

Information Systems

Introduction to Information Systems

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Course Descriptions

- **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 Systems.
- Information Systems (IS).
- Types of Information Systems.
- Computer-Based Information System (CBIS).

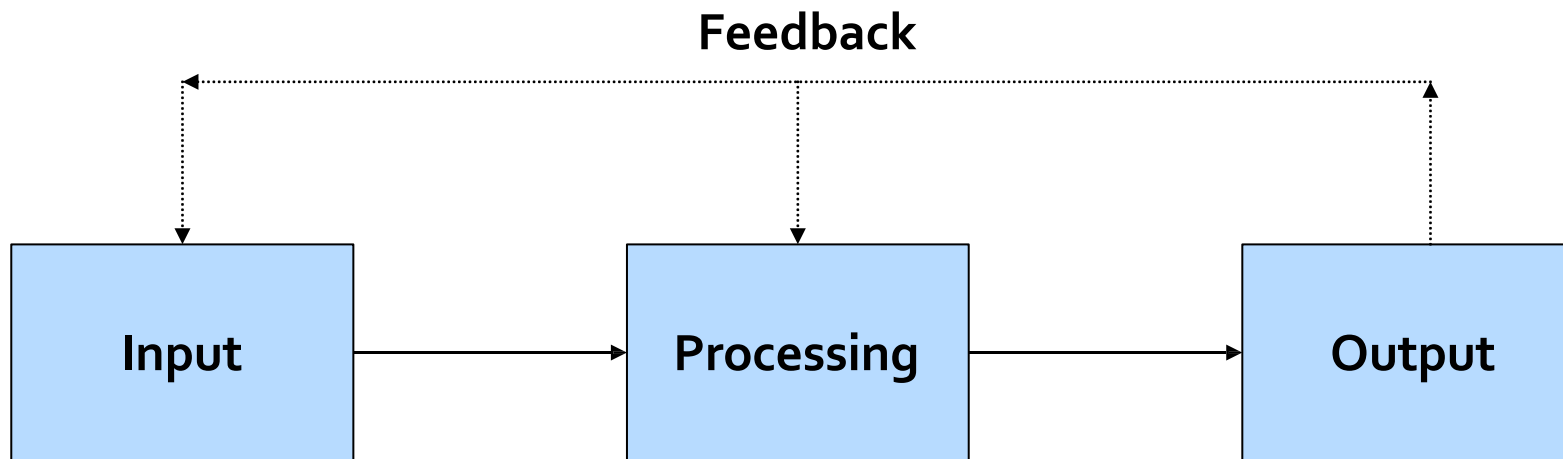
Systems

- **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.**

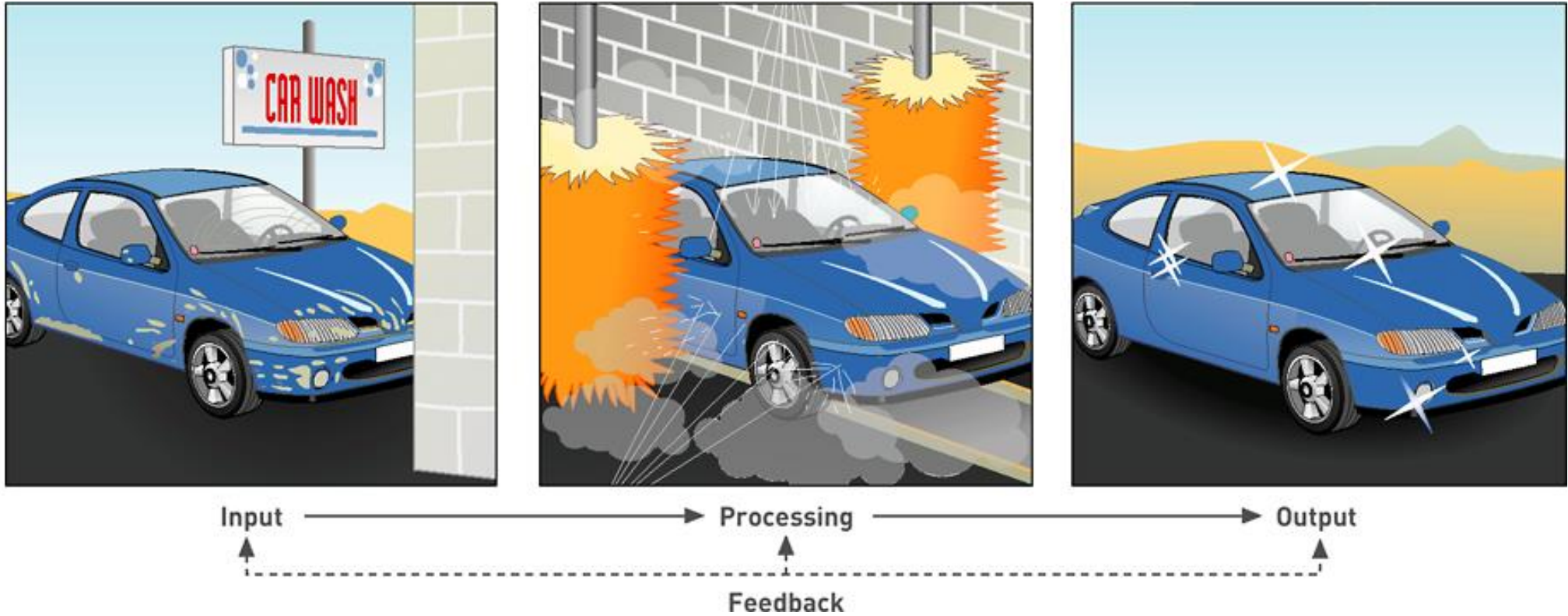


System

➤ Input, Processing, Output, and Feedback

- **Input**
 - Activity of gathering and capturing raw **data**.
- **Processing:**
 - Converting data into useful **outputs**.
- **Output**
 - Production of **useful information** , usually in the form of documents and reports.
- **Feedback:**
 - **Information** from the system that is used to make changes to input or processing activities.

System



System

- **Interfaces**

- Point of contact at which the system meets its environment or where subsystems meet each other.

- **Input**

- Whatever a system takes from its environment in order to fulfill its purpose.

- **Output**






- Whatever a system returns to its environment in order to fulfill its purpose.

- **Constraints**

- Limits to what it can do and how it can achieve its purpose within an environment (capacity, speed or capabilities).

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

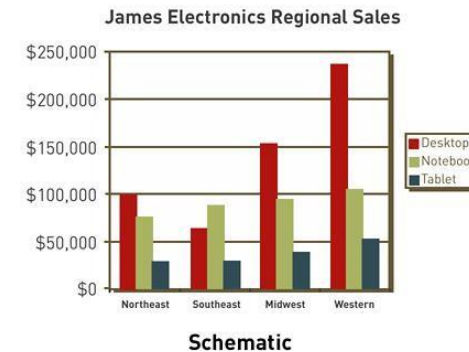
- **Efficiency:** a measure of what is produced divided by what is consumed
- **Effectiveness:** extent to which system attains its goals
- **System performance standard:** a specific objective of a system.

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).



C179		=2*C171*((H170*U175)^2+(H170*V175)^2+(H170*W175)^2+(H170*X175)^2+(H170*Y175)^2+(H170*Z175)^2)	
A	B	C	
n =	40 bolts	ey =	8.75 in Shear (Vp) Eccentricity
Ixx =	980 bolt-in^2	yfx =	7.00 in distance along y axis, force in x dir
Iyy =	2679 bolt-in^2	xyf =	12.50 in distance along x axis, force in y dir
Web Bolt Design Force			
Case 1. Mw =	12970 k-in	Pbw1 =	73.29 kips due to moment and shear
Vp =	469 kips		fx = 12 k fx
Case 2. Ppw =	1477 kips	Pbw2 =	54.56 kips due to axial and shear
Vp =	469 kips		fx = 12 k fx
Pbw = 73.29 kips/bolt actual		Pb =	88.36 kips/bolt design strength
		Pbw =	103.55 kips/bolt bearing design strength, Prw

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

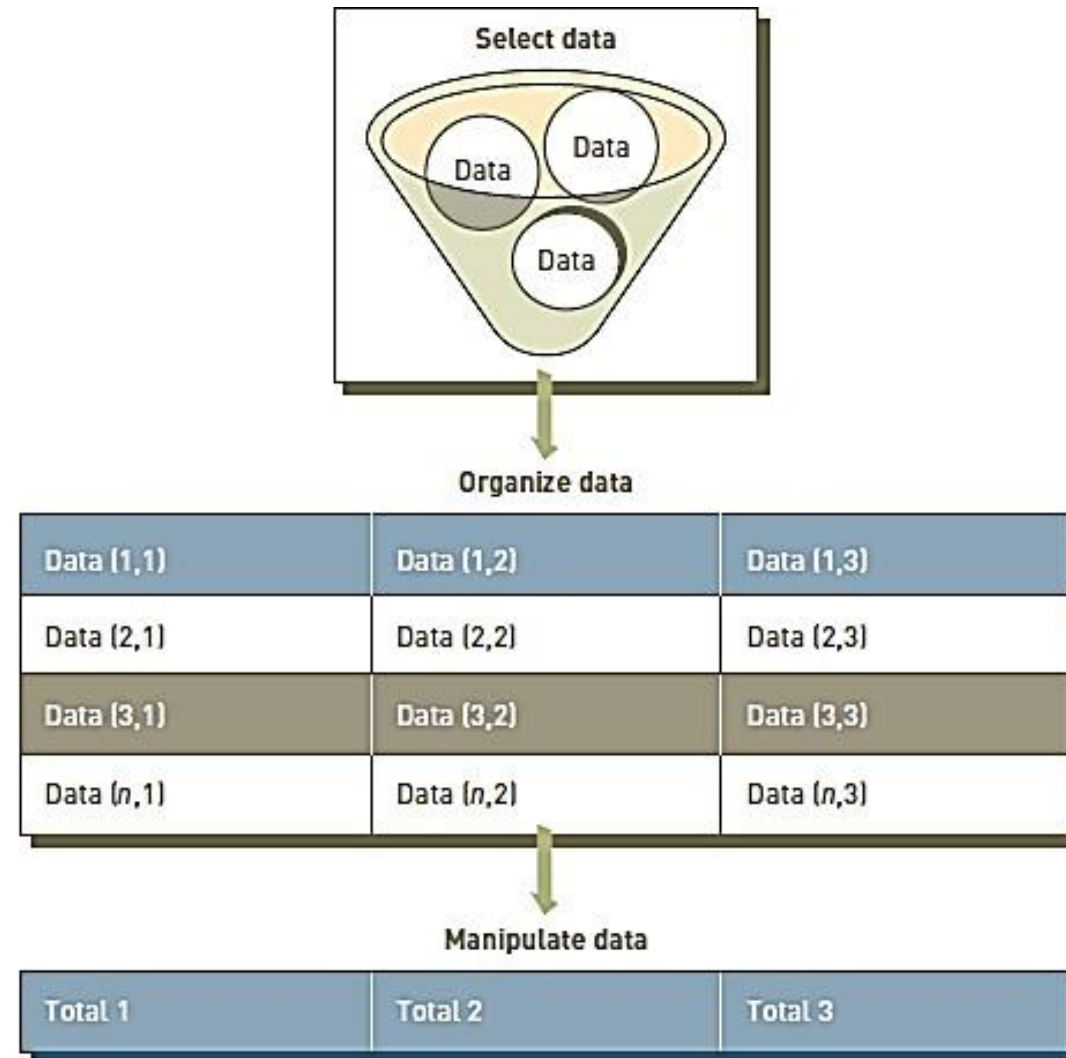


FIGURE 1.1

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.