आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

**IFTM University, Moradabad, Uttar Pradesh**

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# E-Content

# IFTM University, Moradabad

# MBA IT-01

# UNIT-01

# System Analysis and Design

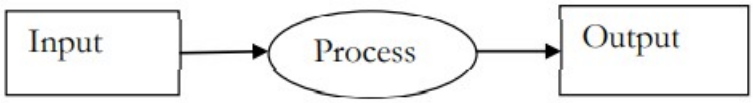
Systems Analysis and Design is an active field in which analysts repetitively learn new approaches and different techniques for building the system more effectively and efficiently. The primary objective of systems analysis and design is to improve organizational systems. The subject provides a basic understanding of system characteristics, system design, and its development processes. It is a good introductory guide that provides an overview of all the concepts necessary to build a system.

## System Concepts:-

System is defined as a set of elements arranged in an orderly manner to accomplish an objective. System is not a randomly arranged set. It is arranged with some logic governed by rules, regulations, principles and policies. Such an arrangement is also influenced by the objective the system desires to achieve. Systems are created to solve problems. One can think of the systems approach as an organized way of dealing with a problem. In this dynamic world, the subject system analysis and design (SAD) mainly deals with the software development activities.

For example, if a computer system is designed to perform commercial data processing, then the elements will be data entry devices, a CPU, a disk, a memory, application programs and a printer. If a computer is designed to achieve the objective of design, engineering and drawing processing, then the elements will be the graphic processor, and the languages suitable for engineering and design applications, and plotters for drawing the output. However, a clear statement of objectives brings a precision and an order into the selection of elements and their arrangements in the system. Any disorder would create a disturbance in the system, affecting the accomplishment of the objectives.

If a system in any field is analyzed. It will be observed that it has three basic parts, which are organized in an orderly manner. These three parts can be represented in a model as shown:-




A system may have single input and multiple outputs or may have several inputs and outputs. All the systems operate in an environment.A collection of component that work together to realize some objectives forms a system. In a system the different components are connected with each other and they are interdependent. For example, human body represents a complete natural system. We are also bound by many national systems such as political system, economic system, educational system and so forth. The objective of the system demands that some output is produced as a result of processing the suitable inputs. A well designed system also includes an additional element referred to as „control" that provides a feedback to achieve desired objectives of the system.

**Definition of a System :-**

The term system may be defined as an orderly arrangement of a set of interrelated and interdependent element that operate collectively to accomplish some common purpose or goal.

For example – human body is a system, consisting of various parts such as head, heart, hands, legs and so on. The various body parts are related by mean of connecting networks of blood vessels and nerves and the system has a main goal of "living". Thus, a system can be described by specifying its parts, the way in which they are related, and goals which they are expected to achieve.

A business is also a system is also a system where economic resources such as people, money, material, machines, etc are transformed by various organizational processes (such as production, marketing, finance etc.) into goods and services.

A computer based information system is also a system which is a collection of people, hardware, software, data and procedures that interact to provide timely information to authorized people who need it.

**Characteristics of a system:-**

There are five types of characteristics for a system. They are

1. Organization

2. Interaction

3. Interdependence

4. Integration

5. A central objective

ORGANIZATION: Organization implies structure and order. It can also be defined as the arrangement of components that helps to achieve objectives.

For example in the design of a business system, the hierarchical relationships starting with the president on top and leading towards the workers represents the organization structure. So this gives the authority structure and specifies the formal flow of communication.

Like wise a computer system is designed around an input device, a central processing unit, an output device and one or more storage units.

- structure and order
- Example: Hierarchical organization in a company.
- Computer system: organization of various components like input devices, output devices, CPU and storage devices

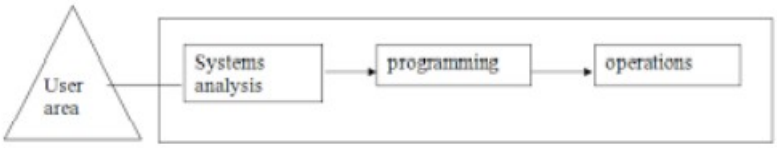
INTERACTION: Interaction refers to the manner in which each component functions with other components of the system. ie, there should be an interrelationship between each components of a system.

For example, in an organization there should be interaction between purchase department and production department, same way advertising with sales, payroll with personnel. 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.

- Between sub systems or the components
- Example: the main memory holds the data that has to be operated by the ALU.

**INTERDEPENDENCE:** This is one of the important characteristics of a system.

Interdependence means the parts or the components of an organization or computer system depends on one another. Each component or parts should depend on other components of an organization. One component or subsystem depends on the input of another subsystem for proper functioning, ie, the output of one subsystem is required input for another subsystem. For example: - A decision to computerize an application is initiated by the user, analyzed and designed by the analyst, programmed and tested by the computer operator. In the below figure:- none of these persons can perform properly without the required input from others in the computer centre subsystem.




- Component linkage
- Component dependence

**INTEGRATION:** Integration is concerned with how 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

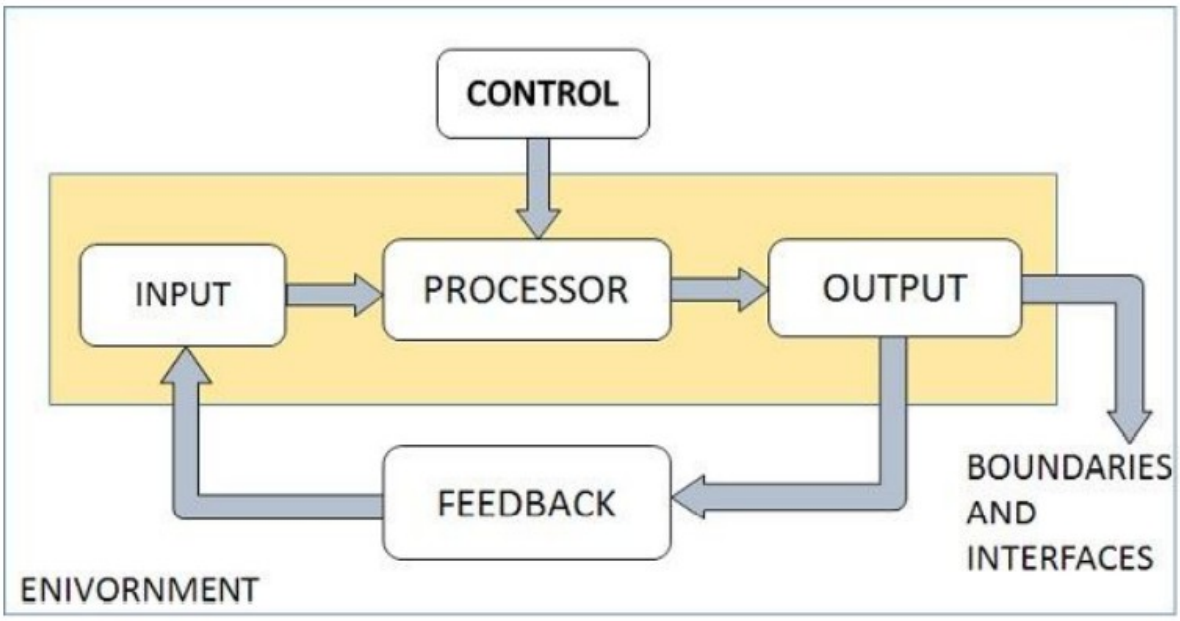
- How subsystems are tied together to achieve the system objective

**CENTRAL OBJECTIVE:** The objective of system must be central. It may be real or stated. It is not uncommon for an organization to state an objective and operate to achieve another. The users must know the main objective of a computer application early in the analysis for a successful design and conversion

- Should be known in early phases of analysis

**Elements of the System**

A system has three basic elements input, processing and output. The other elements include control, feedback, boundaries, environment and interfaces.




## INPUTS AND OUTPUTS

Inputs are the information or elements that we enter the system for processing. Output is the outcome of processing. A major objective of a system is to produce an output that has value to its user. Whatever the nature of the output it must be in line with the expectations of the intended user. A system feeds on input to produce output.

## PROCESSOR

The processor is the element of a system that involves the actual transformations of input into output. It is the operational component of a system. Processors may modify the input totally or partially, depending on the specifications of the output.

## CONTROL

The control element guides the system. It is the decision-making subsystem that controls the pattern of activities governing input, processing and output. In an organization context, management as a decision making body controls the inflow, handling and outflow of activities that affect the welfare of the business. In a computer system, the operating system and accompanying software influence the behavior of the system. Output specifications determine what and how much input is needed to keep the system in balance.

### FEEDBACK

Control in a dynamic system is achieved by feedback. Feedback measures output against a standard procedure that includes communication and control. After the output is compared against performance standards, changes can result in the input or processing and consequently the output.

- Feedback provides the control in a dynamic system.
- Positive feedback is routine in nature that encourages the performance of the system.
- Negative feedback is informational in nature that provides the controller with information for action.

### ENVIRONMENT

- The environment is the “super system” within which an organization operates.
- It is the source of external elements that strike on the system.
- It determines how a system must function. For example, vendors and competitors of organization’s environment may provide constraints that affect the actual performance of the business.

### BOUNDARIES AND INTERFACE

- A system should be defined by its boundaries. 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 knowledge of the boundaries of a given system is crucial in determining the nature of its interface with other systems for successful design.

## Types of Systems:-

The systems can be divided into the following types −

Physical or Abstract Systems

- Physical systems are tangible entities. We can touch and feel them.

- Physical System may be static or dynamic in nature. For example, desks and chairs are the physical parts of computer center which are static. A programmed computer is a dynamic system in which programs, data, and applications can change according to the user's needs.
- Abstract systems are non-physical entities or conceptual that may be formulas, representation or model of a real system.

    - Physical system: tangible entities
    - static or dynamic in nature.
    - Example : system-computer centre
    - Desks and chairs are the static parts
    - Programs, data, and applications can change according to the user's needs.
    - Abstract systems are conceptual. These are not physical entities. They may be formulas, representation or model of a real system

## Open or Closed Systems

- An open system must interact with its environment. It receives inputs from and delivers outputs to the outside of the system. For example, an information system which must adapt to the changing environmental conditions.
- A closed system does not interact with its environment. It is isolated from environmental influences. A completely closed system is rare in reality.
- open system has many interfaces with its environment
- can also adapt to changing environmental conditions
- can receive inputs from, and delivers output to the outside of system
- Closed systems: Systems that don't interact with their environment. Closed systems exist in concept only.

## Adaptive and Non Adaptive System

- Adaptive System responds to the change in the environment in a way to improve their performance and to survive. For example, human beings, animals.
- Non Adaptive System is the system which does not respond to the environment. For example, machines.

### Permanent or Temporary System

- Permanent System persists for long time. For example, business policies.
- Temporary System is made for specified time and after that they are demolished. For example, A DJ system is set up for a program and it is dissembled after the program.

### Natural and Manufactured System

- Natural systems are created by the nature. For example, Solar system, seasonal system.
- Manufactured System is the man-made system. For example, Rockets, dams, trains.

### Deterministic or Probabilistic System

- Deterministic system operates in a predictable manner and the interaction between system components is known with certainty. For example, two molecules of hydrogen and one molecule of oxygen makes water.
- Probabilistic System shows uncertain behavior. The exact output is not known. For example, Weather forecasting, mail delivery.

### Social, Human-Machine, Machine System

- Social System is made up of people. For example, social clubs, societies.
- In Human-Machine System, both human and machines are involved to perform a particular task. For example, Computer programming.
- Machine System is where human interference is neglected. All the tasks are performed by the machine. For example, an autonomous robot.

### Man–Made Information Systems

- It is an interconnected set of information resources to manage data for particular organization, under Direct Management Control (DMC).
- This system includes hardware, software, communication, data, and application for producing information according to the need of an organization.

  Man-made information systems are divided into three types −

- **Formal Information System** − It is based on the flow of information in the form of memos, instructions, etc., from top level to lower levels of management.

- **Informal Information System** − This is employee based system which solves the day to day work related problems.
- **Computer Based System** − This system is directly dependent on the computer for managing business applications. For example, automatic library system, railway reservation system, banking system, etc.
- Information system is the basis for interaction between the user and the analyst.
- Main purpose-manage data for a particular organization.

## Decision support systems (DSS):-

Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

DSS uses the summary information, exceptions, patterns, and trends using the analytical models. A decision support system helps in decision-making but does not necessarily give a decision itself. The decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

## Programmed and Non-programmed Decisions

There are two types of decisions - programmed and non-programmed decisions.

Programmed decisions are basically automated processes, general routine work, where −

- These decisions have been taken several times.
- These decisions follow some guidelines or rules.

For example, selecting a reorder level for inventories, is a programmed decision.

Non-programmed decisions occur in unusual and non-addressed situations, so −

- It would be a new decision.
- There will not be any rules to follow.
- These decisions are made based on the available information.
- These decisions are based on the manger's discretion, instinct, perception and judgment.

For example, investing in a new technology is a non-programmed decision.

Decision support systems generally involve non-programmed decisions. Therefore, there will be no exact report, content, or format for these systems. Reports are generated on the fly.

## Attributes of a DSS

- Adaptability and flexibility
- High level of Interactivity
- Ease of use
- Efficiency and effectiveness
- Complete control by decision-makers
- Ease of development
- Extendibility
- Support for modeling and analysis
- Support for data access
- Standalone, integrated, and Web-based

## Characteristics of a DSS

- Support for decision-makers in semi-structured and unstructured problems.
- Support for managers at various managerial levels, ranging from top executive to line managers.
- Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level.
- Support for interdependent or sequential decisions.
- Support for intelligence, design, choice, and implementation.
- Support for variety of decision processes and styles.
- DSSs are adaptive over time.

## Benefits of DSS

- Improves efficiency and speed of decision-making activities.

- Increases the control, competitiveness and capability of futuristic decision-making of the organization.
- Facilitates interpersonal communication.
- Encourages learning or training.
- Since it is mostly used in non-programmed decisions, it reveals new approaches and sets up new evidences for an unusual decision.
- Helps automate managerial processes.

## Components of a DSS

Following are the components of the Decision Support System −

- **Database Management System (DBMS)** − To solve a problem the necessary data may come from internal or external database. In an organization, internal data are generated by a system such as TPS and MIS. External data come from a variety of sources such as newspapers, online data services, databases (financial, marketing, human resources).
- **Model Management System** − It stores and accesses models that managers use to make decisions. Such models are used for designing manufacturing facility, analyzing the financial health of an organization, forecasting demand of a product or service, etc.

  **Support Tools** − Support tools like online help; pulls down menus, user interfaces, graphical analysis, error correction mechanism, facilitates the user interactions with the system.