ISD100-Introduction to Systems & Informatics

Introduction to Information Systems

Dr. Riham Moharam

Faculty of Information Technology & Computer Science

Sinai University

North Sinai, Egypt

Course Descriptions

- **Assessment:**
  - Course Work (Assignments, Labs, Projects): 20%
  - Midterm exam: 20%
  - Final examination: 60%
- **References:**
  - R. M. Stair and G. W. Reynolds (2019), **Principles of Information Systems**, 13th Edition, Cengage Learning.
  - R., Rainer, B. Prince and C. Cegielski (2014), **Introduction to Information Systems** Supporting and Transforming Business , 5th Edition, Wiley.

Outline

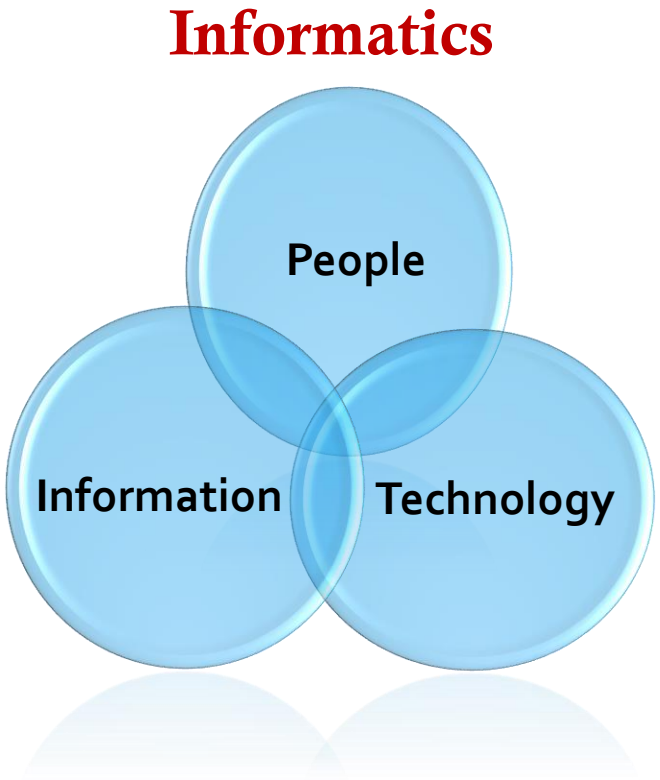
- Introduction to Informatics & Systems.
- Information Systems (IS).
- Types of Information Systems.
- Computer-Based Information System (CBIS).

What is Information?

- The term "information" has been employed to denote knowledge and associated terms, including:
  - Meaning,
  - Instruction,
  - Representation,
  - Communication,
  - Signs, symbols, etc.

Informatics

- The word is a combination of “information” and “automatic.”
  - Came from applied information science.
  - Considered it to be applied computer science.
  - The science and art of turning data into information.
- Heterogeneous Field – Interaction between People, Information and Technology:
  - Computer science and engineering
  - Social science (Human Computer Interface)
  - Information science (Data Storage, Retrieval and Mining).
- **Informatics (data science)** is the application of information technologies to optimize the information management function within an organization.



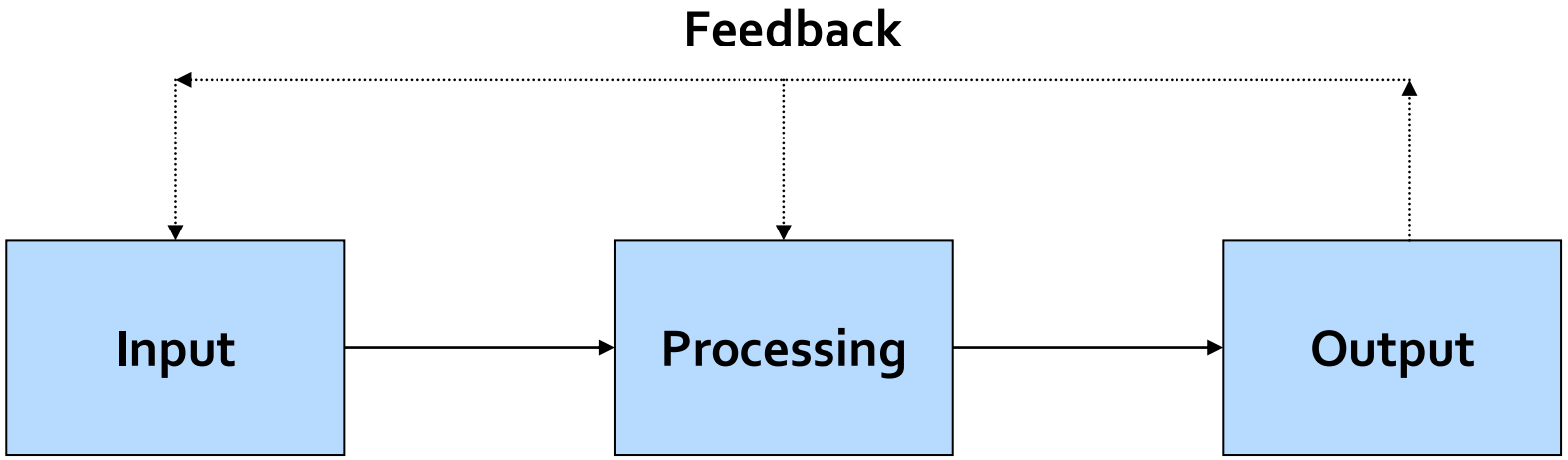
Systems

- **System**: A set of elements or components that interact to accomplish goals.
  - **Ex:** a computer system includes both hardware and software.
- **System Elements:**
  - Inputs
  - Processing mechanisms
  - Outputs

System	Elements			Goal
	Inputs	Processing elements	Outputs	
Movie	Actors, director, staff, sets, equipment	Filming, editing, special effects, distribution	Finished film delivered to movie studio	Entertaining movie, film awards, profits

Systems

- A set of interrelated elements or components that collect (input), manipulate (process), and disseminate (output) data and information and provide a **feedback mechanism to meet an objective**.



Systems Classifications and their Primary Characteristics

- Systems can be classified as simple or complex, open or closed, stable or dynamic, adaptive or non-adaptive, and permanent or temporary.

Simple	**Complex**
Has few components, and the relationship or interaction between elements is uncomplicated and straightforward	Has many elements that are highly related and interconnected
Open	**Closed**
Interacts with its environment	Has no interaction with the environment
Stable	**Dynamic**
Undergoes very **little change** over time	Undergoes **rapid** and constant change over time
Adaptive	**Nonadaptive**
Is **able** to change in response to changes in the **environment**	Is not able to change in response to changes in the environment
Permanent	**Temporary**
Exists for a relatively long **period** of time	Exists for only a relatively short period of time

System Variables and Parameters

- **System variable:** quantity or item controlled by the decision maker

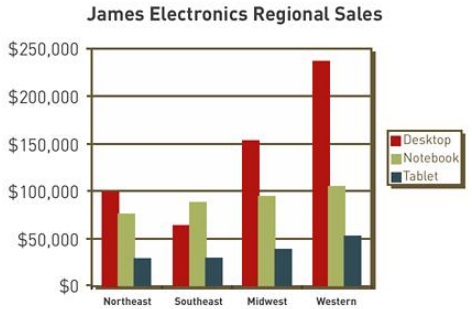
- **System parameter:** value or quantity that cannot be controlled (e.g., the cost of a raw material).

System Performance and Standards

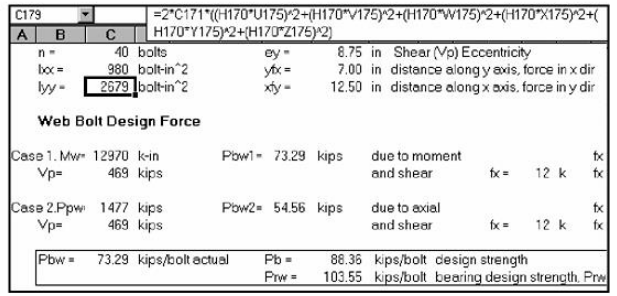
- **Efficiency:** a measure of what is produced divided by what is consumed
- **Effectiveness:** extent to which system attains its goals
- **System performance standard:** a specific objective of a system.

Modeling a System

- Model: an abstraction that is used to represent reality
  - Four major types of models:
    - Schematic model (graphic representation);
    - Mathematical model (arithmetic representation).



Schematic



Mathematical

Information System (IS)

- A set of interrelated **components** that *collect, manipulate, and disseminate* **data** and **information** and provide **feedback** to meet an **objective**.

- **Businesses:**
  - Can use information system to **increase revenues** and **reduce costs.**

Information System (IS)

- Is any combination of information technology and people's activities using that technology to support operations, management, and decision making.
  - In a broad sense, refers to the interaction between **people**, **algorithmic processes**, **data** and **technology (hardware, software, telecommunications)**.
  - **Together they are…**
    - Configured to **collect**, **manipulate**, **store**, and **process data** into **information**.

Data vs. Information

- **Data**: Raw facts. (**Unprocessed data**).
  - Data can exist in a variety of forms -- as numbers or text on pieces of paper, as bits and bytes stored in electronic memory, or as facts stored in a person's mind.

Data	Represented by
Alphanumeric data	Numbers, letters, and other characters
Image data	Graphic images or pictures
Audio data	Sound, noise, tones
Video data	Moving images or pictures

- **Information**: A collection of facts organized in such a way that they have additional value beyond the value of the facts themselves. (**Processed data**).

Data, Information, and Knowledge

- **Process:** set of logically related tasks performed to achieve a defined outcome.
  - Turning data into information is a process.
- **Knowledge:** awareness and understanding of a set of information and the ways it can be made useful to support a task
  - The process of defining relationships among data to create useful information requires knowledge

Data, Information, and Knowledge

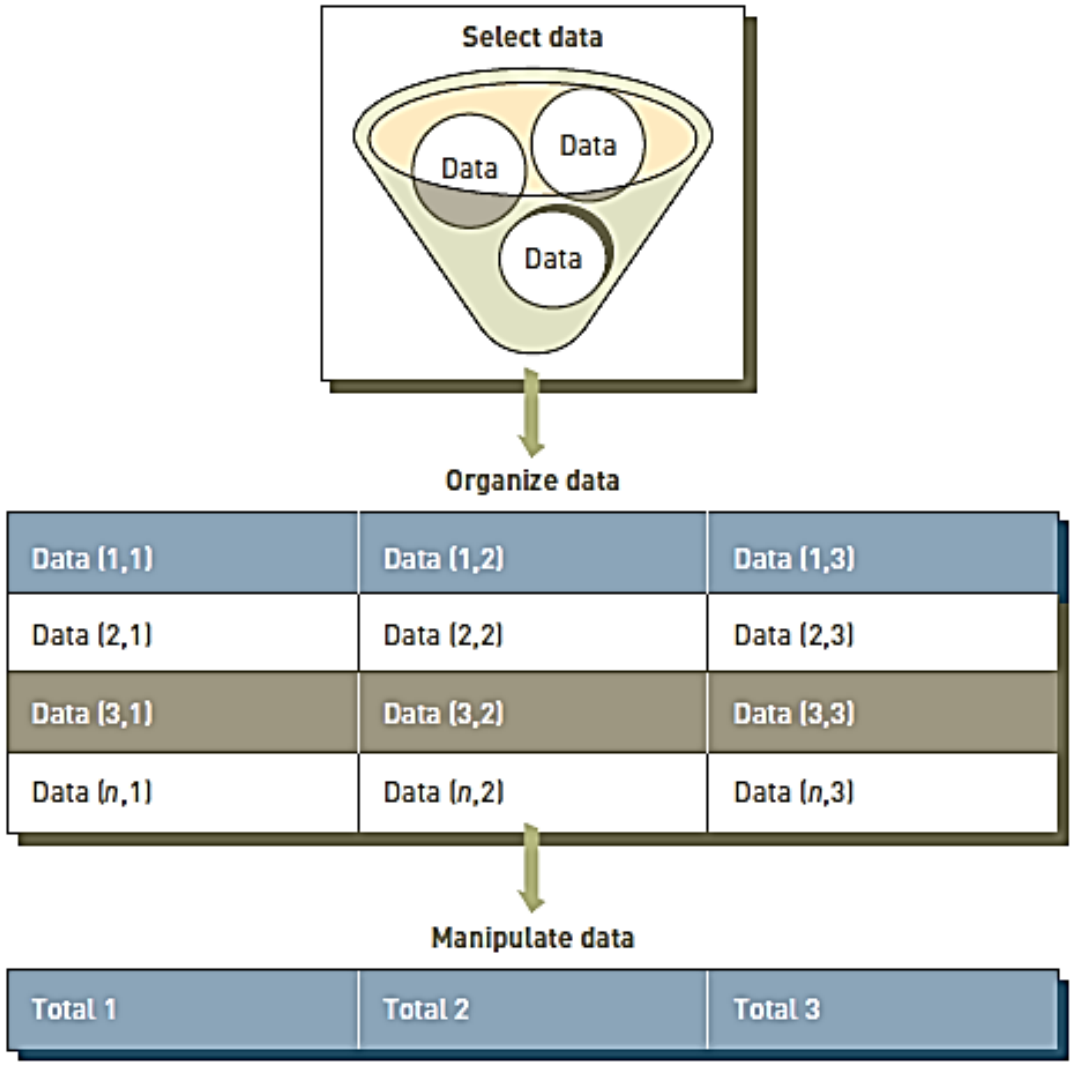


FIGURE 1.1

Process of transforming data into information

Transforming data into information starts by selecting data, then organizing it, and finally manipulating the data.

Characteristics of Valuable Information

- If an organization's information is not accurate or complete:
  - People can make poor decisions, costing thousands, or even millions, of dollars.
- Depending on the type of data you need:
  - Some characteristics become more important than others.
- Accuracy and completeness are critical for data used in accounting for the management of company assets.

Types of Information System

1. **Manual Information System:**
   - **Ex:** Investment analysts **manually draw charts** and **trend lines** to assist them in making investment decisions.
2. **Computerized Information System:**
   - **Ex: Follow stock indexes** and **markets** and suggest when large blocks of stocks should be purchased or sold.

Computer-Based Information System (CBIS)

- **Single set** of hardware, software, databases, telecommunications, people, and procedures.
  - That are configured to collect, manipulate, store, and process **data** into **information**.
- **Technology infrastructure:**
  - Include all hardware, software, databases, telecommunications, people, and procedures.
  - Configured to collect, manipulate, store, and process data into information.

Computer-Based Information System (CBIS)

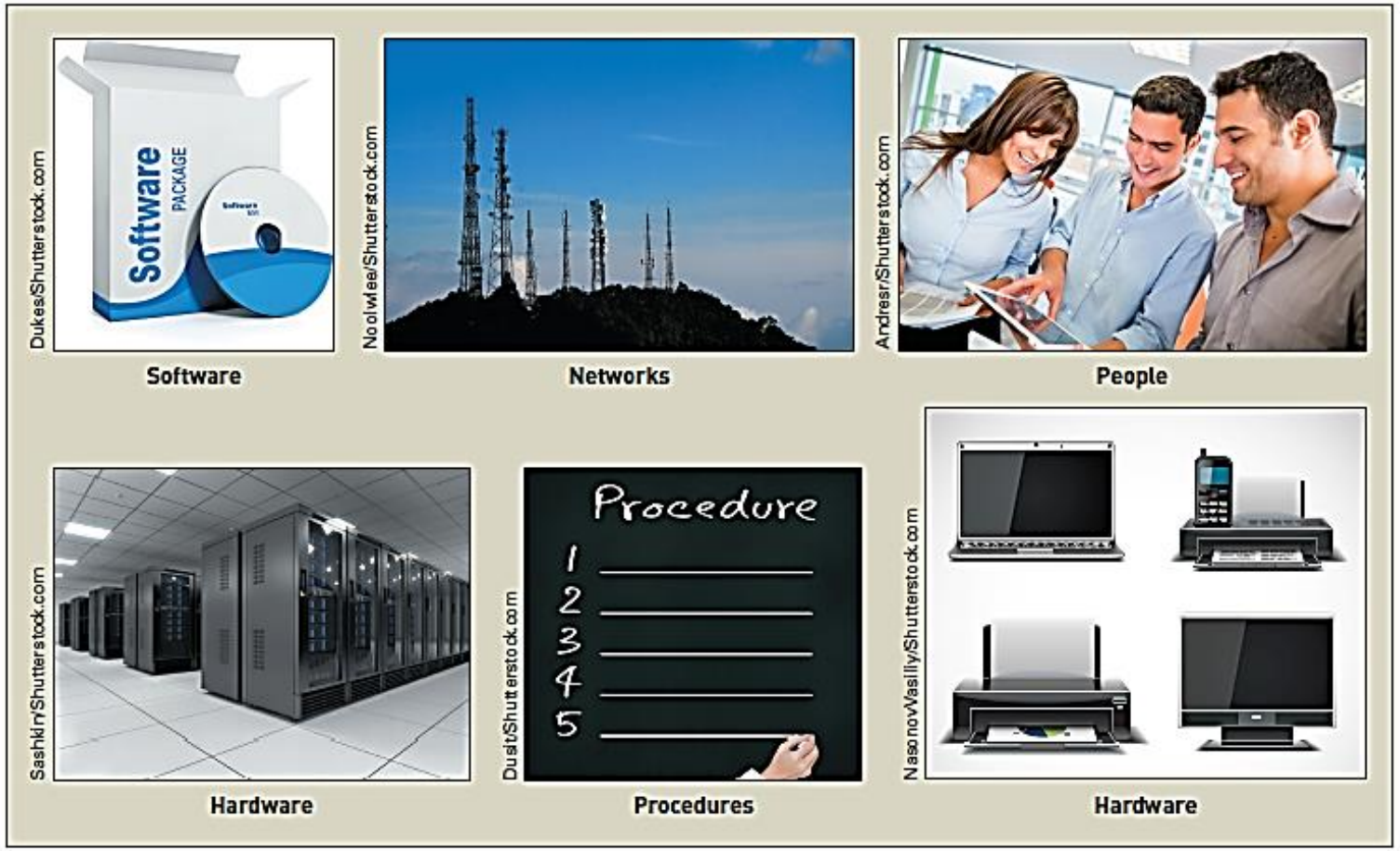


FIGURE 1.2

Components of a computer-based information system

Hardware, software, networks, people, and procedures are part of a business's technology infrastructure.

Computer-Based Information System (CBIS)

- **Hardware:**
  - Consists of computer **equipment** used to perform input, processing, and output activities.
- **Software:**
  - Consists of the computer programs that govern the operation of the computer.
- **Database:**
  - Organized collection of facts and information, typically consists of two or more related data files.
- **Telecommunications, networks and internet:**
  - The electronic transmission of signals for communications.

Computer-Based Information System (CBIS)

- **Networks:**
  - Connect computers and equipment to enable **electronic communication**.
- **Internet:**
  - World's **largest computer network**, consisting of thousands of interconnected networks, all freely exchanging information.
- **Intranet:**
  - **Internal network** that allows people within an organization to exchange information and work on projects.
- **Extranet:**
  - Network that **allows selected outsiders**, such as business partners and customers, to access authorized resources of a company's intranet.

Computer-Based Information System (CBIS)

- **People:**
  - The **most important element** in most computer-based information systems.
- **Procedures:**
  - Include **strategies**, **policies**, **methods**, and **rules** for using the CBIS.