# Chapter 1

## An Introduction to Information Systems

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| At a Glance |

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##### Overview

This chapter presents an overview of information systems, with each section getting full treatment in subsequent chapters. Begin the discussion by exploring the basics of information systems.

**Principles and Objectives**

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| **Principles** | **Learning Objectives** |
| The value of information is directly linked tohow it helps decision makers achieve the organization’s goals. | * Discuss why it is important to study and understand information systems.
* Distinguish data from information and describe the characteristics used to evaluate the quality of data.
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| Computers and information systems help makeit possible for organizations to improve the way they conduct business. | * Name the components of an information system and describe several system characteristics.
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| Knowing the potential impact of informationsystems and having the ability to put this knowledge to work can result in a successful personal career and in organizations that reach their goals. | * List the components of a computer-based information system.
* Identify the basic types of business information systems and discuss who uses them, how they are used, and what kinds of benefits they deliver.
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| System users, business managers, and information systems professionals must work together to build a successful information system. | * Identify the major steps of the systems development process and state the goal of each.
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| Information systems must be applied thoughtfully and carefully so that society, businesses, and industries around the globe can reap their enormous benefits. | * Describe some of the threats that information systems and the Internet can pose to security and privacy.
* Discuss the expanding role and benefits of information systems in business and industry.
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**Teaching Tips**

**Why Learn About Information Systems?**

1. Introduce the term **information system**. Note that it is the feedback mechanism that helps organizations to achieve their goals.

Information Concepts

1. This section introduces a central concept of this course: information.

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| *Teaching****Tip*** | Develop a class Web site. Maintain a copy of your syllabus, a lecture schedule, and assignment information. |

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| *Teaching****Tip*** | As class begins, reassure students that you are here to help them understand technology. Many less technically oriented students will feel intimidated by this course. Get off to a good start! |

**Data, Information, and Knowledge**

1. Introduce the terms **data**, **information**, **process**, **knowledge**, **knowledge worker**, and **knowledge management**. Use Figures 1.1 to 1.3 and Table 1.1 to aid the discussion.

**The Value of Information**

1. Explain that the value of information is directly linked to how it helps decision makers achieve their organization’s goals.

**Characteristics of Quality Information**

1. Students should understand that in order to be valuable to managers and decision makers, information should have the characteristics described in Table 1.2. Note that quality information can vary widely in the value of each of these attributes depending on the situation and the kind of decision you are trying to make.

###### System Concepts

1. A system is a set of elements or components that interact to accomplish goals. Systems have inputs, processing mechanisms, outputs, and feedback. Use Figure 1.4 to aid the discussion.

###### What Is an Information System?

1. An information system is a set of interrelated components that collect, process, store, and disseminate data and information and provide a feedback mechanism to meet an objective. Use Figure 1.5 to aid the discussion.

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| *Teaching****Tip*** | Pass a list around class and ask students to list their experience in information systems. Does anyone have familiarity with the field? If so, speak with them about sharing their knowledge with the class. This list will also help you organize your lectures with a focus specific to your class’s needs. |

**Input**

1. Explain that in information systems, input is the activity of gathering and capturing raw data. In producing paychecks, for example, the number of hours every employee works must be collected before paychecks can be calculated or printed.

**Processing**

1. In information systems, processing means converting or transforming data into useful outputs. Note that processing can involve making calculations, comparing data and taking alternative actions, and storing data for future use.

**Output**

1. Output involves producing useful information, usually in the form of documents and reports. Note that it can include paychecks for employees, reports for managers, and information supplied to stockholders, banks, government agencies, and other groups.

**Feedback**

1. The term feedback refers to information from the system that is used to make changes to input or processing activities. Point out that in addition to feedback, a computer system can predict future events to avoid problems. This concept, often called forecasting, can be used to estimate future sales and order more inventory before a shortage occurs.

**Computer-Based Information Systems**

1. Introduce the terms **computer-based information system** and **technology infrastructure**. Use Figure 1.7 to aid the discussion.

**Components of a computer-based information system**

1. The following topics should be discussed:
	* **Hardware**: Consists of computer equipment used to perform input, processing, storage, and output activities.
	* **Software**:Computer programs that govern the operation of the computer. There are two types of software: system software and application software.
	* **Databases**: An organization’s database can contain facts and information on customers, employees, inventory, sales, online purchases, and much more.
	* **Telecommunications and Networks**: Introduce the terms **telecommunications**, **networks**, **Internet**, **intranet,** and **extranet**.
	* **People**:Note that information systems personnel include all the people who manage, run, program, and maintain the system.
	* **Procedures**: Note that when people are well trained and follow effective procedures, they can get work done faster, cut costs, make better use of people resources, and enable people to adapt to change. When procedures are well documented, they can greatly reduce training costs and shorten the learning curve.

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| *Teaching****Tip*** | When introducing the material in this chapter, rely heavily on the case studies and examples. Much of this material will be a review for the students since it is often covered in general management and business strategy courses. The educational value for most students will center on the focus on information system-related issues. |

Quick Quiz 1

1. A(n) \_\_\_\_ is a set of interrelated components that collect, manipulate, store, and disseminate data and information and provide a feedback mechanism to meet an objective.

 Answer: information system

1. \_\_\_\_ consists of raw facts, such as an employee number, number of hours worked in a week, inventory part numbers, or sales orders.

 Answer: Data

1. \_\_\_\_ is a collection of facts organized so that they have additional value beyond the value of the facts themselves.

 Answer: Information

1. \_\_\_\_ is the awareness and understanding of a set of information and the ways that information can be made useful to support a specific task or reach a decision.

 Answer: Knowledge

1. In information systems, \_\_\_\_ involves producing useful information, usually in the form of documents and reports.

 Answer: output

###### Business Information Systems

1. The most common types of information systems used in business organizations are those designed for electronic and mobile commerce, transaction processing, management information, and decision support. Use Figures 1.14 and 1.15 to aid the discussion.

**Electronic and Mobile Commerce**

1. Explain that e-commerce involves any business transaction executed electronically between companies (business-to-business, or B2B), companies and consumers (business-to-consumer, or B2C), consumers and other consumers (consumer-to-consumer, or C2C), business and the public sector, and consumers and the public sector.
2. Introduce the term **mobile commerce (m-commerce)**.
3. Note that e-commerce offers many advantages for streamlining work activities. Use Figure 1.17 to aid the discussion.
4. Introduce the term **electronic business**. Use Figure 1.18 to aid the discussion.

**Enterprise Systems: Transaction Processing Systems and Enterprise Resource Planning**

1. The following topics should be addressed:
	* **Transaction Processing Systems**: An interesting point to make is that one of the first business systems to be computerized was the payroll system (see Figure 1.19).
	* **Enterprise Resource Planning**:Note that an ERP system can replace many applications with one unified set of programs, making the system easier to use and more effective.

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| *Teaching****Tip*** | To learn more about ERP, visit: <http://www.netsuite.com/portal/resource/articles/erp/what-is-erp.shtml> |

**Information and Decision Support Systems**

1. Explain that the benefits provided by an effective TPS or ERP are substantial and justify their associated costs in computing equipment, computer programs, and specialized personnel and supplies.
2. The following topics should be addressed:
	* **Management Information Systems**: MISs typically provide standard reports generated with data and information from the TPS or ERP. Use Figure 1.21 to aid the discussion.
	* **Decision Support Systems:** A DSS goes beyond a traditional MIS by providing immediate assistance in solving problems. Many of these problems are unique and complex, and key information is often difficult to obtain. Use Figure 1.23 to discuss essential DSS elements.

**Specialized Business Information Systems: Knowledge Management, Artificial Intelligence, Expert Systems, and Virtual Reality**

1. Use Figure 1.24 to discuss the knowledge management process and Figure 1.25 to discuss the major elements of artificial intelligence.
2. The following topics should also be discussed:
	* **Artificial Intelligence**: Introduce the terms **robotics, vision systems, natural language processing, learning systems**, and **neural networks**.
	* **Expert Systems**: Introduce the term **knowledge base**.
	* **Virtual Reality and Multimedia**: Virtual reality is an artificial three-dimensional environment created by hardware and software and experienced through sensory stimuli (primarily sight and sound, but sometimes through touch, taste, and smell) and within which an individual can interact to affect what happens in the environment. Multimedia is a natural extension of virtual reality. It can include photos and images, the manipulation of sound, and special 3D effects.

Quick Quiz 2

1. \_\_\_\_ is the use of mobile, wireless devices to place orders and conduct business.

 Answer: Mobile commerce (m-commerce)

1. \_\_\_\_ goes beyond e-commerce and e-procurement by using information systems and the Internet to perform all business-related tasks and functions, such as accounting, finance, marketing, manufacturing, and human resource activities.

 Answer: Electronic business (e-business)

1. A(n) \_\_\_\_ is an organized collection of people, procedures, software, databases, and devices used to record business transactions.

 Answer: transaction processing system (TPS)

1. A(n) \_\_\_\_ is an organized collection of people, procedures, software, databases, and devices that support problem-specific decision making.

 Answer: decision support system (DSS)

1. A(n) \_\_\_\_ is an organized collection of people, procedures, software, databases, and devices to create, store, share, and use the organization’s knowledge and experience.

 Answer: knowledge management system (KMS)

###### Systems Development

1. One strategy for improving the results of a systems development project is to divide it into several steps, each with a well-defined goal and set of tasks to accomplish. Use Figure 1.30 to aid the discussion.
2. Point out that people inside a company can develop systems, or companies can use outsourcing, hiring an outside company to perform some or all of a systems development project.

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| *Teaching****Tip*** | Conduct a Web-based scavenger hunt in which students locate companies that specialize in providing outsourcing services. |

**Investigation, Analysis, and Design**

1. Note that the goal of systems investigation is to gain a clear understanding of the problem to be solved or opportunity to be addressed. Systems analysis, however, defines the problems and opportunities of the existing system, while systems design determines how the new system must work, what inputs are required, and what outputs must be produced to meet the business needs defined during systems analysis.

**Construction, Integration and Testing, Implementation, Operation and Maintenance, and Disposition**

1. Point out that companies often hire outside companies to do their development, integration and testing, implementation, and operation and maintenance work.

Information Systems in Business and Society

1. Explain that computer-related attacks can come from individuals, groups, companies, and even countries.

**Security, Privacy, and Ethical Issues in Information Systems and the Internet**

1. Explain that although information systems can provide enormous benefits, they do raise many security, privacy, and ethical issues. A survey of security breaches in the United Kingdom found that 93 percent of large organizations and 87 percent of small organizations had a security breach in 2012. The average cost of a security breach is increasing, and several individual breaches cost more than £1 million.

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| *Teaching****Tip*** | Ask students to discuss the steps they would take to protect their home computers from threats such as viruses, spyware, and worms. Is it possible to provide 100% protection for a computer? Why or why not? |

**Computer and Information Systems Literacy**

1. Introduce the terms **computer literacy,** **information systems literacy**, and **information literacy**. Use Figure 1.32 to aid the discussion.

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| *Teaching****Tip*** | Encourage the students to use the Web for all of the research topics in the text. Provide some simple search engine guidelines. |

**Information Systems in Business**

1. Point out that information systems are used in all functional areas of business organizations and most industries. In finance and accounting, information systems forecast revenues and business activity, determine the best sources and uses of funds, manage cash and other financial resources, analyze investments, and perform audits to make sure that the organization is financially sound and that all financial reports and documents are accurate.
2. Note that in addition to being used in every department in a company, information systems are used in almost every industry or field in business.

Quick Quiz 3

1. \_\_\_\_ allows a company to focus on what it does best and delegate other functions to companies that have world-class development capabilities.

 Answer: Outsourcing

1. \_\_\_\_ determines how the new system should be developed to meet the business needs defined during systems analysis.

 Answer: Systems design

1. (True or False) Ethical issues concern what is generally considered right or wrong.

 Answer: True

1. \_\_\_\_ is the knowledge and ability to use computers and related technology effectively.

 Answer: Computer literacy

1. \_\_\_\_ is the knowledge of how data and information are used by individuals, groups, and organizations.

 Answer: Information systems literacy

**Global Challenges in Information Systems**

1. Having a global presence is a key to financial success for many organizations. In his book, *The World Is Flat*, Thomas Friedman describes three eras of globalization. According to Friedman, we have progressed from the globalization of countries (Globalization 1.0) to the globalization of multinational corporations (Globalization 2.0) and individuals (Globalization 3.0). Use Table 1.3 to aid the discussion.
2. Explain to students why global markets have expanded. People and companies can get products and services from around the world, instead of around the corner or across town. These opportunities, however, introduce numerous obstacles and issues:
	* Cultural challenges
	* Language challenges
	* Time and distance challenges
	* Infrastructure challenges
	* Currency challenges
	* Product and service challenges
	* Technology transfer issues
	* State, regional, and national laws
	* Trade agreements

**Class Discussion Topics**

1. Discuss a specific computerized information system. If possible, get a representative from the university’s computing services to come in as a guest speaker.
2. What are some of the systems development methodologies used by specific corporations?
3. What steps would you take to align the IS functions of an organization with its organization’s goals?
4. Should technology drive an organization's strategic planning or should strategic planning drive an organization's technology adoption plans?
5. Give an example of a real or fictional corporation and describe the goals of the corporation. Then, ask students to discuss how a computerized information system can help the corporation achieve its goals.
6. Why is it important for everyone to be computer literate? Give some examples of how being computer literate can help an individual in his or her job and personal life.

**Additional Projects**

1. Pick a company that operates globally and use the Internet and any other available source to gather information on the company. Based on your research, write a one- to two-page paper describing some of the possible benefits that the company might have gained by operating globally. Also, describe challenges that the company has faced or is currently facing as a result of operating in a global society.
2. Choose a company that has a Web site. By exploring the Web site, determine the goals of the company. How does the company use the Internet to accomplish these goals? Report your findings in one to two paragraphs.
3. Use the Internet to research the risks that companies face because of their use of information systems. What kind of damage can each of these risks cause to a company’s operations? Summarize your findings in two to three paragraphs.
4. Choose a subfield of artificial intelligence. Research the present and potential future uses of the technologies in this subfield. Report your findings in one or two paragraphs.

**Additional Resources**

1. MISQ Central:
<http://www.misq.org/>
2. E-Commerce Times:
<http://www.ecommercetimes.com/>
3. Computer Certification:
<http://certification.about.com/index.htm>
4. Artificial Intelligence:
<http://www-formal.stanford.edu/jmc/whatisai/node1.html>
5. Management information system (MIS):
<http://mays.tamu.edu/info/what-is-mis/>
6. Decision support system:
<http://www.techopedia.com/definition/770/decision-support-system-dss>

**Key Terms**

* **artificial intelligence (AI)**—a field in which the computer system takes on the characteristics of human intelligence.
* **computer literacy—**knowledge of computer systems and equipment and the ways they function; it stresses equipment and devices (hardware), programs and instructions (software), databases, and telecommunications.
* **computer-based information system (CBIS)—**consists of hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information.
* **data**—raw facts, such as an employee number, number of hours worked in a week, inventory part numbers, or sales orders.
* **database**—an organized collection of facts and information.
* **decision support system (DSS)**—an organized collection of people, procedures, software, databases, and devices used to support problem-specific decision-making.
* **electronic business (e-business)**—using information systems and the Internet to perform all business-related tasks and functions
* **electronic commerce (e-commerce)**—involves any business transaction executed electronically between companies (business-to-business), companies and consumers (business-to-consumer), consumers and other consumers (consumer-to-consumer), business and the public sector, and consumers and the public sector.
* **enterprise resource planning (ERP) system**—a set of integrated programs capable of managing a company’s vital business operations for an entire multisite, global organization.
* **expert system**—a system that gives a computer the ability to make suggestions and act like an expert in a particular field.
* **extranet**—a network based on Web technologies that allows selected outsiders, such as business partners and customers, to access authorized resources of a company’s intranet.
* **feedback—**output that is used to make changes to input or processing activities.
* **forecasting**—predicting future events to avoid problems.
* **hardware**—computer equipment used to perform input, processing, and output activities.
* **information**—a collection of facts organized in such a way that they have additional value beyond the value of the facts themselves.
* **information literacy**—the ability to recognize a need for additional information, and then to find, access, evaluate, and effectively use that information to deal with the issue or problem at hand
* **information system (IS)**—a set of interrelated components that collect, manipulate, store, and disseminate data and information and provide a feedback mechanism to meet an objective.
* **information systems literacy—**the knowledge of how data and information are used by individuals, groups, and organizations. It includes knowledge of computer technology and the broader range of information systems.
* **input—**the activity of gathering and capturing raw data.
* **Internet—**the world’s largest computer network, actually consisting of thousands of interconnected networks, all freely exchanging information.
* **intranet**—an internal network based on Web technologies that allows people within an organization to exchange information and work on projects.
* **knowledge**—the awareness and understanding of a set of information and ways that information can be made useful to support a specific task or reach a decision.
* **knowledge base**—the collection of data, rules, procedures, and relationships that must be followed to achieve value or the proper outcome.
* **management information system (MIS)**—an organized collection of people, procedures, software, databases, and devices used to provide routine information to managers and decision makers.
* **mobile commerce (m-commerce)**—transactions conducted anywhere, anytime using wireless communications.
* **network**—computers and equipment that are connected in a building, around the country, or around the world to enable electronic communications.
* **output—**production of useful information, usually in the form of documents and reports.
* **procedures**—the strategies, policies, methods, and rules for using a CBIS.
* **process—**a set of logically related tasks performed to achieve a defined outcome.
* **processing**—converting or transforming data into useful outputs.
* **software—**the computer programs that govern the operation of the computer.
* **system**—a set of elements or components that interact to accomplish goals.
* **systems development**—the activity of creating or modifying existing business systems.
* **technology infrastructure**—all the hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information.
* **telecommunications**—the electronic transmission of signals for communications; enables organizations to carry out their processes and tasks through effective computer networks.
* **transaction**—any business-related exchange, such as payments to employees, sales to customers, and payments to suppliers.
* **transaction processing system (TPS)**—an organized collection of people, procedures, software, databases, and devices used to record completed business transactions.
* **virtual reality**—the simulation of a real or imagined environment that can be experienced visually in three dimensions.