Tomorrow's Technology and You 8/e

Chapter 12
Information Systems in Business

Systems and Organizations

Information Technology IT

As an academic discipline, IT is concerned with issues related to advocating for users and meeting their needs within an organizational and societal context through the selection, creation, application, integration and administration of computing technologies.

Curriculum Guidelines for Undergraduate

Degree Programs in Information Technology

http://www.acm.org//education/curricula/IT2008%20Curriculum.pdf




Systems and Organizations

Information Technology IT

Definition of the Information Technology Academic Discipline

Information Technology is the study of systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to enable users to accomplish their personal, organizational, and societal goals.

Curriculum Guidelines for Undergraduate Degree Programs in Information Technology

Systems and Organizations

Information Technology IT

Not to be confused with:

Information Technology **Services**

Often (not quire correctly) referred to as IT,

usually, a division in an organization that provides maintenance and other services related to computing resources of that organization




QUANTUM INFORMATION TECHNOLOGY

- A merger of quantum physics and computing technologies.
- http://www.rle.mit.edu/quantummuri/Shapiro.pdf




Systems and Organizations

Anatomy of a System

- ✓ A **system** is a set of interrelated parts that work together to accomplish a purpose.
- ✓ To accomplish its purpose, a system performs three basic functions:
  - Input
  - Processing
  - Output
- ✓ By the above definition, a computer is a system.
- ✓ A system has two additional functions: feedback and control.




Systems and Organizations

Anatomy of a System

- From a Business Major perspective, a computer or information system is often seen as a *black box* in a way characteristic of *cybernetics*:
  - The structure of the inside of the system is hidden
  - The functionality of the system is either asserted or it can be identified experimentally by observing what outputs are caused by given inputs.
  - The functionality of the system can be changed by means of control; feedback facilitates decision what control to chose.

Systems and Organizations

Anatomy of a System

- From a Computer Science Major perspective, a computer or information system is usually seen as a *white box*:
  - The structure of the inside of the system is visible.
  - The functionality of the system is derived from its structure.
  - The functionality of the system can be changed by modifying its structure; for instance, by modifying its software code.
  - Experimentation (e.g., testing) is a secondary activity.

Systems and Organizations

Business Organizations as Systems

- A **business organization** (commonly referred to as a company or a firm) is a system designed for the purpose of creating products and services for customers.
  - When we view a company as a system within an environment, each of the basic system concepts takes on a specific meaning.
- A firm's environment is made up of customers, stockholders, and other organizations, such as competitors, suppliers, banks, and government agencies.

*"In every business, however large or small, every person must have a **broad vision** and a **sense of place** in that vision."*
—Sir David Scholey


Systems and Organization

- ✓ Every system has a **boundary** that defines its limits.
- The **environment** is anything outside the system's boundary.
- ✓ A system can be a part, or a **subsystem**, of a larger system.
- For example, a personal computer can be a subsystem of a LAN, which might be a subsystem of a WAN, which could be a subsystem of the Internet.
- ✓ An **Interface** is a shared boundary between systems.
- When the output of one subsystem is used as the input for another subsystem, they are interfacing.
- A large system (like the Internet or a corporation) can have many interfacing subsystems.




Systems and Organizations

Business Information Technology System ITS

- A complex **system** whose purpose is gathering (acquisition), extracting, creating, storage, retrieval, processing, protection, transmission, dissemination, and presentation of information in order to support business, organizational, and decision-making needs of entire company or enterprise.



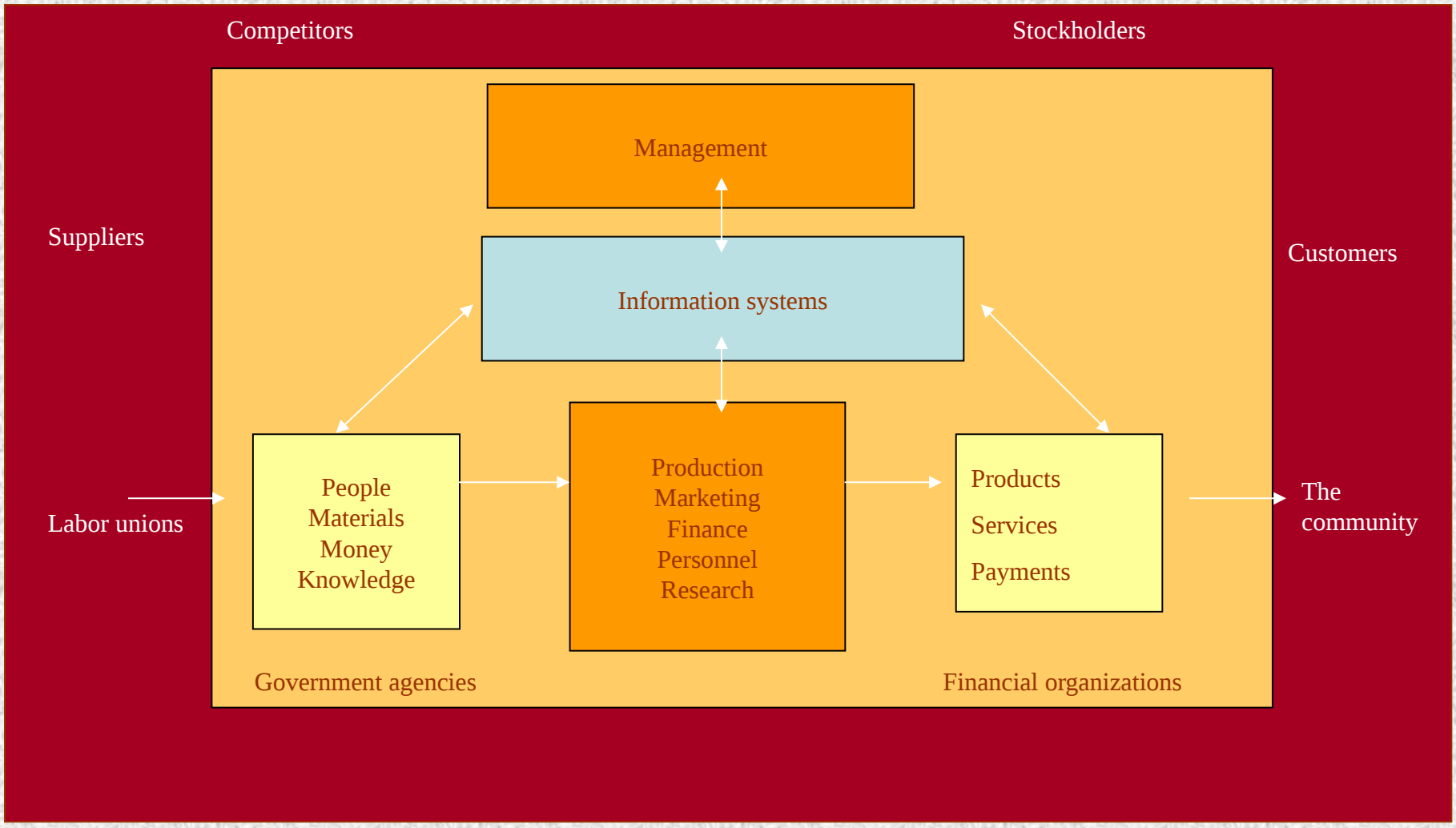

Systems and Organizations

IT vs ITS

- **IT** is an area of science and technology that aims at scientific and technological progress that supports information handling within an ITS. As an academic field, usually hosed at **CSC** or **Engineering** schools
- **ITS** is a complex system that utilizes IT for specific needs of a company or enterprise. As an academic field, usually hosted at **Business** schools.




Systems and Organizations



Systems and Organizations

- ✓ From the environment, a company acquires people, materials, money, knowledge, and other resources as input.
- Work processes such as manufacturing, marketing and sales, and accounting and finance
- Outputs include products and services, as well as dividends, taxes, and information that are transferred to entities in the environment.
- The firm's managers perform the control function to ensure that the input, processing, and output functions perform properly.
- ✓ Information systems play a key role in the feedback and control functions, collecting data from each of the primary activities and processing the data into information needed by managers.




Systems and Organizations

The Value Chain Model of a Business Organization

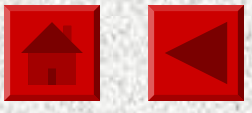
- One way to understand a business organization as a system is to use the **value chain model**.
- An organization performs a series of activities to provide products and services for customers.

Systems and Organizations

- ✓ The value chain model divides the activities of an organization into two **types—primary activities** and **support activities**
- ✓ **Primary activities**: directly related to producing the firm's goods and services
- ✓ **Support activities:** ensure the firm can perform its primary activities efficiently and effectively

Systems and Organizations

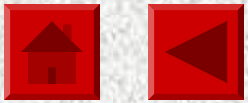
- Five primary activities in an organization's value chain:
  - **Inbound logistics** refers to receiving, storing, and distributing raw materials.
  - **Operations** is the process of creating products and services from raw materials.
  - **Outbound logistics** means delivering the products or services to customers.
  - **Marketing and sales** has to do with finding customers and getting orders.
  - **Service** refers to supporting customers after the sale.




Systems and Organizations

✓Four support activities in the value chain:

- **Management and administrative services** administer the relationships between business and financial institutions, governments, and other external organizations.
- **Human resources management** is responsible for recruiting, hiring, training, and retaining employees.
- **Technology development** means acquiring and using technology to support the other activities.
- **Procurement** refers to the process of acquiring the raw materials needed by the business.




Systems and Organizations

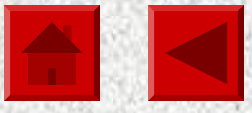
- ✓ An Organization's **efficiency** increases when its primary and support activities produce desired output with lower costs.
- Improve efficiency by:
- Empowering employees by training them
- Automating tasks requiring repetition
- Integrating value chain activities within the company and with other organizations
- ✓ **Effectiveness** is how customers rate the output of the organization's value chain.
- Improve effectiveness by:
- Improving how customers interact directly with the company
- Customizing products to fit with customer' particular desires
- Having good field service to ensure the products are easy to maintain




Systems and Organizations

Information Systems

- **Business Information System (BIS)**: a subsystem of Business Information Technology System that supports the information needs of other business processes within an organization
- Performs input, processing, and output functions, and contains feedback and control functions
- Involves people using information and information technologies to perform business processes

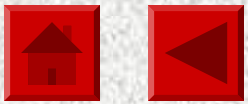



Systems and Organizations

✓ **Acquisition**
- Process of capturing data about an event that is important to the organization
- Managers, clerks, or other users expect the data to be useful later

✓ **Processing**
- An activity that manipulates and organizes information in ways that add value to the information so it is useful to users

✓ **Storage and Retrieval**
- Activities that systematically accumulate information for later use and then locate the stored information when needed



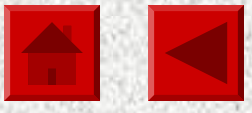

Systems and Organizations

✓Presentation

- Process of showing information in a format and medium useful to the user

✓Transmission

- Process of sending and distributing data and information to various locations




Systems and Organizations

Information Systems for Business Transactions

- ✓ A **transaction** is an event that occurs in any of the primary activities of a company.
- Examples: a sale to a customer, a purchase from a supplier, or a payroll payment to an employee
- An organization can use an information system to track transactions in order to operate efficiently.
- ✓ A **transaction processing system** (**TPS**) is a basic accounting and record-keeping system that keeps track of routine transactions.




Systems and Organizations

Information Systems for Business Transactions

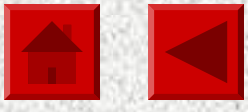
✓Transaction processing is a cyclical process with five steps:

- **Data entry**
- Entering the transaction data into machine-readable format
- Can be done electronically using **Electronic Data Interchange (EDI)**
- **Processing the data**
- Organizing and sorting data and performing calculations.
- Data can be processed in two ways:
- **Batch processing:** transactions accumulated and processed in a large batch
- **Real-time processing:** each transaction processed as it occurs

Systems and Organizations

Information Systems for Business Transactions

- **Storing and updating the data**
- Storing the transaction data in database files so it can be retrieved later for processing some future transaction
- A payment on this month's phone bill used in calculating the amount due next month
- **Data warehousing** software used to create and maintain large databases containing data on all aspects of the company
- **Document and report preparation**
- Produces several types of action documents and reports
- **Action document** initiates an action by the recipient or verifies for the recipient that a transaction has occurred
- A billing statement produced by phone company triggers an action (making a payment) on your part




Systems and Organizations

Information Systems for Business Transactions

- **User inquiry**
- Can retrieve information about any transaction activity as necessary
- Can present responses on screen or in hard-copy format
- The transaction processing cycle repeats regularly with output from one cycle serving as input to the next cycle.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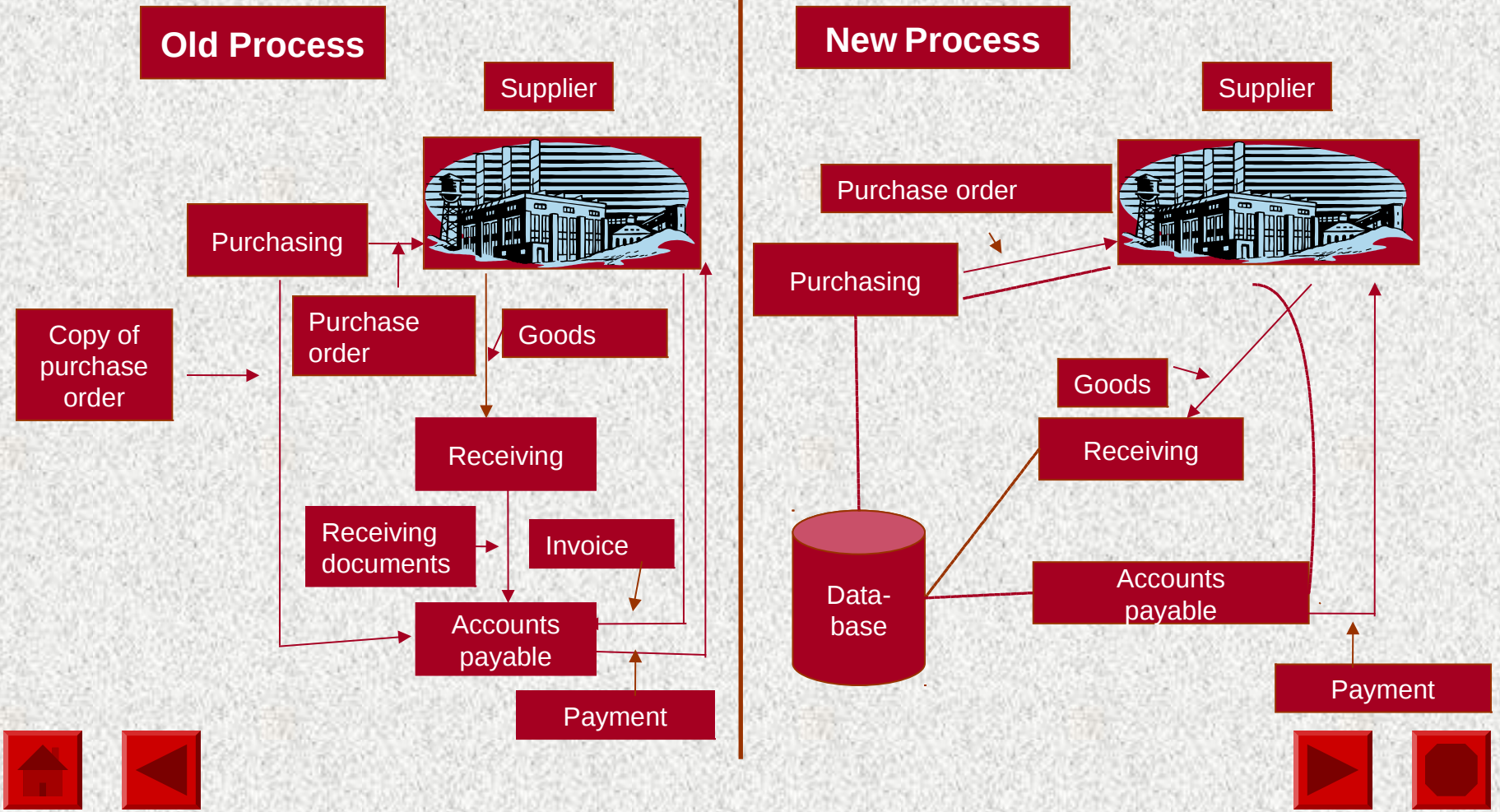
Chapter 12

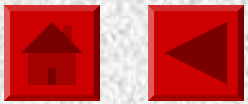
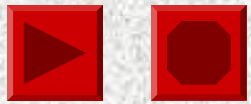
Information Systems for Business Transactions



Systems and Organizations

Enterprise Resource Planning

- ✓ An **enterprise resource planning** (**ERP**) system links, simplifies, and speeds up a company's entire transaction processing cycle.
- ✓ The emphasis of ERP is to improve the free flow of information between different parts of a firm.
- ✓ ERP systems are usually large and complex, and take a lot of time and money to implement.
- A recent survey found that the average total cost of an ERP is $15 million (the highest cost was $300 million and the lowest cost was $400,000).

Systems and Organizations

Supply Chain Management and Outsourcing

- An **interorganizational information system (IOS)** uses networking technology to facilitate communication between an organization and its suppliers, customers, and other organizations.
- The users share business data and exchange transactions with other companies electronically.
- Two forms of IOS: electronic data interchange and
business alliances

Systems and Organizations

Supply Chain Management and Outsourcing

- **Electronic data interchange (EDI)**
- The direct, computer-to-computer exchange of standardized, common business transaction documents—such as purchase orders and invoices—between business partners, suppliers, and customers
- Uses international standards for data formatting
- Enables companies to exchange large amounts of information in real time around the world
- **Business alliances**
- Cooperative arrangements between two or more businesses with complementary capabilities

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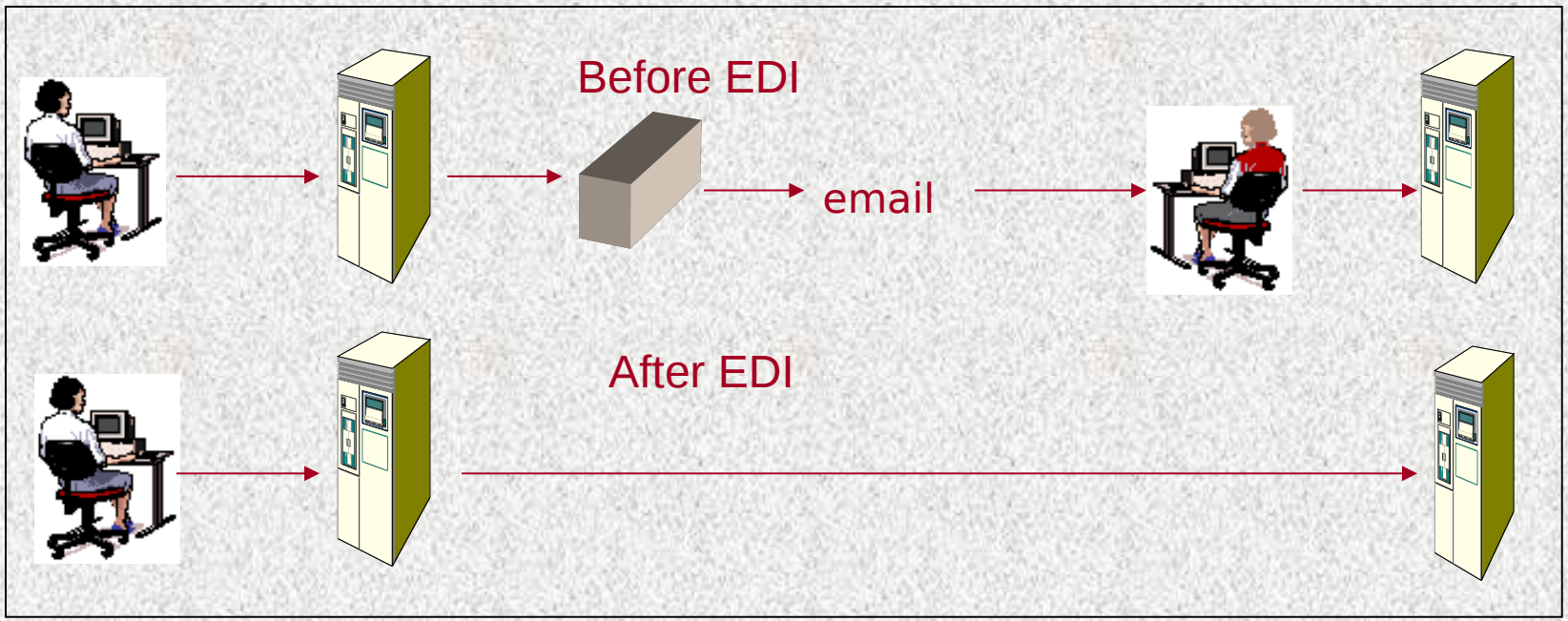
Supply Chain Management and Outsourcing



Systems and Organizations

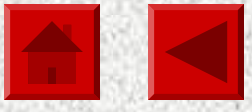
International Information Systems

- Any information system that supports international business activities is called an **international information system**
- The international business environment poses several challenges:
- Is multilingual and multicultural
- Has multiple governments, with many different regulations regarding privacy and intellectual property protection
- Has varying standards for telecommunications and other technologies, as well as multiple geographic conditions, time zones, and monetary currencies
- All of these factors affect the flow of data between countries, commonly called **transborder data flow**.


Systems and Organizations

International Information Systems

- Even though good business practices make sense around the world, many issues are unique to particular countries:
- Some countries do not allow personal data about employees to leave the country.
- **Many countries have weak, nonexistent, or poorly enforced software copyright laws.**
- Some countries consider the inexpensive labor costs in other countries to be the result of unethical labor practices.
- Some countries have poorly maintained and aging telecommunication infrastructures.




Information Technology Systems Management

- **Management** is a set of activities that helps people efficiently use resources to accomplish an organization's goals.
- Managers have several functions in an organization, all aimed at accomplishing the goals and objectives of the firm.
- Managers use several methods to solve different types of problems in various decision-making situations.

Decision Type	Problem Type	Methodology
Structured	Repetitive, routine	Procedures, rules
Semi-structured	Partially structured, partially "fuzzy"	Procedures, judgment
Unstructured	"Fuzzy," complex	Judgment, intuition

Information Technology Systems Management

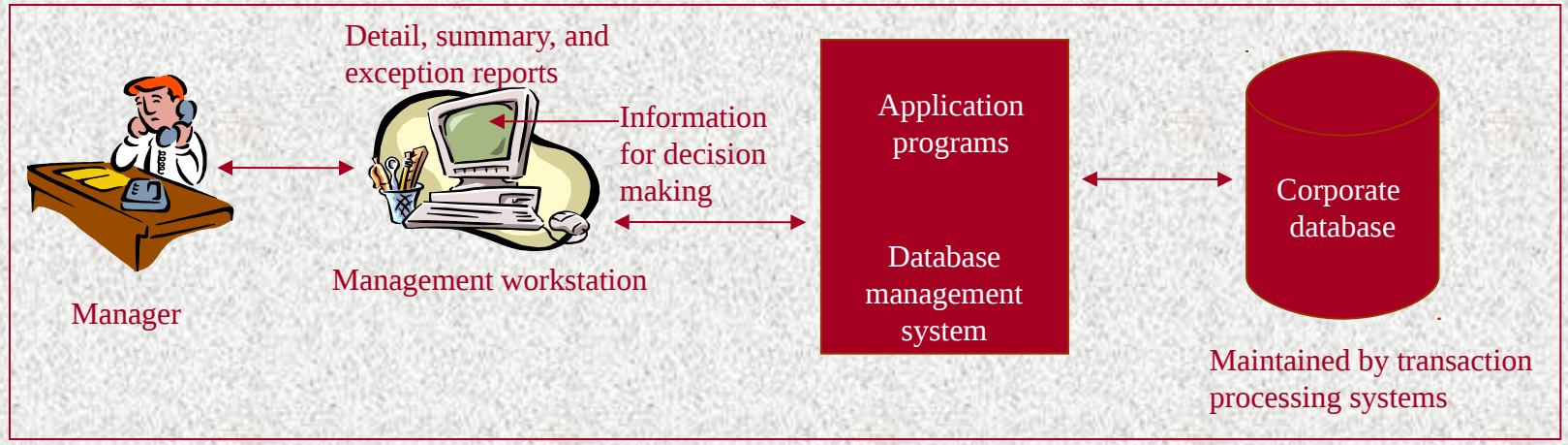
- An organization usually has a hierarchy of managers responsible for work at several levels.

Information Technology Systems Management

Decision Making

✓ Management information systems

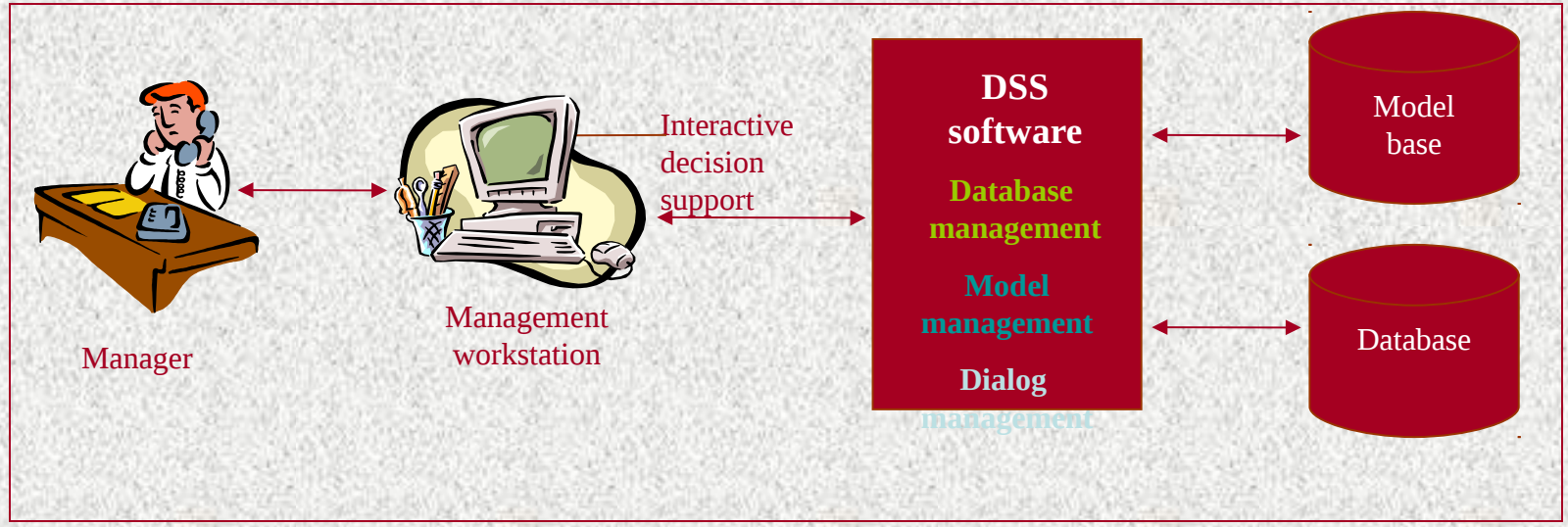
- A **management information system** (**MIS**) gives a manager the information he or she needs to make decisions—typically, structured decisions—regarding the operational activities of the company.



Information Technology Systems Management

✓ Decision support systems

- A **decision support system** (**DSS**) helps a manager make semistructured decisions, such as budget planning and sales forecasting, and unstructured decisions, such as new product development and contract negotiation.



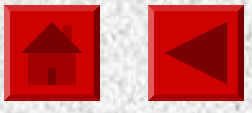
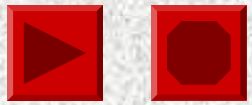
Information Technology Systems Management

✓Group decision support systems

- A **group decision support system** (**GDSS**) can enhance the dynamics of face-to-face contact in group meetings.
- Physically, a GDSS usually takes the form of a room equipped with computers, DSS database and modeling software, LAN connections, and a large-screen projection of computer output for viewing by the group.
- A GDSS also includes specific communication-oriented software tools that support the development and sharing of ideas.

Information Technology Systems Management

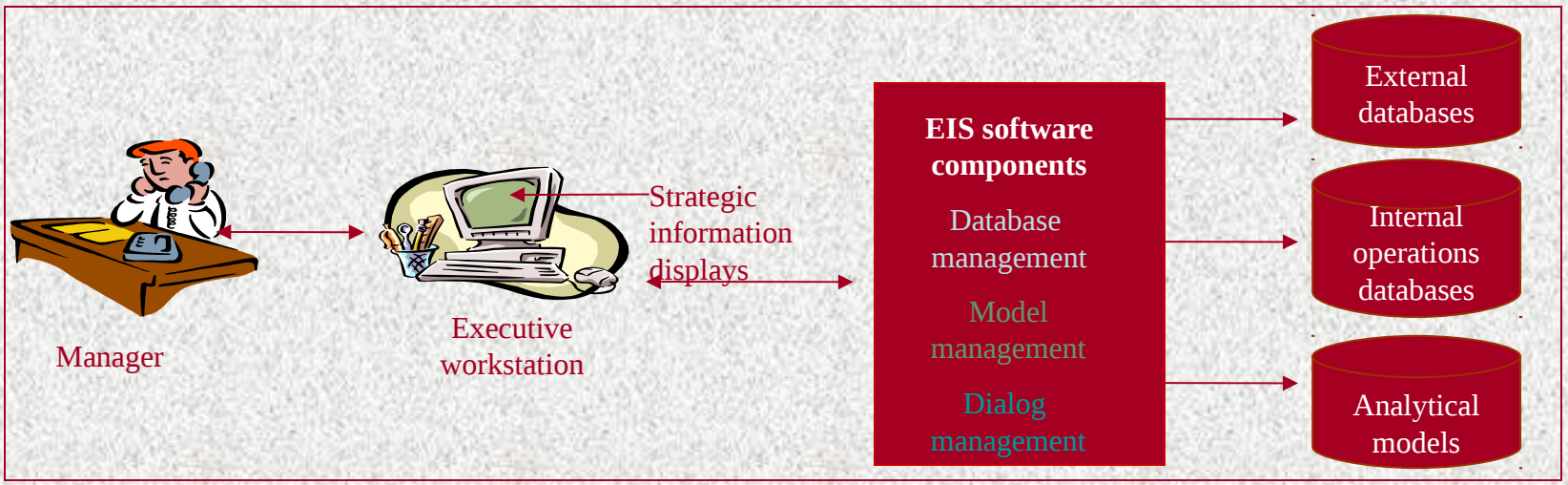
- ✓ Application of expert systems:
- Support decision making by providing managers with access to computerized expert knowledge
- An **expert** is someone who has mastery of an extraordinary amount of knowledge within a narrow domain.

Information Technology Systems Management

Executive Information Systems

- Managers can use an **executive information system** (**EIS**) to monitor the important economic and social trends affecting their organization, as well as the important performance measures of the company.



Strategic Information Systems

- An information system that is crucial to a company's competitive success is called a **strategic information system**.

Create entry barriers, switching costs and new products or services	Automate work
Modify or enhance a product or service to differentiate it and to increase its value to customers	Integrate across functions and organizations
Emphasize the organization's primary and support activities	Purchase the product
Empower people	Fit the product to customer requirements
Eliminate waste	Use the product
Use the best-known way to do the work	Make the product easier to maintain

Planning for Information Systems

- ✓ Planning: identifying a desired goal or objective and then deciding:
- What will be done to achieve the objective?
- When it will be done?
- Who will do it?
- How it will be done?
- ✓ Information technology systems planning is a major concern of top management.
- ✓ ITS planning involves four phases:
- Aligning the information technology plan with the overall business plan of an organization
- Describing the organization's ITS infrastructure
- Allocating resources to specific information systems and projects
- Planning specific information system projects




Planning for Information Systems

Strategic Planning

Decision support features	MIS	DSS	EIS	ES
Type of decision making	Many operational managers	Individuals or small groups of managers	Individual strategic or tactical manager	Individual strategic, tactical, or operational manager
Type of problem	Structured	Semi-structured	Unstructured	Structured
Type of information	Pre-designed reports	Interactive queries and analyses	Graphics and communications	Recommendations for a particular complex problem
Type of use	Indirect	Direct	Direct	Direct
Phase of decision making	Intelligence	Design, choice	Intelligence	Implementation

Planning for Information Systems

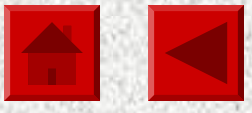
Social Responsibility in the Information Age

- ✓ **Social responsibility** refers to both legal and ethical behavior.
- ✓ Information workers face many situations in which they must make decisions about ethical and legal behavior, such as:
  - Viewing email files of project team members or subordinates
  - Making a recommendation to sell mailing lists of customers to other businesses
  - Using a browser to shop during working hours
  - Helping to implement a system that will result in five people losing their jobs




Planning for Information Systems

- A company is obliged to treat its employees with respect, healthy working conditions, fair wages, and employment continuity.
- Within this context, a socially responsible company can provide a stable and predictable ethical working environment by establishing policies and procedures, called a **code of ethics**, to guide the behavior of its information workers.




Lesson Summary

- ✓ A system is a set of interrelated parts that work together to accomplish a goal by performing three basic functions: input, processing, and output .
- ✓ A system can be a subsystem of another system and may interact with other systems in its environment.
- ✓ Business organizations can also be viewed as systems.
- ✓ As a subsystem of a larger business organization, an information system is a set of interrelated parts that work together to produce, distribute, and use information products.
- ✓ Communication between organizations is improved with electronic data interchange.




Lesson Summary (continued)

- ✓ Managers have complicated jobs that involve functions and roles requiring communication and decision making.
- ✓ An organization has three levels of management: operational, tactical, and strategic.
- ✓ A manager uses a management information system (MIS) to make structured decisions at the operational level in an organization.
- ✓ A manager uses a decision support system (DSS) to make semistructured decisions at the tactical level in an organization.




Lesson Summary (continued)

- ✓ A group decision support system (GDSS) is used to enhance collaborative decision making in teams.
- ✓ A geographic information system (GIS) supports decision making with maps and other spatial information.
- ✓ A manager uses an executive information system (EIS) to make unstructured decisions at the strategic level in an organization.
- ✓ A strategic information system is any information system that is crucial to a company's competitive success.
- ✓ An organization typically creates an overall ITS plan before developing particular systems.