CSC 339

SYSTEM ANALYSIS AND DESIGN

LECTURE 1

LECTURER

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COURSE OVERVIEW

LECTURE 1	Introduction to System Concepts and SDLC Analysis
LECTURE 2	Systems Analysis and Fact Gathering Techniques
LECTURE 3	Data Flow Diagrams and Process Description
LECTURE 4	Analyzing Processes and Descriptive Techniques
LECTURE 5	Data Modeling and System Design Principles
LECTURE 6	Designing Systems - ERDs and Structure Charts
LECTURE 7	Form Designs, Security, and Automated Tools for Design
LECTURE 8	Scope of Systems Analysis and Investigation
LECTURE 9	Review and Implementation

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Introduction to System Concepts and SDLC Analysis

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SYSTEM ANALYSIS AND DESIGN

- **Systems analysis and design** is a step-by-step process for developing high-quality information systems.
- **An information system** combines information technology, people, and data to support business requirements.
- Information systems handle daily business transactions, improve company productivity, and help managers make sound decisions. The IT department team includes systems analysts who plan, develop, and maintain information systems.

SYSTEM

- A **System** is a complex whole comprising interrelated and interdependent parts that work together to achieve a common goal.
- **In the context of information systems**, this often involves hardware, software, data, processes, and human resources.
- **Examples of a system: Library Management System** etc
  - A Library Management System is a comprehensive system that includes hardware, software, processes, data, and human resources working together to efficiently manage library resources.

SYSTEM COMPONENTS

Inputs	Inputs: Elements that enter the system for processing.
Processes	Processes: Activities or transformations that occur within the system.
Outputs:	Outputs: Results or outcomes produced by the system.
Feedback	Feedback: Information that the system gathers to evaluate and adjust its performance.
Environment	Environment: The external elements that interact with the system.

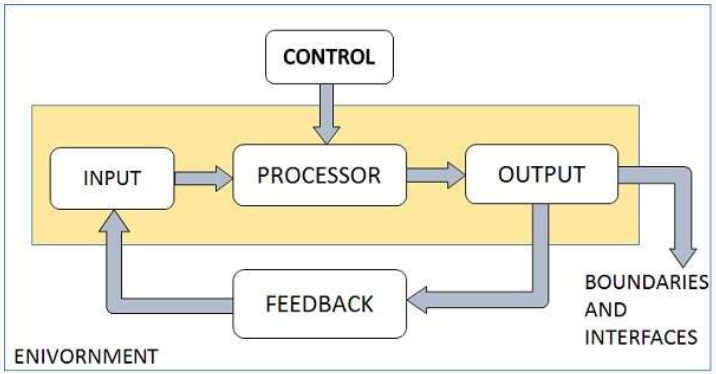

Figure 1: Components of a stem

SYSTEM CONCEPTS

- In order to build any system only the knowledge of its elements does not serve the purpose, there should be fundamental clarity of some important concepts which are essential to build the efficient system & to keep it in equilibrium. The major concepts are

  I. Boundary & environment

  II. Subsystem

  III. Interface

  IV. Feedback control

  V. Black box

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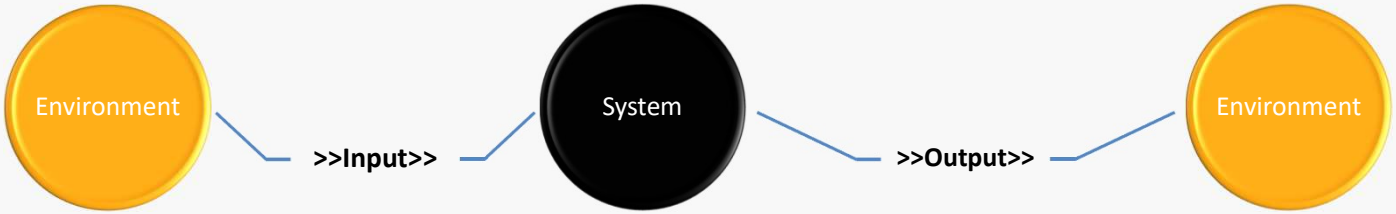
SYSTEM CONCEPTS

Boundary & environment

- Boundary: It is the entity/bound that determines the limits and the sphere of influence & control of a system.
- Environment: Everything within the circumscribed space is called system & everything outside it is environment.
- Flow from environment to the system is its input while a flow from system to its environment is the output. Boundary of the system may exist physically or conceptually.



SYSTEM CONCEPTS

Subsystems

- Subsystem: An irreducible part or aggregation of parts that makes up a system; also called a subsystem.
- A complex system is difficult to implement when consider as a whole. However if we divide it into smaller functional units which are of manageable sizes then every small function unit becomes a subsystem.
- In the formation of subsystem the components performing same or similar functions are grouped.

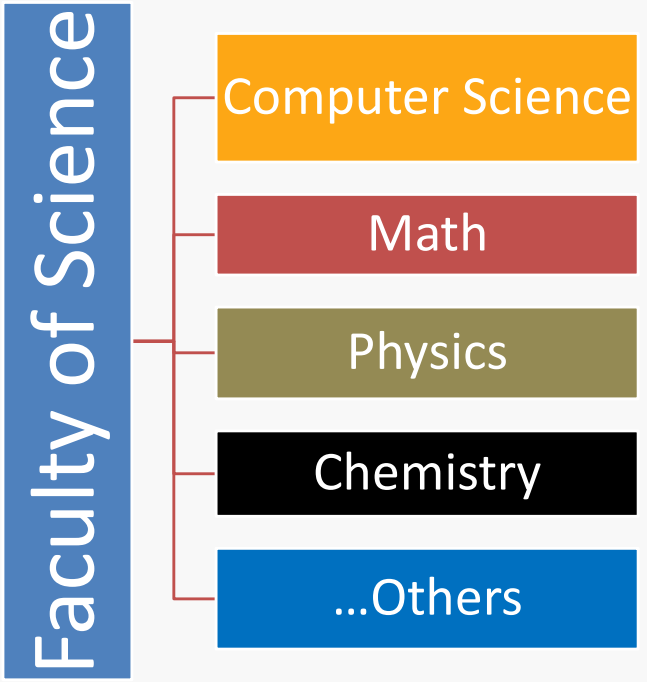


Figure 2: Example of Subsystems

SYSTEM CONCEPTS

Interface, Feedback and Blackbox

- Interface: The interconnections & interactions among the subsystems are termed as interfaces. In fact each interface implies a communication path. Number of interfaces increase with number of subsystems.
- **Feedback control**: In order to improve the performance of any system feedback control mechanism can be used as a tool or device to control or modify the input of the system after analyzing the output properly.
- **Black box**: Black box is the subsystems at lowest level where the inputs are defined, outputs are determined but the processor of the system is not defined means it difficult to understand how the transformation of input to output takes place.

CHARACTERISTICS OF A SYSTEM

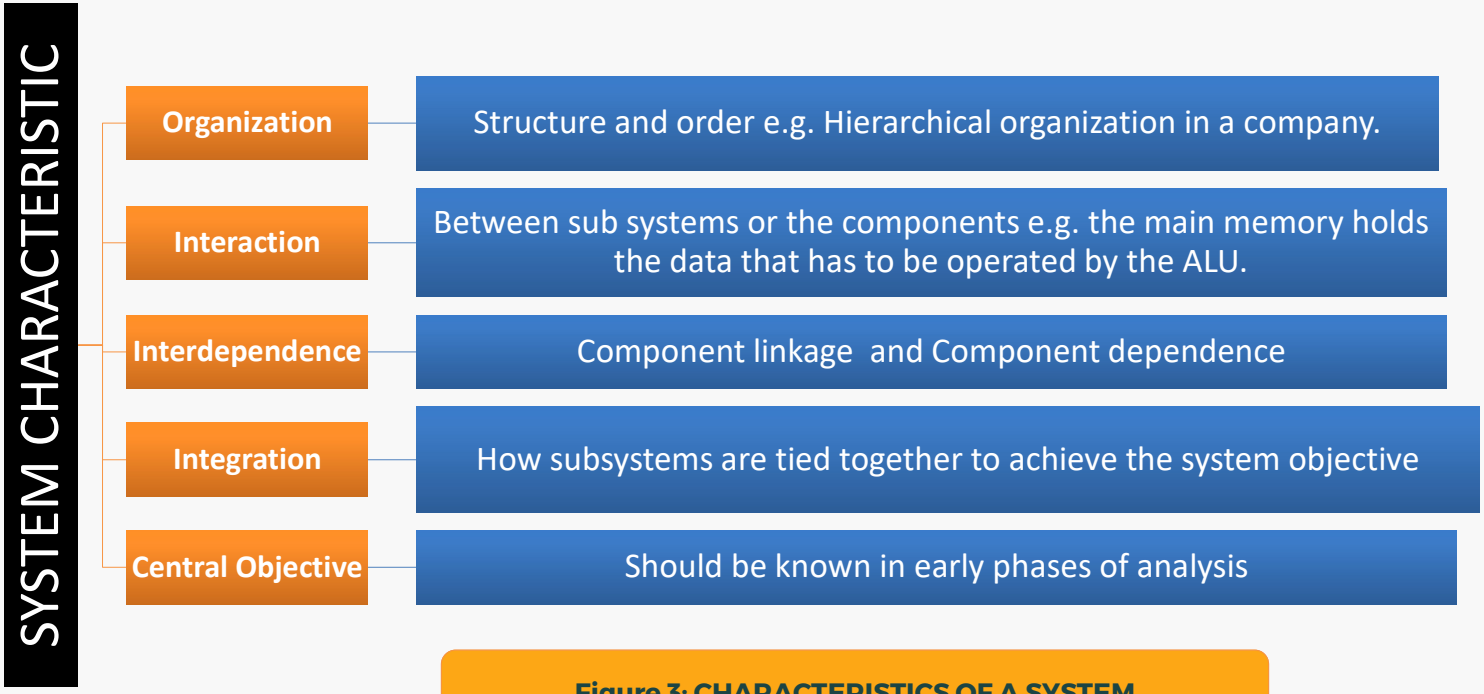


Figure 3: CHARACTERISTICS OF A SYSTEM

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TYPES OF SYSTEM

- Open or Closed Systems
- Physical or Abstract Systems
- Natural & Artificial Systems
- Deterministic or Probabilistic Systems
- Integrated Systems

TYPES OF SYSTEM

Physical or Abstract Systems

- Physical system: These are the concrete operational systems made up of people , material, machines energy & other physical things. For example: Management information system.
- Abstract (conceptual) system is an orderly arrangement of independent ideas. For example: Economic theory, Theory of relativity.
- Physical systems being operational systems can display activities or behavior. While conceptual system as it works on different ideas or concepts it displays theoretical structures.

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TYPES OF SYSTEM

Natural or Artificial Systems

- Natural systems All the naturally occurring systems are called as natural systems For example: Solar system.
- Artificial system: All man made systems are called as artificial systems.

TYPES OF SYSTEM

Open or Close Systems

- **Open system**: Open system is that system which interacts with its environment. *For example: Any business organization system exchanges its material, manpower, money & information with its environment.*
- **Closed system**: Closed system is that system which does not interact with its environment. It has only controlled & well defined input & output. *For example: Television is itself is closed system which controls its sharpness, brightness automatically with sensors.*

TYPES OF SYSTEM

Deterministic & Probabilistic system

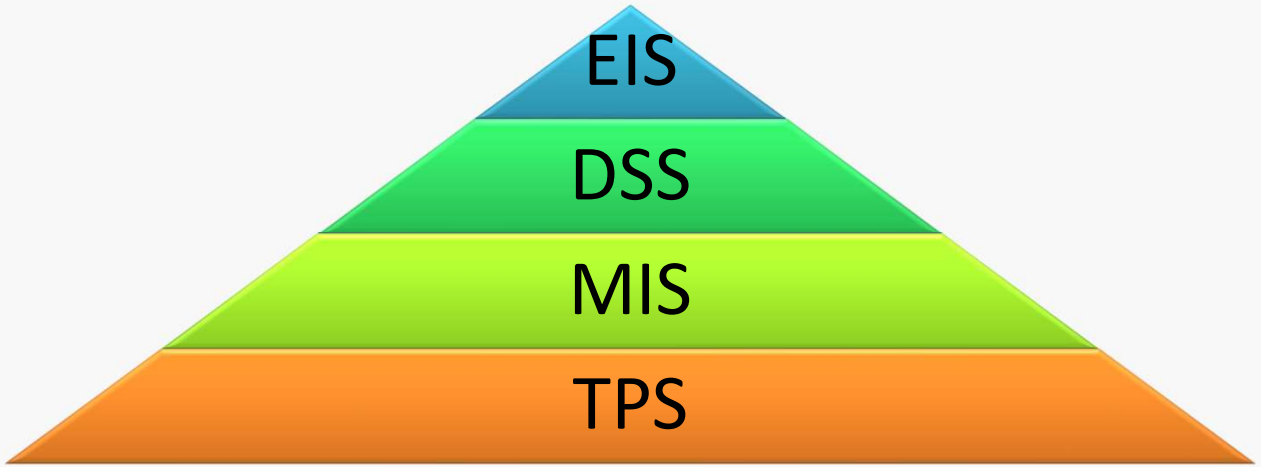
- **Deterministic system**: It is a system which operates in predictable manner. Stepwise execution is always possible & output is sure. *For example: computer system.*
- **Probabilistic system**: It is a system which operates in unpredictable manner & degree of error is always possible. Also output is not sure. *For example: Weather forecasting system.*

TYPES OF SYSTEM

Integrated system

- Integrated system: An integrated system is one that combines related subsystems to form a larger subsystem or total system. For example: Airline reservation system

MANAGEMENT INFORMATION SYSTEM



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MANAGEMENT INFORMATION SYSTEM

Transaction processing system (TPS)

- **Functions**: It updates history files, prepares summarized & processed transaction, and It generates detailed transaction reports.
- **Application areas**: Banking system, Sales accounting system, etc.
- **Users of the system**: Lower level management of the system.
- Benefits:
  i. Stores all transactions.
  ii. Helps to trace out the problem,
  iii. Gives current status of all the organizational entities.

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MANAGEMENT INFORMATION SYSTEM

Management information system (MIS)

- **Functions**: It makes use of output from the TPS as input and generates meaningful reports.
- **Application areas**: Marketing, production, personnel departments.
- **Users**: Middle level management
- **Benefits**:

i. Helps in planning.

ii. Helps in decision making.

iii. Suitable for analysis.

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MANAGEMENT INFORMATION SYSTEM

Decision support system (DSS)

- Functions:
  i. This system makes use of internal data from MIS for studying trends I
  ii. External data collected from environment to understand the environment.
- Benefits :
  i. It helps to prepare analytical & planning models.
  ii. It assists top level management in decision making.
- Application area: Production planning control system

MANAGEMENT INFORMATION SYSTEM

Executive information system (ESS)

- Function: It is structured & automated system provides rapid access to timely information & management reports. This system is supported with online information services such as electronic mail to keep the management updated with all current happenings in major areas.
- Benefits:
  i. User-friendly
  ii. Fast
  iii. Updated with graphics & reports

SYSTEM DEVELOPMENT METHODOLOGY

- A system development methodology is an orderly & integrated collection of various methods, tools & techniques. There are many approaches to the development of computer system, such as
  I. System development life cycle(SDLC)
  II. Structured system analysis & design method (SSADM)
  III. System prototype method (SPM)