MIS :
    - Initiating and designing specific strategic information systems
    - Incorporating the Internet and electronic commerce into the business
    - Managing system integration including the Internet, intranets, and extranets
    - Educating the non-MIS managers about IT
    - Educating the MIS staff about the business
    - Partnering with business-unit executives
    - Managing outsourcing
    - Proactively using business and technical knowledge to seed innovative ideas about IT
    - Creating business alliances with business partners

1.2 Overview of Computer-Based IS's

- Data – Information – Knowledge
- Computer-Based Information System (CBIS)
  - an information system that uses computer technology to perform some or all of the its intended tasks.
- Types of Computer-Based Information Systems (CBIS)

Data – Information – Knowledge

- **Data Items:**
  - an elementary description of things, events, activities, and transactions that are recorded, classified, and stored but are not organized to convey any specific meaning.
  - Data items can be numbers, letters, figures, sounds, and images.
  - Examples of data items are collections of numbers (e.g., 3.11, 2.96, 3.95, 1.99, 2.08) and characters (e.g., B, A, C, A, B, D, F, C).
- **Information:**
  - refers to data that have been organized so that they have meaning and value to the recipient.
  - For example, a grade point average (GPA) by itself is data, but a student's name coupled with his or her GPA is information.
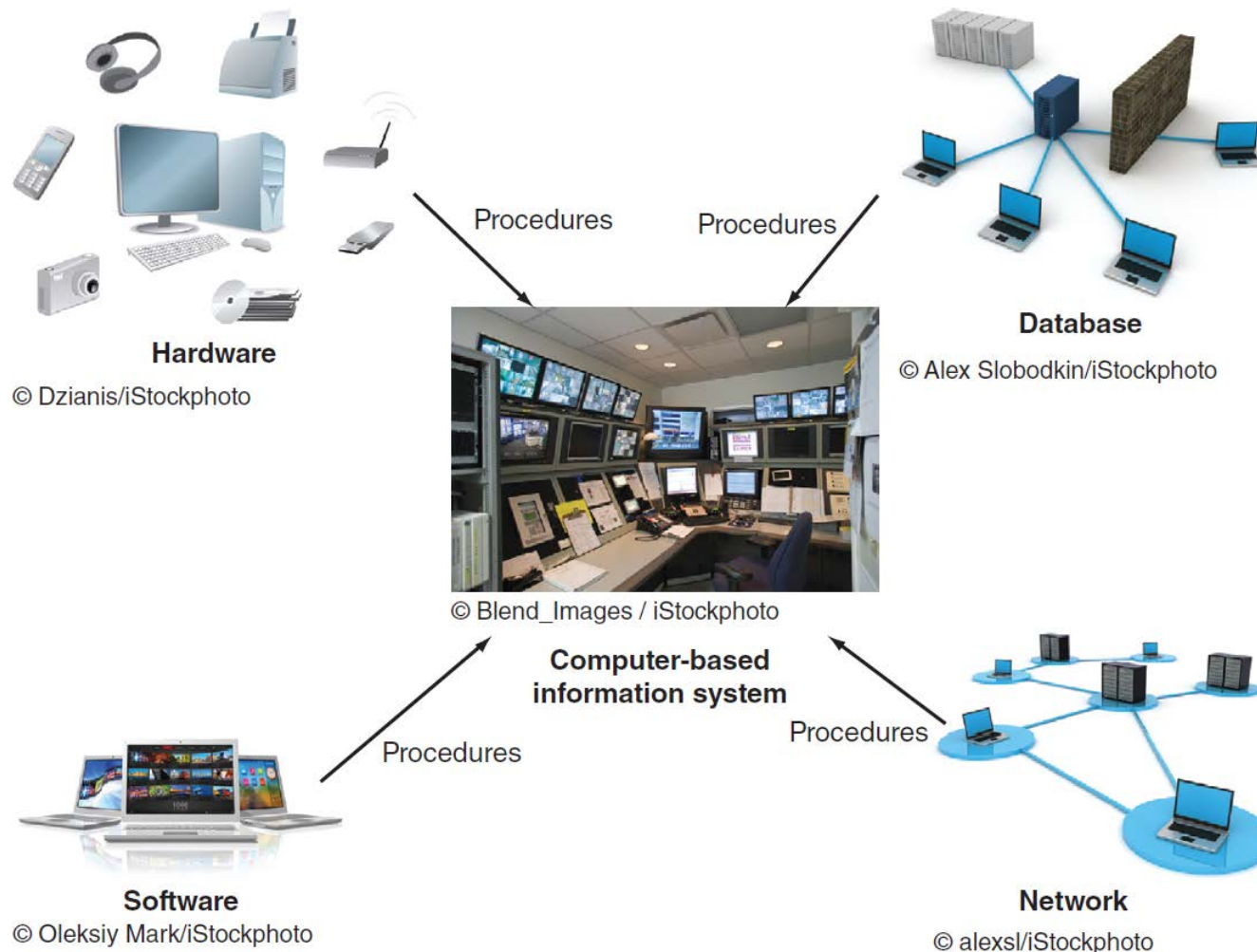- **Knowledge:**
  - consists of data and/or information that have been organized and processed to convey understanding, experience, accumulated learning, and expertise as they apply to a current business problem.
  - For example, suppose that a company recruiting at your school has found over time that students with grade point averages over 3.0 have experienced the greatest success in its management program.

Data – Information – Knowledge

Data	Information	Knowledge
[No context]	[University context]	
3.16	3.16 + John Jones = GPA	* Job prospects
2.92	2.92 + Sue Smith = GPA	* Graduate school prospects
1.39	1.39 + Kyle Owens = GPA	* Scholarship prospects
3.95	3.95 + Tom Elias = GPA	
Data	**Information**	**Knowledge**
[No context]	[Professional baseball pitcher context]	
3.16	3.16 + Ken Rice = ERA	
2.92	2.92 + Ed Dyas = ERA	* Keep pitcher, trade pitcher, or send pitcher to minor leagues
1.39	1.39 + Hugh Carr = ERA	* Salary/contract negotiations
3.95	3.95 + Nick Ford = ERA	
GPA = Grade point average (higher is better)		
ERA = Earned run average (lower is better); ERA is the number of runs per nine innings that a pitcher surrenders.		

Components of a CBIS

Hardware
© Dzianis/iStockphoto

Procedures

Procedures

Database
© Alex Slobodkin/iStockphoto

© Blend_Images / iStockphoto

Computer-based
information system

Software
© Oleksiy Mark/iStockphoto
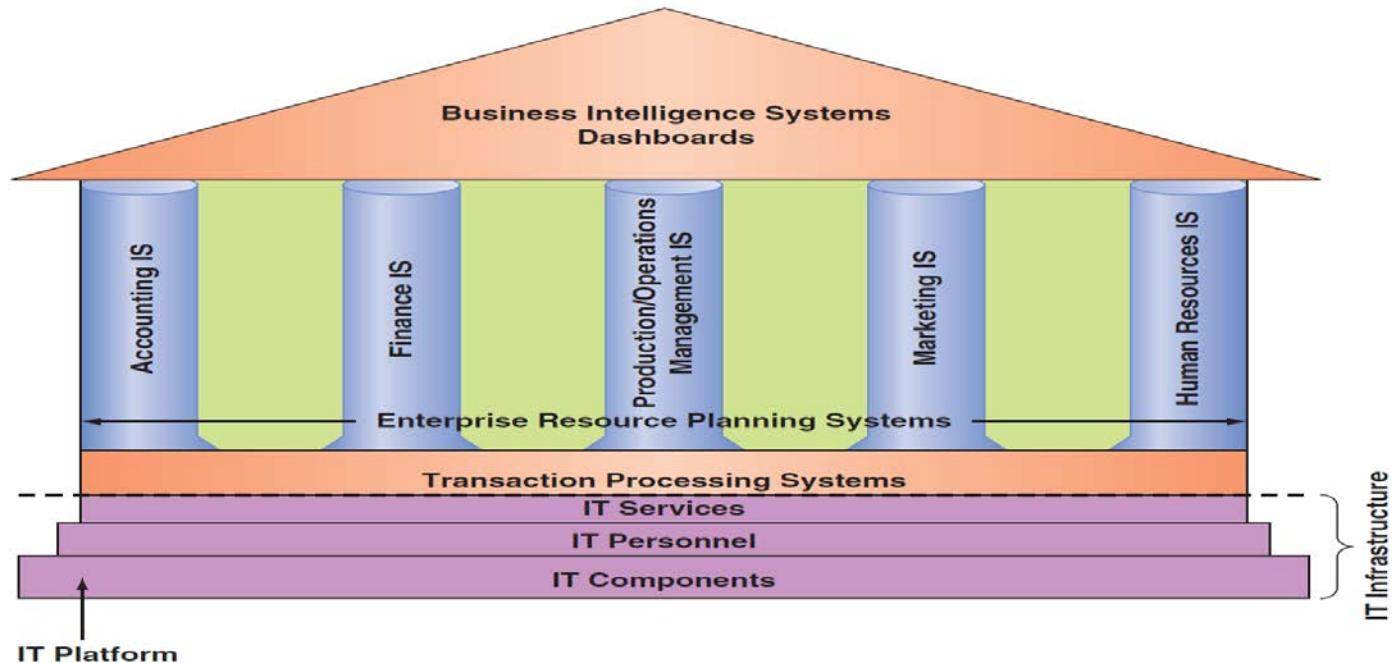
Procedures

Procedures

Network
© alexsl/iStockphoto

Components of a CBIS

- **Information Technology Components**
- **Hardware:** consists of devices such as the processor, monitor, keyboard, and printer.
- **Software:** a program or collection of programs that enable the hardware to process data.
- **Database:** a collection of related files or tables containing data.
- **Network:** a connecting system (wireline or wireless) that permits different computers to share resources.

- **Procedures:** are the instructions for combining the above components to process information and generate the desired output.
- **People:** individuals who use the hardware and software, interface with it, or utilize its output.

Computer-Based Information Systems (CBIS)

IT Components: Hardware, Software, a database, a network, procedures, and people.
IT Services: IT Personnel use IT Components to develop IS's, oversee security & risk, and manage data.
These activities cumulatively are called [information technology services](#).
IT Infrastructure: The IT components and IT services.
Application: A program designed to support a specific task or business process.
Functional Area Information Systems (FAIS) : a collection of application programs in a single department or functional area.

Major Capabilities of Information Systems

- Perform high-speed, high-volume numerical computations.
- Provide fast, accurate communication and collaboration within and among organizations.
- Store huge amounts of information in an easy-to-access, yet small space.
- Allow quick and inexpensive access to vast amounts of information, worldwide.
- Analyze and interpret vast amounts of data quickly and efficiently.
- Automate both semiautomatic business processes and manual tasks.

Types of Computer Based Information Systems (CBIS)

- Breadth of Support for Information Systems (IS)
- Support for Organizational Employees

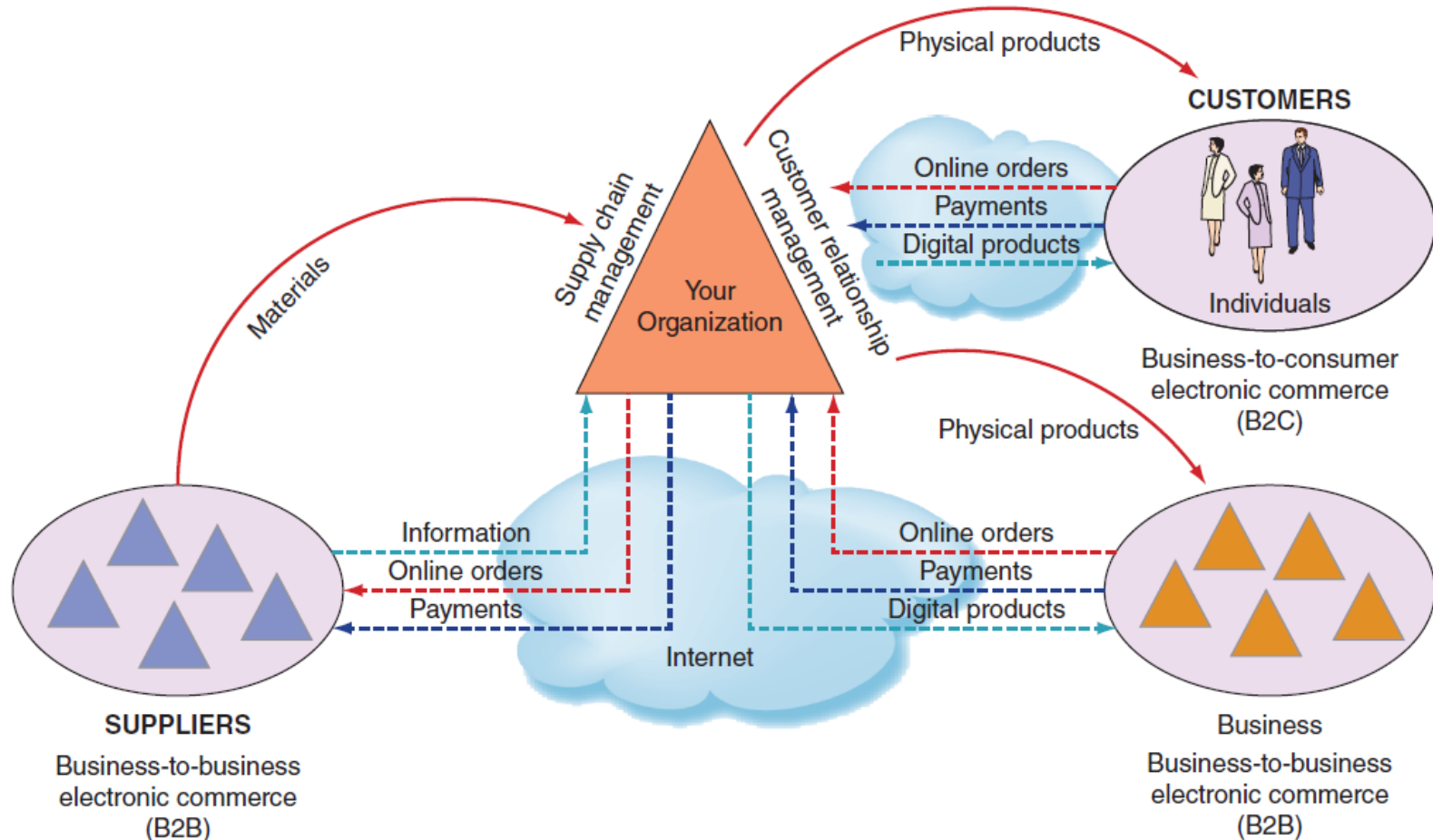# Figure 1.5: IS that function among multiple organizations

Figure 1.5 Information systems that function among multiple organizations.

Breadth of Support for Information Systems (IS)

- **In finance and accounting,**
  - Forecasting revenue
  - Determining the best sources and uses of funds
  - Performing audits
- **In sales and marketing,**
  - **Product analysis:** Developing new goods and services
  - **Site analysis:** Determining the best location for production and distribution facilities
  - **Promotion analysis:** Identifying the best advertising channels
  - **Price analysis:** Setting product prices to obtain the highest total revenues
- **In manufacturing,**
  - Production scheduling
  - **Inventory management:** Controlling inventory level
  - Computer Aided Design(CAD)
  - Computer Aided Manufacturing(CAM)
- **In human resources,**
  - Recruiting process
  - Career management
  - Employee evaluation

Breadth of Support for Information Systems (IS)

- **Functional Area Information Systems (FAIS) :** a collection of application programs in a single department or functional area.
- **Enterprise Resource Planning (ERP):** systems are designed to correct a lack of communication among the functional area IS.

  ERP systems span the FAISs.
- **Transaction Processing System (TPS):** systems that support the monitoring, collection, storage, and processing of data from the organization's basic business transactions, each of which generates data.

  When you are checking out at Walmart, for example, a transaction occurs each time the cashier swipes an item across the bar code reader.
- **Interorganizational Information systems (IOSs):** Information systems that connect two or more organizations.
- **Electronic Commerce (e-commerce) Systems:** an interorganizational information system that enable organizations to conduct transactions, called business-to-business (B2B) electronic commerce, and customers to conduct transactions with businesses, called business-to-consumer (B2C) electronic commerce.

Support for Organizational Employees

- **Knowledge Workers:** professional employees that are experts in a particular subject area (e.g., financial and marketing analysts, engineers, lawyers, and accountants.).
- **Office Automation Systems (OASs):** typically support the clerical staff, lower and middle managers, and knowledge workers (e.g., word processing and desktop publishing software).
- **Business Intelligence (BI) Systems:** systems that provide computer-based support for complex, nonroutine decisions, primarily for middle managers and knowledge workers.
- **Expert Systems (ES):** systems that attempt to duplicate the work of human experts by applying reasoning capabilities, knowledge, and expertise within a specific domain.
- **Dashboards:** a special form of IS that support all managers of the organization by providing rapid access to timely information and direct access to structured information in the form of reports.

Types of Organizational Information Systems (Table 1.4)

Type of System	Function	Example
Functional area IS	Supports the activities within specific functional area.	System for processing payroll
Transaction processing system	Processes transaction data from terminal	Walmart checkout point-of-sale business events
Enterprise resource planning	Integrates all functional areas of the organization.	Oracle, SAP system
Office automation system	Supports daily work activities of individuals and groups.	Microsoft® Office
Management information system	Produces reports summarized from transaction data, usually in one functional area.	Report on total sales for each customer
Decision support system	Provides access to data and analysis tools.	"What-if" analysis of changes in budget
Expert system	Mimics human expert in a particular area and makes decisions.	Credit card approval analysis
Executive dashboard	Presents structured, summarized information about aspects of business important to executives.	Status of sales by product
Supply chain management system	Manages flows of products, services, and information among organizations.	Walmart Retail Link system connecting suppliers to Walmart
Electronic commerce system	Enables transactions among organizations and between organizations and customers.	www.dell.com

1.3 How Does IT Impact Organizations?

- IT Impacts Entire Industries
- IT Reduces the Number of Middle Managers
- IT Change's the Manager's Job
- Will IT Eliminate Jobs?
- IT Impacts Employees at Work

IT Impacts Entire Industries

- In July 2015, United Airlines flights were grounded worldwide for about two hours due to a computer problem in the airline's reservation system. United canceled 61 flights and another 1,162 flights were delayed.
- Also in July 2015, the New York Stock Exchange suspended trading for almost four hours due to a software upgrade.

- Book Industry
  - What is the largest book publisher and bookseller in the United States today?
  - electronic (or digital) books
  - In 2001, Borders agreed to hand over its online business to Amazon because Borders was convinced that online book sales were nonstrategic and unimportant. Ten years later, Borders filed for bankruptcy.
- Music Industry
  - "Big Three" music labels: Warner Music Group (www.wmg.com), Universal Music (www.universalmusic.com), and Sony (www.sonymusic.com).
  - the emergence of digital music streaming technologies
  - Internet radio companies such as Pandora (www.pandora.com)
  - interactive companies such as Spotify (www.spotify.com) and Apple's iTunes (www.apple.com/itunes)

IT Impacts Entire Industries

- ## Video Industry
  - Blockbuster which rented and sold videos through its chain of stores was the industry leader. Blockbuster declared bankruptcy in February 2011
  - Netflix (www.netflix.com).

- ## Soteware Industry
  - Incumbent software companies such as Oracle and Microsoft are increasingly threatened by software-as-a-service (SaaS) products (e.g., Salesforce.com) and Android, an open-source operating system developed by the Open Handset Alliance (www.openhandsetalliance.com)

IT Impacts Entire Industries

- ## Videogame Industry
  - Today, the fastest growing entertainment companies are videogame makers
  - Epic games (www.epicgames.com), the creator of Fortnite; Rovio (www.rovio.com), the maker of Angry Birds.

- ## Photography Industry
  - the longtime market leader, Kodak declared bankruptcy in January 2012.
  - people can upload photos automatically to the Internet for permanent archiving and global sharing
  - Shutterfly (www.shutterfly.com), Snapfish (www.snapfish.com), Flickr (www.flickr.com), and Instagram (www.instagram.com).

IT Impacts Entire Industries

- ## Marketing Industry
  - Today's largest direct marketing companies include Facebook (www.facebook.com), Google (www.google.com), and Foursquare (www.foursquare.com)

- ## Recruiting Industry
  - LinkedIn (www.linkedin.com) is disrupting the traditional job recruiting industry.

- ## Financial Services Industry
  - Square (https://squareup.com) allows anyone to accept credit card payments with a mobile phone.

IT Impacts Entire Industries (Continued)

- Motion Picture Industry
  - The process of making feature-length computer-generated films has become incredibly IT intensive.
  - DreamWorks Animation (www.dreamworksanimation.com), a motion picture studio that creates animated feature films, television programs, and online virtual worlds.

- Automotive Industry
  - In modern cars, software is responsible for running the engines; controlling safety features; entertaining passengers; guiding drivers to their destinations; and connecting the car to mobile, satellite, and GPS networks.
  - self-driving car

IT Impacts Entire Industries (Continued)

- Agriculture Industry
  - precision agriculture makes use of automated, driverless tractors controlled by global positioning systems and software.
- National Defense Industry
  - Software-powered drone aircraft launch airstrikes without placing human pilots at risk
  - Intelligence agencies perform large-scale data mining with software to uncover and track potential terrorist plots.
- Fashion Industry
  - Rent the Runway (www.renttherunway.com) has redefined the fashion business, making expensive clothing available to more women than ever before.
  - why buy a dress when you can rent one for a very low price?

IT Impacts Entire Industries (Continued)

- Education
  - UniversityNow (www.unow.com), founded to make college more accessible to working adults by offering online, self-paced degrees.
- Legal Profession
  - Blackstone Discovery (www.blackstonediscovery.com) helped one company analyze 1.5 million documents for less than $100,000. That company estimated that the process would have cost $1.5 million had it been performed by lawyers.

IT Impacts Employees at Work

- IT Impacts Employees' Health and Safety
  - job stress and long-term use of the keyboard(Carpal tunnel syndrome)
  - The science of designing machines and work settings that minimize injury and illness is called ergonomics.

IT Impacts Employees at Work

- IT Provides Opportunities for People with Disabilities
  - Computers can create new employment opportunities for people with disabilities by integrating speech-recognition and vision-recognition capabilities.
  - a two-way writing telephone, a page turning robot, and a hospital-bedside video trip to the zoo or the museum.

1.4 Importance of IS to Society

- IT Affects Our Quality of Life
  - The workplace can be expanded from the traditional 9-to-5 job at a central location to 24 hours a day at any location. IT can provide employees with flexibility that can significantly improve the quality of leisure time, even if it doesn't increase the total amount of leisure time.

1.4 Importance of IS to Society

- **The Robot Revolution is Here Now**
  - Industrial Robot
    - Baxter is a new kind of industrial robot by Rethink Robotics (www.rethinkrobotics.com) that sells for $25,000. Humans share a workspace with Baxter, making it an excellent example of a social, collaborative robot.
  - Drone
    - Sensors on drones, coupled with data analytics, are extending precision agriculture beyond simply monitoring crops. Drones help farmers increase crop yields by optimizing the fertilizer mix for different parts of a field down to the square meter. They similarly help winemakers increase yields by precisely controlling drip irrigation down to the individual vine.
    - On large-scale *construction* sites, envisioning the overall "picture" presents a major challenge for contractors. Drones enable project managers from construction giants such as Bechtel (www.bechtel.com) and DPR (www.dpr.com) to monitor progress and supply stockpiles on a real-time basis.
    - The energy industry uses drones for applications beyond monitoring and inspecting pipelines. In Alaska, BP (www.bp.com) uses drones to monitor its gravel-extraction operations to comply with environmental guidelines. ConocoPhillips (www.conocophillips.com) and Chevron (www.chevron.com) use drones in the Arctic to help search for new sources of oil. First Solar (www.firstsolar.com) uses drones to inspect for faulty solar panels.
    - Large *mining* companies such as Rio Tinto (www.riotinto.com) are reducing risk to their workers by using drones to detect potential landslides and to inspect safety infrastructure, as well as to more accurately monitor how much mineral their workers are extracting.
    - American *film and television* studios, such as 20th Century Fox (www.foxmovies.com) and Warner Bros (www.warnerbros.com), have been using drones in their overseas productions because they were allowed to do so by foreign governments.

1.4 Importance of IS to Society

- Improvements in Healthcare
  - Medical personnel use IT to make better and faster diagnoses and to monitor critically ill patients more accurately.
  - IT also has streamlined the process of researching and developing new drugs.
  - Expert systems now help doctors diagnose diseases, and machine vision is enhancing the work of radiologists. Surgeons use virtual reality to plan complex surgeries.
  - They also employ surgical robots to perform long-distance surgery. Finally, doctors discuss complex medical cases via videoconferencing.