



Introduction to Systems

LECTURE 01

MR. ALFRED EDWIN WORTHINGTON

Course Outline

Module name: Introduction to System Analysis & Design

Credits: 3

Delivery method

- Lectures :2 hours/week
- Tutorial :1 hour/week
- Self study :2 hours/week

Enrolment Key

2023Aug@SAD

Assessment Criteria

- Mid Term Examination : 30%
- Assignments (Class Tests) : 20%
- Final Examination : 50%

To pass this module, need to obtain a pass mark in both “Continuous Assessments” and “End of the Semester Examination”

Class Test Structure

- Class Test 01 → Presentation / Poster
- Class Test 02 → In class Activity

Subject Contact

- Lecturer in charge – Mr. Alfred Edwin Worthington
- Email – alfrededwin.w@gmail.com
- Venue – 13th Floor Staff Room

IMPORTANT CLASSROOM RULES!!!

- **Lecture Notes?**
- **Don't leave the lecture without doubts.**
- **Don't keep first rows empty!**
- **If you're sleepy, you can sleep but don't snore!!!**
- **Mobiles need to be silent!**
- **Have group discussions when you're allowed to do so!**

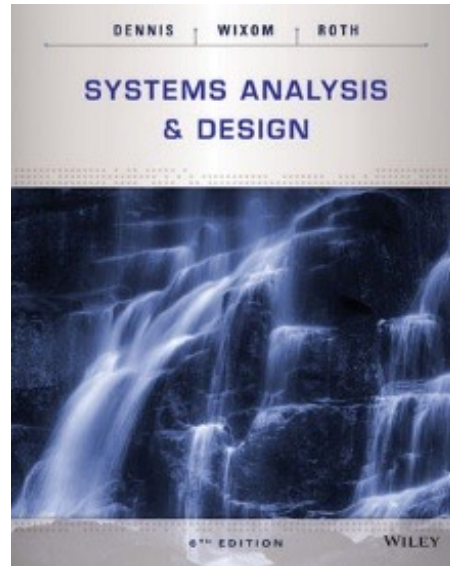
Learning Outcomes

End of this lecture you will be able to learn ,

LO1: Understand the theory behind the system with different perspectives

References

Systems Analysis & Design By – Alan Dennis & Barbra Haley
Wixom – 6th Edition



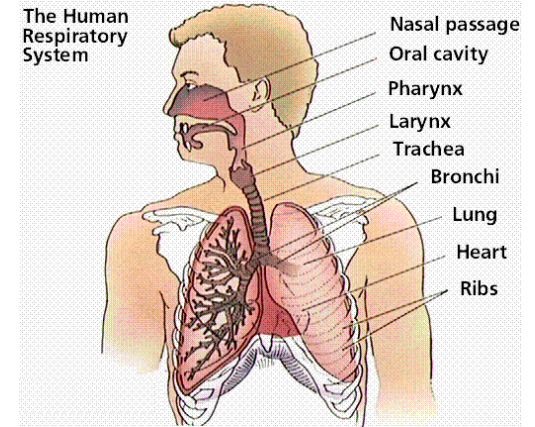
Content

- What is a system?
- System Concepts
- Properties of a System
- System Components/ Elements
- Types of System
- Information Systems & Automated Information systems

What is a System?



Systems are everywhere!!!



What is a system?

Talk with your friend and come up with a definition!



What is a system?

- The term “System” is derived from the Greek word Systema.
- A system is
 - “an orderly grouping of interdependent components
 - linked together according to a plan
 - to achieve a specific goal”.

Examples of Systems

- Human body – Biological System
 - Nervous System – brain, spinal cord, nerves etc..
 - Digestive System – Stomach, Intestine, etc...
 - Respiratory System – Lungs, Nasal Cavity
 - Immune System



Examples of Systems

Organizations:

- Employer
- Employees
- Customers

School System

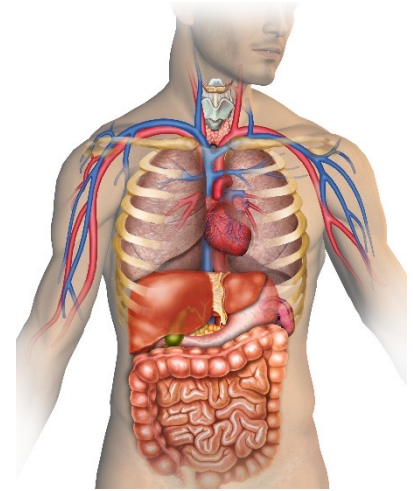
- Principal
- Teachers
- Students

Governments

- President
- Ministers
- Public

Hospitals

- Health Ministry
- Doctors
- Patients



Collection

Vs.

System

Collection Vs. System

Collection:

A group of things collected or assembled together, often a group created by someone.

Example: Bowl of fruits, Tool-Box

System:

A group of things that connect & form some kind of related.

Example: Human Body, Government, Solar system

Why do we need Systems?

- Systems are created to solve problems.
- It is an organized way of dealing with a problem.

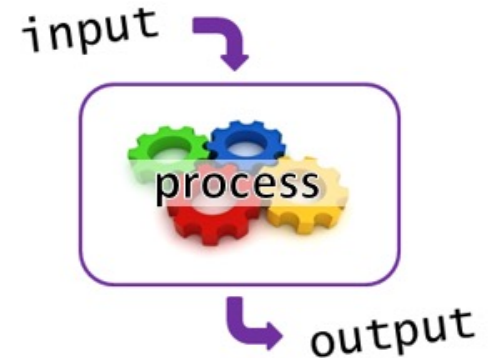


System Concepts

- Can be defined as a combination of resources/functional units working together to accomplish a given task.
- All components in a System are interrelated and interdependent and cannot exist independently.

- Three major components in every system.

- Input
- Processing
- Output



System Concepts

- Systems occur in number of forms and vary in composition, hierarchical structure and behavior.
 - **Economic Systems**
 - **Educational Systems**
 - **Financial Systems**
 - **Environmental Systems**
 - **Medical Systems**

- Systems produce combinations of products , by-products or services.

Properties of a system

- Sub-system
- Purpose/Objective
- Organization
- Interaction
- Interdependence
- Integration

Properties of a System

Sub - systems

- A System may consist a set of interacting smaller systems.
- Known as **Subsystems or Functional Units**.
- Have their own defined tasks.
- Subsystems work in coordination to achieve the overall objective of the System.

Purpose/Objective

➤ Systems have a **purpose** that defines it as a discrete entity that holds it together

- Purpose of an automobile ➔ Take you from one place to the other



Organization

- Implies structure and order.
- The arrangement of components that helps to achieve predetermined objectives.

Example:

- Hierarchical relationship in a business system
- Computer system is designed around an input device, a central processing unit, an output device and one or more storage units.

Interaction

- The manner in which each component functions with other components of the system.
- An interrelationship between each components of a system.

Examples:

- In computer system, the central processing unit must interact with the input device to solve a problem. In turn the main memory holds programs and data that the arithmetic unit uses for computation.

Interdependence

- How the components of a system depend on one another.
- The components are coordinated and linked together according to a specified plan.
- The output of one subsystem is the required by other subsystem as input.

Integration

- How a system components are connected together.
- It means that the parts of the system work together within the system even if each part performs a unique function.

System Components/Elements

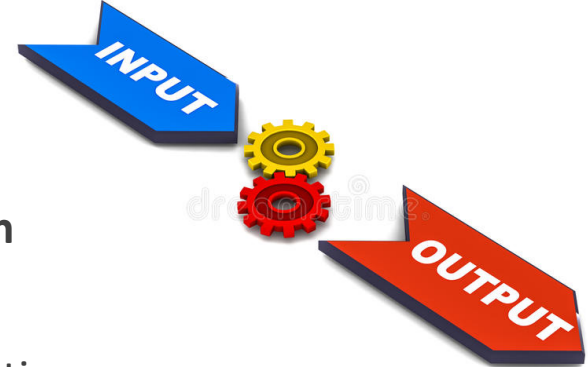
- Outputs & Inputs
- Processor(s)
- Control
- Resources (**Hardware, Software, Liveware**)
- Procedures
- Feedback
- Standards
- Environments
- Boundaries and Interfaces



Components of a System

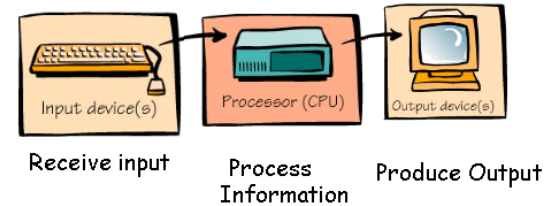
Outputs & Inputs

- The main aim of a system is to produce an output which is useful for its user.
- Inputs - information that enters the system for processing.
 - **Example: material, Data**
- Outputs - the outcome of processing.
 - **Example : Goods, Services, Information**
- Outputs must conform to the customers expectations



Processor(s)

- Involves the actual transformation of input into output.
- The operational component of a system.
- May modify the input either totally or partially, depending on the output specification.
- As the output specifications change, so does the processing. In some cases, input is also modified to enable the processor for handling the transformation.

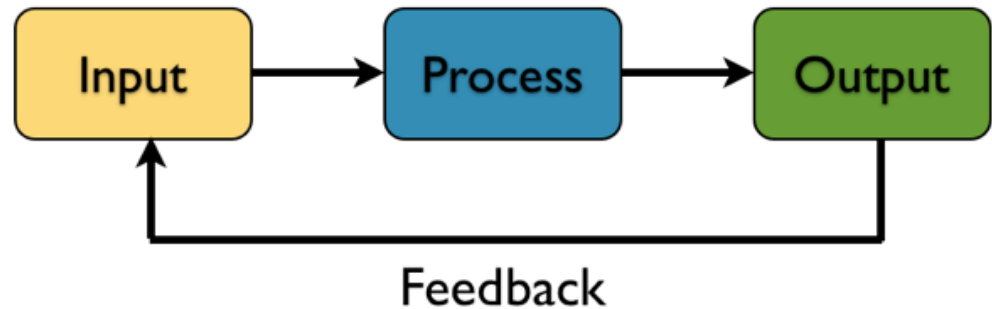


Control

- The control element guides the system.
- The decision–making subsystem that controls the pattern of activities governing input, processing, and output.
- To keep system in balance, what and how much input is needed is determined by Output Specifications.
- **Example** : The behavior of a computer System is controlled by the Operating System and software.

Feedback

- Feedback provides the control in a dynamic system.
- The output of the system needs to be observed.
- Feedback from the output is taken to improve the system and make it achieve the laid standards.



Environment

- The “super system” within which a system operates.
- It is the source of external elements that strike on the system.
- Determines how a system must function.
- All systems must adapt with the current environment. Systems should also change with the changing environment.
- **Example** : vendors and competitors of organization’s environment, may provide constraints that affect the actual performance of the business.

Boundaries & Interfaces

- Boundaries are the limits that identify its components, processes, and interrelationship when it interfaces with another system.
- Each system has boundaries that determine its sphere of influence and control.
- The system interacts with other systems through its interfaces.
- Users of the system also interact with the system through its interfaces.
- Interfaces should therefore be customized and user friendly.

Standards

- It is the acceptable level of performance for any system
- Systems should be designed to meet standards
- Standards:
 - **Business specific**
 - **Organization specific**

System Components:

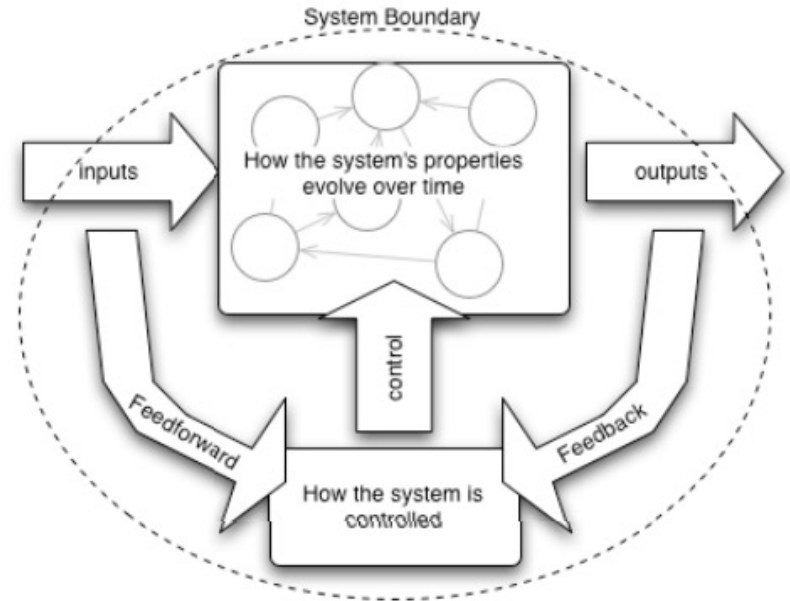
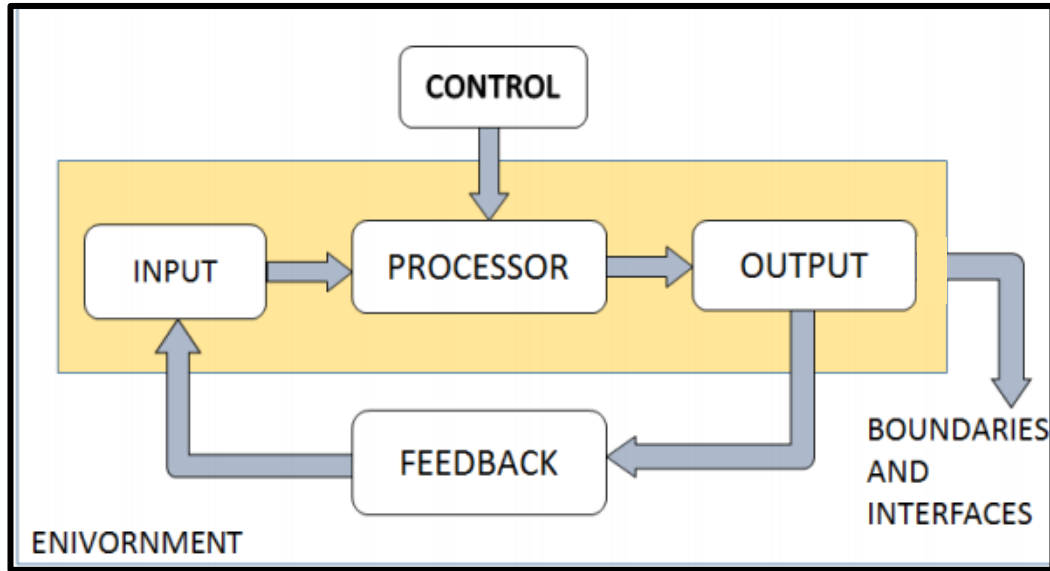
Procedures

- Every system functions under a set of rules that govern the system to accomplish the defined goal of the system.

Intermediate Data

- Processors process system inputs
- Before it transforms into outputs, it goes through many intermediate transformations

Conceptual Picture of a System



Types of Systems:

Physical System vs. Abstract System

Physical Systems: Tangible entities that may be static or dynamic in nature.

- Static systems - each entity has its own physical existence, which can be seen, touched and counted.
 - **Example : Desks and chairs of computer center**
- Dynamic system - responds to various demands made by the user.
 - **Example : programmed computer**

Physical System vs. Abstract System

Abstract system:

Conceptual and non-physical entities.

Used for describing data and data relationships in accordance with concept.

It can be formulas, representation or model of a real system

Open System vs. Closed System

Open systems: Real-world systems where boundaries allow interactions with the environment.

Example : An information system which must adapt to the changing environmental conditions.

Closed systems: Theoretical systems that do not interact with the environment.

A completely closed system is rare in reality.

Example : Chemical reaction in the sealed tube.

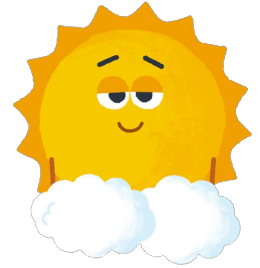


Natural systems vs Man Made Systems:

Natural systems

Systems which are in the environment made by nature.

Example: ecosystems, weather, water cycles



Man Made Systems:

System which is made by man is called man made system.

Example: Rockets, Drums, Trains



Other Types of Systems

Symbol Systems:

Example : languages, set of icons

Human Activity Systems:

Example: business, organizations, markets

Designed Systems:

Example : cars, telephones

Information Systems:

- Special case of designed systems

Example: banking systems, accounting systems

Information System

- An interconnected set of information resources to manage data for particular organization under Direct Management Control (DMC).
- An information system has three components
 - Data
 - People
 - Procedures

Example: Business Systems

➤ Examples for Business systems:

- **Banking System**
- **Vehicle Manufacturing System**
- **Game designing system**

➤ These Systems have their information needs like

- **Maintaining Employee records**
- **Inter office mail**
- **Employee salaries etc.**

➤ So, it is essential to maintain data.

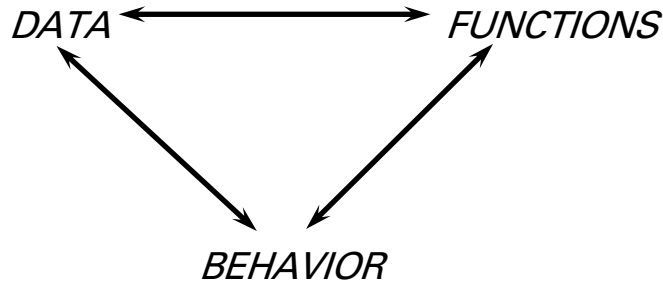
Automated Information Systems

An AUTOMATED INFORMATION SYSTEM IS:

- a type of fabricated system
- used by one or more persons
- to help them accomplish some task or assignment
- utilizes hardware and software in addition to data, people, procedures
- plus all the aspects of a system

Automated Information Systems

- An AUTOMATED INFORMATION SYSTEM has three basic characteristics to consider:



- **DATA** - input, output, or already stored data electronically
- **FUNCTIONS** - transformations or actions taken
- **BEHAVIOR** - the observable effects from interaction

Summary

- What is a system?
- Properties of a System
- System Components/ Elements
- Types of System
- Information Systems & Automated Information systems



Thank
You!
