

Chapter 1

- 1. Definition of Systems & Systems Analysis and Design SAD**
- 2. Components of a System**

What is a system

- A collection of elements (people, processes, technology, etc.) that interact to achieve a purpose.
- A system is a collection of interconnected elements—such as people, processes, technology, or resources—that work together to achieve a specific purpose or function.

- These elements interact within a defined boundary, often influenced by feedback mechanisms, to produce outcomes that align with the system's goal.
- It combines analytical, technical, and managerial skills to create efficient, scalable, and user-focused systems.
- Systems can be found in nature, technology, organizations, and more.

- In the context of Systems Analysis and Design SAD, a system often refers to an information system—a set of hardware, software, data, people, and procedures that interact to collect, process, store, and distribute information to support organizational functions.

Key Features of a System:

Components: The individual parts (e.g., hardware, employees, or rules).

Interactions: Relationships or exchanges between components (e.g., data flow, communication).

Purpose: The system's intended objective (e.g., producing goods, maintaining balance).

Boundary: What is included in the system versus its external environment.

Feedback: Loops that influence behavior (positive feedback amplifies, negative feedback stabilizes).

Examples

Ecosystem: Plants, animals, and environmental factors interacting to sustain life (e.g., a forest).

Computer System: Hardware, software, and networks processing data (e.g., a laptop).

Organizational System: People, workflows, and tools achieving business goals (e.g., a company's logistics).

Transportation System: Roads, vehicles, and signals enabling movement (e.g., a subway network).

Key Components

1. Systems Analysis

- Focuses on understanding the problem domain and defining system requirements.
- Involves gathering and analyzing business needs, user expectations, and existing system limitations.

Key activities

Requirement Gathering: Interviews, surveys, and observation to collect stakeholder needs.

Feasibility Analysis: Assessing technical, economic, operational, and legal feasibility.

Problem Identification: determine inefficiencies, redundancies, or gaps in current processes.

Modeling: Creating diagrams (e.g., data flow diagrams, ERDs, use case diagrams) to represent system processes and data.

2. Systems Design:

- Focuses on creating a blueprint for the system based on analysis findings.**
- Involves defining system architecture, interfaces, databases, and components.**

Key activities:

Architectural Design: Outlining hardware, software, and network infrastructure.

Interface Design: Creating user-friendly interfaces for interaction.

Data Design: Structuring databases and data storage solutions.

Process **Design:** **Defining** **workflows,**
algorithms, and system logic.

Prototyping **Building to validate design with**
stakeholders.

B.Components of a System

A system typically consists of the following key components:

1. Inputs

The resources, data, or materials that enter the system to be processed.

Example: In a payroll system, inputs include employee work hours and pay rates.

2. Processes

The activities, operations, or transformations that manipulate inputs to produce outputs.

Example: In a payroll system, processes include calculating wages , deductions, and taxes.

3. Outputs

The results or products generated by the system after processing inputs.

Example: In a payroll system, outputs include paychecks and payroll reports.

4. Feedback

Information about the system's performance or outputs that is used to adjust or improve the system.

Example: Employee feedback on payroll errors can lead to system improvements.

5. Environment

The external factors or surroundings that influence the system but are outside its control.

Example: Government tax regulations affecting a payroll system.

6. Boundaries

The limits that define what is included in the system and what is external to it.

Example: A payroll system may exclude employee processes.

7. Interfaces

- Points of interaction between the system and its environment or other systems.**

Example: A user interface for employees to submit work hours in a payroll system.

8. Controls

- Mechanisms to ensure the system operates correctly and securely, such as rules, policies, or validation checks.

Example: Access controls to prevent unauthorized changes to payroll data.

Example: Online Shopping System

Inputs: Customer orders, payment details.

Processes: Order processing, inventory updates, payment verification.

Outputs: Order confirmations , shipping notifications

Feedback: Customer reviews or return requests.

Environment: Market trends, internet connectivity.

Boundaries: Excludes physical delivery logistics.

Interfaces: Website or mobile app for customer interaction.

Controls: Security protocols for payment processing.

End