**CHAPTER 14: USING TECHNOLOGY TO MANAGE INFORMATION**

**Chapter Overview**

This chapter explores how businesses manage information as a resource, particularly how they use technology to do so. Today, virtually all business functions—from human resources to production to supply chain management—rely on information systems.

The chapter begins by differentiating between information and data and then defines an information system. The components of information systems are presented, and two major types of information systems are described. Because of their importance to organizations, the chapter discusses databases, the heart of all information systems. Then the chapter looks at the computer hardware and software that drive information systems. Today, specialized networks make information access and transmission function smoothly, so the chapter examines different types of telecommunications and computer networks to see how businesses are applying them for competitive advantage.

The chapter then turns to a discussion of the ethical and security issues affecting information systems, followed by a description of how organizations plan for, and recover from, information system disasters. A review of the current trends in information systems concludes the chapter.

**Glossary of Key Terms**

**Application service provider (ASP):** outside supplier that provides both the computers and the application support for managing an information system

**Botnet:** a network of PCs that have been infected with one or more data-stealing viruses

**Chief information officer (CIO):** executive responsible for managing a firm’s information system and related computer technologies

**Cloud computing:** powerful servers store applications software and databases for users to access the software and databases via the Web using anything from a PC to a smart phone

**Computer-based information systems:** information systems that rely on computer and related technologies to store information electronically in an organized, accessible manner

**Data:** raw facts and figures that may or may not be relevant to a business decision

**Database:** centralized integrated collection of data resources

**Decision support system (DSS):** gives direct support to businesspeople during the decision-making process

**Executive support system (ESS):** lets senior executives access the firm’s primary databases, often by touching the computer screen, pointing and clicking a mouse, or using voice recognition

**Expert system:** computer program that imitates human thinking through complicated sets of “if-then” rules

**Firewall:** limit data transfers to certain locations and log system use so that managers can identify attempts to log on with invalid passwords and other threats to a system’s security

**Grid computing:** consists of a network of smaller computers running special software

**Hardware:** all tangible elements of a computer system

**Information:** knowledge gained from processing data

**Information system:** organized method for collecting, storing, and communicating past, present, and projected information on internal operations and external intelligence

**Intranet:** computer network that is similar to the Internet but limits access to authorized users

**Local area networks (LANs):** computer networks that connect machines within limited areas, such as a building or several nearby buildings

**Malware:** any malicious software program designed to infect computer systems

**Management information system (MIS):** information system that is designed to produce reports to managers and other professionals

**Management support systems:** information systems that are designed to provide support for effective decision making

**On-demand computing:** firms essentially rent the software time from application providers and pay only for their usage of the software

**Operational support systems:** information systems designed to produce a variety of information on an organization’s activities for both internal and external users

**Process control system:** operational support system to monitor and control physical processes

**Server:** the heart of a midrange computer network

**Software:** all the programs, routines, and computer languages that control a computer and tell it how to operate

**Spyware:** software that secretly gathers user information through the user’s Internet connection without his or her knowledge, usually for advertising purposes

**Transaction processing system:** operational support system to record and process data from business transactions

**Trojan horse:** program that claims to do one thing but in reality does something else, usually something malicious

**Virtual private networks (VPNs):** secure connections between two points on the Internet

**Viruses:** programs that secretly attach themselves to other programs (called hosts) and change them or destroy data

**VoIP (voice over Internet protocol):** alternative to traditional telecommunication services provided by companies such as Verizon and Qwest

**Wide area networks (WANs):** tie larger geographical regions together by using telephone lines and microwave and satellite transmission

**WiFi:** wireless network that connects various devices and allows them to communicate with one another through radio waves

**Worm:** small piece of software that exploits a security hole in a network to replicate itself

**Learning Objective 1: Distinguish between data, information, and information systems.***It is important for businesspeople to know the difference between data and information. Data are raw facts and figures that may or may not be relevant to a business decision. Information is knowledge gained from processing those facts and figures. An information system is an organized method for collecting, storing, and communicating past, present, and projected information on internal operations and external intelligence. Most information systems today use computer and telecommunications technology.*

**Annotated Lecture Outline**

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| **Opening Vignette:**  **Evernote Raises Notetaking to a Profitable Art** EverNote now offers, as CEO Phil Libin calls it, the electronic version of having something on the tip of your tongue. EverNote is a software app for desktops, laptops, and smart phones alike that stores users’ notes, which can be handwritten or typed and include voice messages, and photos, in searchable storage. So far, EverNote has 15 million users, three quarters of whom downloaded the free software version. There is also a version that’s $5 per month. EverNote’s second product, EverNote Peek, became popular in the classroom where teachers and students use iPads and transform them into flashcards. Lisbin would eventually like EverNote to even recognize faces and smells. In the meantime, EverNote continues to expand, adding more employees, buying more companies, and finding more third-party business partners. |  |
| **DATA, INFORMATION, AND INFORMATION SYSTEMS** | PowerPoint Slide 3 |
| * 1. Businesses think about how well a brand is selling, how a price increase affects sales in different regions, and how energy costs impact sales. |  |
| * 1. An effective information system answers these questions. |  |

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| 1. *Data* consist of raw facts and figures that may or may not be relevant to a business decision. | *Lecture Enhancer: Think of a recent situation in which you needed to gather data on a subject. What method(s) did you use to do so?* |
| 1. *Information* is the knowledge gained from processing data. | *Lecture Enhancer: Continuing with the example from #1 above, consider what process you used to transform your data into useful information.* |
| * 1. Data is useless unless transformed into information. |  |
| 1. An *information system* is an organized method for collecting, storing, and communicating past, present, and projected information on internal operations and external intelligence. |  |
| * 1. Most information systems today use computer and telecommunications technology. |  |
| * 1. A large organization typically assigns responsibility for directing its information systems and related operations to an executive called the *chief information officer (CIO)*. |  |
| * 1. An effective CIO can understand and harness technology so that the company can communicate internally and externally in one seamless operation. |  |

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| * 1. The role of a CIO has changed from being a technical one to that of a business partner who often exerts strong influence over his or her company’s strategy. | *Lecture Enhancer: What recent changes in the business environment might account for this change in a CIO’s role?* |
| * 1. Small companies rely just as much on information systems as do large ones, even if they do not employ a manager assigned to this area on a full-time basis. |  |
| * 1. Information systems gather data from inside and outside the organization; they then process the data to produce information that is relevant to all aspects of the organization. |  |
| * 1. Many companies combine high-tech and low-tech solutions to manage the flow of information. |  |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Assessment Check Answers

**1.1 Distinguish between data and information.**

*Data consist of raw facts and figures that may or may not be relevant to a decision. Information is the knowledge gained from processing data.*

**1.2 What is an information system?**

*An information system is an organized method for collecting, storing, and communicating past, present, and projected information on internal operations and external intelligence.*

**Learning Objective 2: List the components and types of information systems.**

*When people think about information systems today, they’re generally thinking about computer-based systems, those that rely on computers and related technologies. Computer-based information systems rely on four components: computer hardware, software, telecommunications and computer networks, and data resource management. The heart of an information system is its database, a centralized integrated collection of data resources. Information systems fall into two broad categories: operational support systems and management support systems. Operational support systems are designed to produce a variety of information for users. Examples include transaction processing systems and process control systems. Management support systems are those designed to support effective decision making. They include management information systems, decision support systems, executive support systems, and expert systems.*

**Annotated Lecture Outline**

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| **COMPONENTS AND TYPES OF INFORMATION SYSTEMS** | PowerPoint Slide 4 |
| 1. *Computer-based information systems*rely on computer and related technologies to store information electronically in an organized, accessible manner. | *Lecture Enhancer: Can you think of an example of an information system that is not computer-based?* |
| 1. Computer-based information systems consist of four components and technologies: |  |
| * 1. Computer hardware |  |
| * 1. Computer software |  |
| * 1. Telecommunications and computer networks |  |
| * 1. Data resource management |  |
| 1. **Databases** |  |
| * 1. A *database*is a centralized, integrated collection of data resources. |  |
| * 1. A company designs its databases to meet particular information processing and retrieval needs of its workforce. |  |
| * 1. Businesses can hire a staff person to build databases on site, hire an outside source to do so, or buy packaged database programs from specialized vendors, such as Oracle. |  |
| * 1. A database must be continually updated. |  |
| * 1. Databases with too much or irrelevant data can contribute to information overload. |  |
| * 1. Databases must be kept secure. | Hit & Miss:  Cyber Attack Trips Up Zappos |
| * 1. Online data are also available: |  |
| i. The general public may access census data via the American FactFinder on the Census Bureau’s Web site, as well as at state data centers and public libraries. | *Lecture Enhancer: Does the availability of this data surprise you? Why or why not?* |
| ii. Company Web sites also offer free data. |  |
| 1. **Types of Information Systems** | PowerPoint Slide 5  **Case 14.1:**  **MICROS Systems Works on a Large Scale** |

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| * 1. ***Operational support systems*** are information systems designed to produce a variety of information on an organization’s activities for both internal and external users. | *Lecture Enhancer:* *Share an example of a company in which the operational support system is the most vital information system.* |
| i. *Transaction processing systems* record and process data from business transactions. |  |
| ii. *Process control systems* monitor and control physical processes. |  |
| * 1. ***Management support systems*** are information systems that are designed to provide support for effective decision making. | *Lecture Enhancer:* *Share an example of a company in which the management support system is the most vital information system.* |
| * + 1. A *management information system (MIS*) produces reports to managers and other professionals. |  |
| * + 1. A *decision support system (DSS)* gives direct support to businesspeople during the decision-making process. |  | |
| * + 1. An *executive support system (ESS)* lets senior executives access the firm’s primary databases, often by touching the computer screen, pointing and clicking a mouse, or using voice recognition. |  | |

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| * + 1. An *expert system* is a computer program that imitates human thinking through complicated  sets of “if-then” rules. |  |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Hit & Miss:**

**Cyber Attack Trips Up Zappos**

**Summary**

Thirty percent of online shoppers forget to change their password for each site they use. Unfortunately, a recent attack on the Internet shoe store Zappos’ database proves why this is important. Hackers had their hands on private information of Zappos’ 24 million customers. Despite Zappos’ security encryption, the last 4 digits of customers’ credit cards still became vulnerable to the hackers, who could potentially pass such information along to spammers for phishing attacks. Customers were alerted right away in hopes of the preservation of both the security of their information and the 12-year reputation of Zappos.**Questions for Critical Thinking**

1. **Do you think Zappos reacted appropriately by emailing customers? Why or why not?**

*Answers will vary. However, it could be argued that although it was appropriate that Zappos contacted their customers to inform them of the hacking incident, it might’ve been more effective to call customers in case customers ignored the important email.*

1. **Do you use a different password for every shopping site you visit?**

*Answers will vary.*

Assessment Check Answers

**2.1 List the four components of a computer-based information system.**

*The four components of a computer-based information system are computer hardware, software, telecommunications and computer networks, and data resource management.*

**2.2 What is a database?**

*A database is a centralized, integrated collection of data resources.*

**2.3 What are the two general types of information systems? Give examples of each.**

*The two categories of information systems are operational support systems (such as transactions processing and process control systems) and management support systems (such as management information, decision support, executive support, and expert systems).*

**Learning Objective 3: Discuss computer hardware and software.**

*Hardware consists of all tangible elements of a computer system, including input and output devices. Major categories of computers include mainframes, supercomputers, midrange systems, personal computers (PCs), and hand-held devices. Computer software provides the instructions that tell the hardware what to do. The software that controls the basic workings of the computer is its* operating system*. Other programs, called* application software*, perform specific tasks that users want to complete.*

**Annotated Lecture Outline**

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| **COMPUTER HARDWARE AND SOFTWARE** |  |
| 1. **Types of Computer Hardware** | PowerPoint Slide 6 |
| * 1. *Hardware* consists of all tangible elements of a computer system. |  |
| * + 1. Input devices: keyboard and mouse |  |
| * + 1. Storage and processing: hard drive, DVD drive, flash memory (USB) devices |  |
| * + 1. Output devices: monitors and printers |  |
| * 1. Classifications of computers: mainframe computers, midrange systems, personal computers, and handheld devices. | PowerPoint Slide 7  *Lecture Enhancer: What specific details must a company take into consideration when deciding on hardware purchases?* |
| * + 1. A mainframe is the largest type of computer system with the most extensive storage capacity and the fastest processing speeds. | *Lecture Enhancer: What are some drawbacks to using mainframe computer systems?* |
| * + 1. Midrange systems consist of high-end and other types of computers that can handle large-scale processing needs. |  |
| * + 1. A *server* is the heart of a midrange network. It supports applications and allows the sharing of output devices, software, and databases among networked users. |  |
| * + 1. Personal computers (PCs) have earned increasing popularity because of their capability to handle many of the functions that large mainframes performed only a few decades ago. | *Lecture Enhancer: Consider and discuss the advantages and disadvantages of each type of PC.* |
| --desktop PCs |  |
| --notebooks or laptops |  |
| --netbooks |  |
| * + 1. Hand-held devices include the personal digital assistant (PDA) and the *smart phone*, which combines a cell phone with a PDA. | *Class Activity: Survey students to see how many have smart phones, and if any use the phone more for Internet access than to talk to someone.***Business Etiquette:** **Courteous Communications via Wireless Devices** |

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| 1. **Computer Software** | PowerPoint Slide 8 |
| * 1. *Software* includes all the programs, routines, and computer languages that control and tell it how to operate. |  |
| * 1. The software that controls the basic workings of a computer is its *operating system.* |  |
| * 1. More than 90 percent of PCs use a version of Microsoft’s Windows operating system. |  |
| * 1. *Applications software* is a program that performs a specific task. | Table 14.1  Common Types of Applications Software |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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Assessment Check Answers

**3.1 List two input and output devices.**

*Input devices include the keyboard and mouse. Output devices include the monitor and printer.*

**3.2 What accounts for the increasing popularity of notebook computers?**

*Notebook computers account for over half of all new personal computers sold. Their increased popularity is due to better displays, lower prices, more rugged designs, increasing computing power, and slimmer designs.*

**3.3 What is software? List the two categories of software.**

*Computer software provides the instructions that tell the hardware what to do. The software that controls the basic workings of the computer is its* operating system*. Other programs, called* application software, *perform specific tasks that users want to complete.*

**Learning Objective 4: Describe computer networks.**

*Local area networks connect computers within a limited area. Wide area networks tie together larger geographical regions by using telephone lines, microwave, or satellite transmission. A wireless network allows computers to communicate through radio waves. Intranets allow employees to share information on a ready-made company network. Access to an intranet is restricted to authorized users and is protected by a firewall. Virtual private networks (VPNs) provide a secure Internet connection between two or more points. VoIP—voice over Internet protocol—uses a personal computer running special software and a broadband Internet connection to make and receive telephone calls over the Internet rather than over traditional telephone networks.*

**Annotated Lecture Outline**

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| **COMPUTER NETWORKS** | PowerPoint Slide 9 |
| **1. Local Area Networks and Wide Area Networks** |  |
| 1. A *local area network (LAN)* is a computer network that connects machines within limited areas, such as a building or several nearby buildings. |  |
| * + 1. LANs are useful because they link computers and allow them to share printers, documents, and information, as well as provide access to the Internet. | Figure 14.1 A Local Area Network |
| 1. A *wide area network (WAN)* ties larger geographical regions together by using telephone lines and microwave and satellite transmission. |  |
| * + 1. One familiar WAN is long-distance telephone service. |  |

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| 1. **Wireless Local Networks** | *Lecture Enhancer: What are some drawbacks to a wireless local network?* |
| 1. A wireless network allows computers, printers, and other devices to be connected without the hassle of stringing cables in traditional office settings. |  |
| 1. The current standard for wireless networks, *WiFi* is a wireless network that connects various devices and allows them to communicate with one another through radio waves. |  |
| * + 1. Any PC with a WiFi receptor can connect with the Internet at hot spots—locations with a wireless router and a high-speed Internet modem. | *Lecture Enhancer: What are some drawbacks to accessing the Internet via a WiFi hot spot?* |
| * + 1. Some locations provide free access, while others charge a fee. |  |
| **3. Intranets** |  |
| 1. An *intranet* is a computer network that is similar to the Internet but limits access to authorized users. |  |
| * + 1. An intranet blocks outsiders from entering its network by incorporating both software and hardware known as a firewall. |  |
| * + 1. A *firewall* limits data transfers to certain locations and logs system use so that managers can identify attempts to log on with invalid passwords and other threats to a system’s security. |  |
| 1. Intranets can integrate computers running all kinds of operating systems. |  |
| 1. Intranets are relatively easy and inexpensive to set up. |  |
| 1. Intranets also support teamwork among employees who travel or work from home. |  |
| **4. Virtual Private Networks** |  |
| 1. A *virtual private network (VPN)* is a secure connection between two points on the Internet. | *Lecture Enhancer: Describe a situation in which a VPN would be particularly useful for two firms.* |
| 1. VPNs use firewalls and programs that encapsulate data to make it more secure during transit. |  |
| 1. Because a VPN uses the Internet, it can be wired, wireless, or a combination of the two. |  |
| **5. VoIP** |  |
| 1. *VoIP,* or *voice over Internet Protocol*, is an alternative to traditional telecommunication services provided by companies such as Verizon and Qwest. |  |
| * + 1. The VoIP telephone is not connected to a traditional phone jack but rather is connected to a personal computer with any type of broadband connection. | *Lecture Enhancer: Share examples of current popular VoIP providers.* |
| * + 1. Special software transmits phone conversations over the Internet, rather than through telephone lines. |  |
| * + 1. A VoIP user can make and receive calls to and from those with traditional telephone connections (landline or wireless). | **Case 14.2:**  **Skype Enters a New Era** |
| 1. A growing number of consumers and businesses have embraced VoIP due to its cost savings and extra features. |  |
| 1. Various VoIP providers are working together with the goal of creating a single VoIP standard that would permit seamless roaming worldwide. |  |
| 1. Potential drawbacks to VoIP: |  |
| * + 1. Your Internet phone service will be only as reliable as your broadband connection. |  |
| * + 1. Without extensive safeguards, VoIP can expose a phone system to worms and viruses. |  |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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Assessment Check Answers

**4.1 What is a LAN?**

*A local area network (LAN) is a computer network that connects machines within a limited area, such as a building or several nearby buildings.*

**4.2 What are the differences between an intranet and a VPN?**

*An intranet is a computer network patterned after the Internet. Unlike the Internet, access to an intranet is limited to employees and other authorized users. A virtual private network (VPN) is a way of gaining increased security for Internet connections.*

**4.3 Briefly explain how VoIP works.**

*The VoIP phone is connected to a personal computer with any type of broadband connection. Special software transmits phone conversations over the Internet. A VoIP user can make and receive calls to and from those with traditional telephone connections (either landline or wireless).*

**Learning Objective 5: Discuss the security and ethical issues affecting information systems.**

*Numerous security and ethical issues affect information systems. Two of the main security threats are e-crime and malware. E-crimes range from hacking—unauthorized penetration of an information system—to the theft of hardware. Malware is any malicious software program designed to infect computer systems. Examples include viruses, worms, botnets, Trojan horses, and spyware. Ethical issues affecting information systems include the proper use of the systems by authorized users. Organizations also have an obligation to employees, vendors, and customers to protect the security and confidentiality of the data stored in information systems.*

**Annotated Lecture Outline**

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| **SECURITY AND ETHICAL ISSUES AFFECTING INFORMATION SYSTEMS** | PowerPoint Slide 10 |
| 1. **E-Crime** |  |
| * 1. Computer crime, or e-crime, occurs when people with malicious intentions change or destroy data or gain access to classified information. | *Lecture Enhancer: Discuss a recent film or television show that featured an act of e-crime. What were the effects of the crime for the firms or individuals involved?* |
| * 1. E-crime involves stealing or altering data in several ways: |  |
| * + 1. employees or outsiders changing or inventing data to produce inaccurate or misleading information | *Lecture Enhancer: Why might an employee wish to produce inaccurate or misleading company information?* |
| * + 1. employees or outsiders modifying computer programs to create false information or illegal transactions or to insert viruses |  |

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| * + 1. unauthorized people accessing computer systems for their own illicit benefit or knowledge or just to see if they can get in |  |
| * 1. Hackers—unauthorized users working alone or in groups—break into systems for the challenge or to steal personal identity information. |  |
| * 1. The Internet Engineering Task Force (IETF) is working toward a common format that will have reliable time stamps, be available in different languages, and will allow users to attach samples of malicious code. | *Class Activity:*  *Ask students if they have ever received fraudulent e-mails asking for their bank account or social security number, often called “phishing.”* |
| * 1. Protections against e-crime: |  |
| * + 1. Passwords and firewalls prevent access by unauthorized users. |  |
| * + 1. Encryption software encodes or scrambles messages and requires a key to convert them to text and prevents the viewing of sensitive data by unauthorized users. |  |
| * 1. Equipment theft has become easier as computer hardware becomes smaller. | *Lecture Enhancer: Have you ever been the victim of equipment theft? What steps did you take to protect the information stored on the equipment, either before or after the theft?* |

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| * + 1. Many notebook computers and hand-held devices contain special security software or passwords that make it difficult for a thief or any unauthorized person to access the data stored in the device’s memory. |  |
| 1. **Computer Viruses, Worms, Trojan Horses, and Spyware** |  |
| * 1. Viruses, worms, Trojan horses, and spyware are collectively referred to as malware. | *Lecture Enhancer: Discuss the possible effects (specific examples) each of these might have on a PC.* |
| * 1. *Malware* is any malicious software program designed to infect computer systems. |  |
| * + 1. Recently, malware has been discovered in advertisements on major Web sites. |  |
| * + 1. Malware attacks cost consumers and businesses billions of dollars annually. |  |
| * 1. *Viruses* are programs that secretly attach themselves to other programs (called hosts) and change them or destroy data. |  |
| * + 1. Viruses can become active immediately or remain dormant until activated. |  |

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| * + 1. They spread as users install infected software on their systems or exchange files with others. |  |
| * 1. A *worm* is a small piece of software that exploits a security hole in a network to replicate itself. |  |
| * 1. A *botnet* is a network of PCs that have been infected with one or more data-stealing viruses. |  |
| * + 1. Computer criminals tie the infected computers into a network, often without the owners being aware of it, and sell the botnet on the black market. |  |
| * + 1. They use the botnet to commit identity theft, send spam, buy blocks of concert tickets for scalping, and attack the Internet itself. |  |
| * 1. A *Trojan horse* is a program that claims to do one thing but in reality does something else, usually something malicious. |  |
| * + 1. When a user clicks on the Trojan horse to launch it, the program might erase the hard drive or steal any personal data stored on the computer. |  |
| * 1. *Spyware* is software that secretly gathers user information through the user’s Internet connection without his or her knowledge, usually for advertising purposes. |  |

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| * 1. Attacks by malware are not limited to computers and computer networks; hand-held devices, including cell phones, have been affected as well. |  |
| * 1. The simplest way to protect against computer viruses is to install one of the many available antivirus software programs, such as Norton AntiVirus and McAfee VirusScan. | *Lecture Enhancer: Have students discuss additional antivirus software programs with which they are familiar.* |
| **3. Information Systems and Ethics** | PowerPoint Slide 11 |
| * 1. Organizations often have ethical standards and policies to protect system security and the privacy and confidentiality of data. |  |
| * 1. Policies may cover the personal use of computers and related technologies, both hardware and software, by employees. | *Lecture Enhancer: Have you ever worked for a company that had policies regarding the use of its information system? If so, how did the policy affect your use of the system and its components?* |
| * 1. Some organizations use computer technology to monitor employees while they are working. | **Solving an Ethical Controversy:**  Should Employers Monitor Employees’ Internet Use? |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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Assessment Check Answers

**5.1 Explain computer hacking.**

*Computer hacking is a breach of a computer system by unauthorized people. Sometimes the hackers’ motive is just to see if they can get in. Other times, hackers have more sinister motives, including stealing or altering data.*

**5.2 What is malware?**

*Malware is any malicious software program designed to infect computer systems.*

**5.3 How does a computer virus work?**

*A virus is a program that secretly attaches itself to another program (called a* host*). The virus then changes the host, destroys data, or even makes the computer system inoperable.*

**Learning Objective 6: Explain disaster recovery and backup.**

*Information system disasters, whether human caused or due to natural causes, can cost businesses billions of dollars. The consequences of a disaster can be minimized by routinely backing up software and data, both at an organizational level and at an individual level. Organizations should back up critical data at an off-site location. Some may also want to invest in extra hardware and software sites, which can be accessed during emergencies.*

**Annotated Lecture Outline**

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| **DISASTER RECOVERY AND BACKUP** | PowerPoint Slide 12 |
| 1. Natural disasters, power failures, equipment malfunctions, software glitches, human error, and terrorist attacks can disrupt computer systems, costing organizations billions of dollars. |  |
| * 1. One recent study found that more than 93 percent of firms that lost their data centers for 10 days or more went bankrupt within 6 months. | *Lecture Enhancer: Does this statistic surprise you? Discuss what types of vital information might cause a business to go bankrupt if it were lost.* |
| 1. Disaster recovery planning—deciding how to prevent system failures and continue operations if computer systems fail—is a critical function of all organizations. | **Going Green**  **Box.Net Serving in the Cloud** |
| * 1. Disaster prevention programs can avoid some of these costly problems. |  |
| * + 1. The most basic precaution is routinely backing up software and data—at the organizational and individual levels. |  |
| * + 1. Off-site data backup is a necessity, whether in a separate physical location or online on the Internet itself. |  |
| * + 1. Companies that perform online backups store the encrypted data in secure facilities that in turn have their own backups. |  |
| 1. There are five important tasks regarding off-site data storage: | *Lecture Enhancer: Consider and discuss the possible results of skipping any one of these five tasks.* |
| * 1. Plan |  |
| * + 1. decide what data need to be protected |  |
| * + 1. give priority to data having severe legal or business consequences should they be lost |  |
| * 1. Create and follow a backup schedule |  |
| * 1. Protect transmitted data |  |
| * 1. Select the right security vendor |  |
| * 1. Continually test and evaluate the backup system | *Class Activity:*  *What personality traits and skills do students think are most important to be an effective information technology manager?* |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Going Green

Box.Net Serving in the Cloud

Summary

Box.net, a six-year-old cloud storage company worth $11 million, has expanded to roughly 7 million business and individual customers alike ranging from Proctor &Gamble, Pandora, and Six Flags. Businesses who use the cloud-based storage system enjoy applications for PCs, Macs, and phones with highly-secured, shared information. Although the version of Box.net for personal use isn’t as intricate, it still offers data storage that non techno-savvy users can easily navigate. Box.net has plans in the future to increase their current 165 employees and design new products for large businesses.

Questions for Critical Thinking

1. Do you think business users of cloud services like Box.net will ever set up cloud storage as part of their IT departments? Explain.

*Answers will vary. However, it can be argued that business users of cloud services would use a different form of data storage because if their cloud storage failed, they would not have a backup.*

1. Should Box.net provide the same degree of security for individual users as for business customers? Why or why not?

*Answers will vary. However, it can be argued that the same degree of security should be applied to the version for individual users because individuals could have information in their storage like credit card or social security numbers.*

Assessment Check Answers

**6.1 What are the types of disasters to which information systems are vulnerable?**

*Natural disasters, power failures, equipment malfunctions, software glitches, human error, and even terrorist attacks can disrupt even the most powerful, sophisticated computer information systems.*

**6.2 List the tasks regarding off-site data storage.**

*The five tasks are planning and deciding which data to back up, establishing and following a backup schedule, protecting data when they are transmitted off-site, choosing the right vendor, and continually testing and refining the backup system.*

**Learning Objective 7: Review information systems trends.**

*Information systems are continually and rapidly evolving. Some of the most significant trends are the increasing demands of the distributed workforce, the increased use of application service providers, on-demand computing, and grid computing. Many people now work in virtual offices, including at home. Information technology makes this possible. Application service providers allow organizations to outsource most of their IT functions. Rather than buying and maintaining expensive software, on-demand computing offers users the option of renting software time from outside vendors and paying only for their usage. Grid computing consists of a network of smaller computers running special software creating a virtual mainframe or even supercomputer.*

**Annotated Lecture Outline**

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| **INFORMATION SYSTEM TRENDS** | PowerPoint Slide 13 |
| **1. The Distributed Workforce** |  |
| * 1. Companies are relying on a distributed workforce—employees who work in *virtual offices*, including at home. | *Lecture Enhancer: Discuss the advantages and disadvantages of virtual offices.* |
| * 1. According to the Bureau of Labor Statistics (BLS), about 10 percent of full-time wage and salary workers work at home on any given day. |  |
| **2. Application Service Providers** |  |
| 1. Because of the increasing cost and complexity of obtaining and maintaining information systems, many firms hire an application service provider (ASP). |  |
| 1. An *application service provider (ASP)* is an outside supplier that provides both the computers and the application support for managing an information system. |  |
| * + 1. An ASP can simplify complex software for customers, making it easier to manage and use. |  |
| * + 1. An ASP buyer can devote more time and resources to its core businesses instead of struggling to manage its information systems. |  |
| * + 1. An ASP stretches technology dollars and gives smaller firms information that was once only available to large organizations. |  |
| 1. Companies that decide to use ASPs should check the backgrounds and references of these firms before hiring them to manage critical systems. |  |
| 1. Companies using ASPs should also check to be sure that: |  |
| 1. The service provider has strong security measures to block computer hackers or other unauthorized access to the data. |  |
| 1. Its data centers are running reliably. |  |
| 1. Adequate data and applications backups are maintained. |  |
| **3. On-Demand, Cloud, and Grid Computing** |  |
| a. With *on-demand computing*, firms essentially rent the software time from application providers and pay only for their usage of the software |  |
| i. On-demand computing is useful for firms that experience annual peaks in demand or seasonal spikes in customer usage of their applications. | *Lecture Enhancer: Can you think of an example of this type of firm?* |
| ii. On-demand computing can also help companies remain current with the most efficient software on the market without purchasing huge upgrades. |  |
| b. *Cloud computing* uses powerful servers to store applications software and databases for users to access them via the Web using anything from a PC to a smart phone. | Hit & Miss:  Cisco Systems Tackles Cloud Security |
| c. *Grid computing* consists of a network of smaller computers running special software. |  |
| * + 1. The software breaks down a large, complex job into smaller tasks and distributes them to the networked computers. |
| * + 1. The software reassembles the individual task results into the finished job. |  |

**Notes:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Hit & Miss:**

**Cisco Systems Tackles Cloud Security**

**Summary**

Many firms save money and physical space by turning to cloud computing and storage. In a traditional local area network, it is relatively easy to implement security applications at the network’s borders. But in the borderless environment of cloud computing, and with threats to security increasing, meeting this challenge is more difficult. Cisco Systems has responded by developing security applications for cloud-based computing.

**Questions for Critical Thinking**

**1. What are the advantages and disadvantage of storing data “in the cloud”?**

*Some advantages to storing data in the cloud are that the data can be accessed from any Internet-enabled location in the world and that the data are protected from physical disasters to which in-house hardware is vulnerable.*

*Some disadvantages to storing data in the cloud are that it is more difficult to protect the data from Internet-based hackers, and that a user must have access to the Internet in order to access it.*

**2. Why is it important to block former employees’ access to company data?**

*It is important to block a former employee’s access to company data because he or she may use that data either to benefit his or her new position (e.g., a competing firm) or to harm the former company (e.g., reveal the company’s proprietary information to the public).*

Assessment Check Answers

**7.1 What is an application service provider?**

*An application service provider (ASP) is an outside vendor that provides both the computers and application support for managing an information system. By using an ASP, the organization effectively outsources some, or all, of its IT function.*

**7.2 Explain on-demand computing.**

*Instead of purchasing and maintaining expensive software, some organizations use on-demand computing. In this arrangement, software is rented from a vendor and the organization only pays for its actual usage.*

**Answers to Review Questions**

**1. Distinguish between data and information. Why is the distinction important to businesspeople in their management of information?**

* *Data consists of raw facts and figures that may or may not be relevant to a business decision.*
* *Information is the knowledge gained from processing those facts and figures.*

*Data alone is useless to businesspeople if it can’t be analyzed and transformed into information that can be comprehended and used to make optimal decisions. For this reason, information systems are vital to business.*

**2. What are the four components of an information system?**

*The four components of a computer-based information system are computer hardware, software, telecommunications and computer networks, and data resource management.*

**3. Describe the two different types of information systems, and give an example of how each might help a particular business.**

*The two categories of information systems are operational support systems (such as transactions processing and process control systems) and management support systems (such as management information, decision support, executive support, and expert systems).*

**4. Explain decision support systems, executive support systems, and expert systems.**

* *A decision support system (DSS) quickly provides relevant data to help with decision making, often by retrieving information when needed, simulating elements to create models, and creating graphs and charts (examples: retrieving past sales figures, filing financial reports, creating graphs to market share in recent years).*
* *An executive support system (ESS) allows top managers to access a firm’s primary database, allowing them to choose from many levels and types of data (examples: creating an overview for the CEO’s presentation to the board of directors, gleaning data to help decide on acquisitions or mergers, gathering up-to-the-minute statistics to be used in quarterly or annual reports).*
* *An expert system imitates human thinking through a set of “if . . . then” rules, drawing from recognized experts and applying human knowledge to solve a problem (example: monitoring a factory’s machinery for potential breakdowns).*

**5. What are the major categories of computers? What is a smart phone?**

* *A mainframe is the largest and most complex type, with the most extensive storage capacity and the fastest processing speeds.*
* *A midrange system is more compact and less expensive than a mainframe but slower and has less memory.*
* *A personal computer (PC) handles many tasks that a mainframe once did (desktops, notebooks, tablets, and hand-held versions).*
* *A smart phone is a combination of a cell phone and personal digital assistant (PDA), now seeing stronger sales than PDAs.*

**6. What is an intranet? Give specific examples of benefits for firms that set up their own intranets.**

*An* intranet *is a company network patterned after the Internet that links only authorized users through Web-based tools such as e-mail, hyperlinked text, search engines, and home pages*.

*Intranets allow firms to link an almost unlimited number of individuals, departments, and geographic locations and provide all these authorized users with the same information, network tools, and databases, while keeping out unauthorized parties. They link different types of computers and various operating systems and generate communication and teamwork, all at relatively low cost*.

*An example of an organization benefiting from an intranet is an online public school. Students and teachers log on to the school’s private intranet in order to receive and evaluate lessons and learning assessments. The intranet is kept private through the use of password-restricted access. Such schools could not exist without an intranet.*

**7. What steps can organizations and individuals take to prevent computer crime?**

*Organizations and individuals may prevent access by unauthorized users with passwords and firewalls. They may prevent the viewing of sensitive data by unauthorized users with encryption software, which encodes or scrambles messages and requires a key to convert them to text. They can load security software onto notebooks and laptops to combat unauthorized use and can train employees about preventing the theft of these devices. They can also warn employees about the dangers of spreading viruses by downloading files and opening e-mail attachments.*

**8. How does a computer virus work? What can individuals and organizational computer users do to reduce the likelihood of acquiring a computer virus?**

*A computer virus is a program designed to attach itself to other programs or files (called hosts) and then change them or destroy other data. It can become active immediately or remain dormant until suddenly activated. Once activated, it copies itself onto other programs stored in the same drive, then spreads through infected software and exchange files such as e-mail, disks, or downloaded programs.*

*To reduce the likelihood of acquiring a virus, users can install antivirus and antispyware programs and regularly update them. They can train employees to carefully choose the files to be downloaded and be very cautious when opening e-mail attachments. They can alert IT departments to send patches and secure updates immediately if specific viruses or worms are threatening a network.*

**9. Why is disaster recovery important for businesses? Relate your answer to a natural disaster such as a hurricane, tornado, or fire.**

*Disaster recovery planning involves deciding how to prevent system failures and how to continue operating if systems do fail during an emergency. In planning for a potentially catastrophic event such as a hurricane or fire, decisions must be made regarding which data must be regularly sent off-site. In addition, disaster recovery planning involves backing up files, duplicating software, and storing all this in a secure location from which the system can be accessed during an emergency. Disaster recovery is important for businesses because a recent study found that more than 93 percent of firms that lost their data centers for 10 days or more went bankrupt within 6 months.*

**10. Describe four information system trends.**

*Information system trends include the increased use of: 1) ASPs, 2) on-demand computing, 3) cloud computing, and 4) grid computing.* ASPs *allow organizations to outsource most of their IT functions. Rather than buying and maintaining expensive software,* on-demand computing *offers users the option of renting software from outside vendors and paying only for usage.* Cloud computing *uses powerful servers to store applications software and databases for users to access them via the Web, using anything from a PC to a smart phone.* Grid computing *consists of a network of smaller computers running special software.*

**Projects and Teamwork Applications**

1. Have students present and discuss their designs with the entire class. Discuss the pros and cons of each presented design.

2. Students will share the results of their interviews with the person in charge of the information system at a local firm. Students will discuss whether the interview made them more or less interested in a career in information systems.

3. Partners should imagine the next new network format that will take over Wi-Max and prepare reports on their expectations that are shared with the class.

4. Have students share their lists of threats to which the company’s information system is vulnerable. What types of threats should the supervisor be aware of as she continues to grow the company?

5. What does the class think about hacking? Start a discussion about the seriousness of computer hacking and its treatment as a criminal offense.

Web Assignments

1. **Operational support systems.** Go to the Web site listed below and download the “Featured white papers”. After reviewing the white papers, prepare a brief report on what you learned about the advantages of operational support system software.

<http://www8.hp.com/us/en/business-solutions/solution.html?compURI=1089536>

1. **Computer security.** Visit the Web site listed below. Review the material and answer the following questions:
   1. What are two current malware threats? How serious are they?
   2. What is a potentially unwanted program (PUP)? What are two recent PUPs?

<http://www.mcafee.com/us/threat_center/default.asp>

1. **Cloud computing.** IBM is one of the largest providers of so-called cloud computing. Visit the IBM Web site (<http://www.ibm.com>) and click on “solutions” and then “cloud computing.” Print out the material and bring it to class to participate in a class discussion on the subject.

*Note: Internet Web addresses change frequently. If you don’t find the exact sites listed, you may need to access the organization’s home page and search from there or use a search engine such as Bing or Google.*

**Case 14.1: MICROS Systems Works on a Large Scale**

**Answers to Questions for Critical Thinking**

**1. Visit the MICROS Systems Web site to learn more about its products for the global market. In what ways do you think the company can increase sales in Africa, Asia, and Latin America? How might the company have to adapt to conditions in these countries?**

*Have students share what they found on the MICROS Systems Web site. Did they agree on ways in which the company might have to adapt to conditions in Africa, Asia, and Latin America? Possible answers may include that computer hacking, identity theft, and corruption pose major problems in countries with emerging technology systems, such as Nigeria and Kenya.*

**2. Imagine you are the manager of a sports arena. What sorts of hardware and software would help you manage such a large facility?**

*Because managing a sports arena requires management of vast amounts of data, a mainframe or, at the very least, a midrange hardware system would be required, as well as all accompanying input and output systems. Software requirements include specialized software designed to handle such operating issues as vendor assignments, equipment preparation, and seating assignments for ticket-holders, as well as software that is designed to handle management information issues.*

### Case 14.2: Skype Enters a New Era

**Answers to Questions for Critical Thinking**

1. **Microsoft is considering charging business users for some Skype services. Do you think this is a good strategy? Why or why not?**

*Answers will vary. However, it can be argued that it is an effective strategy because if they leave some service free while more advanced services have fees, their business profits will be raised.*

1. **What might be motivating Microsoft to let Skype operate independently?**

*Microsoft may be allowing Skype to operate independently because since Skype’s services are currently free, it wouldn’t generate profits for Microsoft, but the associated name of Skype can still boost their business.*

**CHAPTER 14: COLLABORATIVE LEARNING EXERCISES**

# **1 - Gathering Data**

Learning Objective: 1

Purpose:

To highlight the importance of seeking and capitalizing on relevant data

Background:

Most of us know from experience that we can make some excellent decisions based on intuition, but we also know that we typically make better decisions in the context of relevant information. This exercise is designed to help students assist each other in expanding their information-gathering skills.

Relationship to Text:

Learning Objective 1 – The Importance of Relevant Data

Estimated Class Time:

Less than 10 minutes

Preparation/Materials:

Each student will need paper and a pen/pencil.

Exercise:

Ask your students to jot down an important decision that they will make sometime within the next year (such as choosing a major, moving away from home, changing jobs, getting engaged, etc.). Then ask them to exchange their papers with someone sitting nearby.

Direct students to review the papers they received and jot down 10 questions that would give their classmates useful information to help them make a better decision. After a few minutes, ask them to return the papers to the original students. Give them a moment to read and to ask clarifying questions.

Follow-up discussion: How many students gained new insights from this process? Were there any surprising questions? Do they believe that a more thorough search for information would help them make better decisions? Why or why not?

**2 - Information Overload**

# Learning Objective: 1

# Purpose:

To demonstrate the value of weeding out irrelevant information

# Background:

# With the information floodgates wide open, businesspeople who manage information effectively will have a competitive advantage in any field. This exercise is designed to demonstrate the results of effective and ineffective information management.

Relationship to Text:

Learning Objective 1 – Information Overload

Estimated Class Time:

About 10 minutes

Preparation/Materials:

You’ll need to make two copies of the directions for your volunteers, and you may want additional copies for each class member. See Appendix for a copy-friendly version.

Exercise:

Request two volunteers who are good at following directions (and be sure to choose people you know are good sports). Announce that they will be competing to see who does the best job following directions in the least amount of time. Be sure to give your volunteers only the directions that apply to them (see below).

Start the clock!

NOTE: The two sets of directions are identical, except the first set is arranged in logical groupings, while the second is not.

As you might imagine, student A typically draws a passable sketch in short order, while student B usually becomes discombobulated and melts into laughter, especially when he or she finally reads the last sentence!

Ask your class to identify the key lesson: When you need to process too much information in too little time (which happens every day in most business fields), your effectiveness will increase if you develop a method for weeding out irrelevant information.

Student A: First set of directions: Draw a boy and a girl on the board. Keep in mind that stick figures are fine, and that you only get credit for this exercise if you draw the whole time with one hand behind your back.

The boy should have short spiky hair. He should be smiling widely. The boy should be carrying a bag. The bag should have a large, looped handle.

The girl should have long, straight hair. She should have a bow in her hair. The bow in her hair should be shaped like a star. The girl should be frowning. She should be carrying a book in her hand. The book should be half-hidden behind her dress. What you see of the book should be covered with hearts.

In the background, draw some flowers. Each flower should have a circle in the middle, with five rounded petals. Also draw a sun in the background. Draw triangle-shaped rays coming out of the sun.

Student B: Second set of directions: Draw a boy and a girl on the board. The boy should be carrying a bag. Also draw a sun in the background. The girl should be carrying a book in her hand. In the background, draw some flowers. The boy should have short spiky hair. The bag should have a large, looped handle. The girl should have long, straight hair. Draw triangle-shaped rays coming out of the sun. The girl should be frowning. Each flower should have a circle in the middle, with five rounded petals. She should have a bow in her hair. What you see of the book should be covered with hearts. He should be smiling widely. The bow in her hair should be shaped like a star. The book should be half-hidden behind her dress. Keep in mind that stick figures are fine, and that you only get credit for this exercise if you draw the whole time with one hand behind your back.

# **3 - More Information Overload**

Learning Objective: 1

Purpose:

To help your students develop strategies for coping with information overload

Background:

Ironically, less than a decade ago, many business executives found themselves information-starved. Today, businesspeople have so much information that some are unable to use it effectively. This quick, discussion-based exercise is designed to help students develop strategies for managing the flood of readily available information to their advantage.

Relationship to Text:

Learning Objective 1 – Information Overload

Estimated Class Time:

About 10 minutes

Preparation/Materials:

None needed

Exercise:

Ask your students to brainstorm a list of situations in which they have faced information overload. Possibilities include buying a new computer, using the Internet to research a paper, choosing a stock, etc.

After a few minutes of brainstorming, direct your students to partner with a classmate or two to discuss an information-overload situation that they themselves have recently faced, and how they responded.

After another few moments, reconvene as a class to discuss. What are some productive and counterproductive responses to information overload? Someone is sure to mention simply shutting down in the face of too much information. Help them understand that while this is a tempting option, they would do better to find ways to eliminate poor information sources and to cluster the information that remains into meaningful categories.

# **4 - Computer Troubleshooting**

Learning Objective: 6

Purpose:

To highlight basic computer troubleshooting techniques

Background:

Technology often seems to fail at critical moments, but many computer problems have fairly basic solutions. This exercise is designed to review troubleshooting fundamentals and, as a bonus, to give your most computer-literate students a chance to shine.

Relationship to Text:

Learning Objective 6 – Planning for Information-System Trouble

Estimated Class Time:

About 20 minutes

Preparation/Materials:

You may want to make each student a copy of the scenario below. Please see the Appendix for a copy-friendly version.

Exercise:

Divide your class into groups of 5 to 7 students, and try to distribute your most computer-savvy students as evenly as possible. Present your groups with the scenario and instructions below:

Scenario: It is 4 p.m. and your team is working at top speed to complete a major presentation that is due to the client at 5 p.m. Suddenly—to your horror—your computer screen goes blank and you cannot access any of your information. You are about to call the helpdesk, when you remember that the helpdesk staff seem to be much more helpful when you have done the preliminary troubleshooting yourself. Before you pick up the phone, you check all the basics, doing your best to anticipate the helpdesk questions.

Instructions: Work with your group to develop a checklist of potential problems. Assuming that none of them emerge as the source of your blank screen, appoint a representative to role-play your call to the helpdesk (AKA your teacher).

After about 10 minutes, reconvene as a class to begin the role-playing. In terms of content, they should have checked issues such as hardware, application software, the operating system, the network connection, the antivirus program, recent downloads, etc. When each group has completed its role-play, discuss which call would likely receive the most prompt response. Why?

# **5 - Computer Hardware**

Learning Objective: 3

Purpose:

To explore the costs and benefits of various computer hardware options

Background:

As the different types of computer hardware proliferate—and in some cases, converge—choosing which hardware meets which business needs has become more challenging. This exercise is designed to help students learn to match computer hardware with business objectives, incorporating a cost/benefit perspective.

Relationship to Text:

Learning Objective 3 – Types of Computer Hardware

Estimated Class Time:

About 15 minutes

Preparation/Materials:

None needed

Exercise:

Before you begin this exercise you may want to ask your class to review the different types of computers (i.e., supercomputer, mainframe, minicomputer, PC, tablet, hand-held, etc.) and the typical uses of each. Divide them into seven groups. Their challenge is to determine what kinds of computers would be most effective for workers in each of the following jobs. Why? How could they justify the costs? NOTE: Each job would probably require use of several different types of computers for different purposes.

* Stockbroker for a major brokerage house
* Outside sales representative for a billion-dollar company
* Rocket scientist for the Jet Propulsion Laboratory
* Graphic artist for a large advertising agency
* Small restaurant owner
* Real estate agent
* Student at your college or university

Ask each group to present one of the occupations, and encourage the other groups to add their thoughts or debate ambiguous points. Help them understand that a cost/benefit analysis that considers both immediate and long-term benefits would play a critical role in smart decisions regarding hardware purchases.

# **6 - Technology Planning**

Learning Objectives: 2, 3, and 4

Purpose:

To introduce the basic concepts of technology planning

Background:

In many organizations, technology represents both a significant investment and a source of ongoing costs. Without strategic planning to meet technology needs, costs can skyrocket while effectiveness plummets. This exercise is designed to help students consider technology planning from a “big-picture” standpoint.

Relationship to Text:

Learning Objectives 2 - 4 – Purchasing Hardware and Software

Estimated Class Time:

About 20 minutes

Preparation/Materials:

None needed

Exercise:

After you cover the material on computer hardware and software, divide your class into groups of 3 to 5 students, and direct them to prepare a response to the following scenario:

Your college or university is opening a new campus—close to, but not adjacent to the main campus—to house a separate academy that specializes in entertainment and technology. How would you equip that campus in terms of computer hardware and software? Justify your choices in terms of student needs.

Give your class about 15 minutes for planning, and then begin presentations. Ask each group to include only items that were not part of previous presentations and keep a running list on the board. (The complete list should probably include PCs for the lab, network connections to the main campus, multimedia capability, computer projection systems for classrooms with Internet access, groupware for both students and faculty, an Academy Intranet, broadband Internet connections, etc.).

You may want to close by asking them how this technology would help students learn, and how they anticipate it will change in the future. What can they do to plan for those changes now?