Systems Analysis and Design – Overview

Systems development is systematic process which includes phases such as planning, analysis, design, deployment, and maintenance.

Systems Analysis: It is a process of collecting and interpreting facts, identifying the problems, and decomposition of a system into its components. System analysis is conducted for the purpose of studying a system or its parts in order to identify its objectives. It is a problem solving technique that improves the system and ensures that all the components of the system work efficiently to accomplish their purpose. Analysis specifies what the system should do.

Systems Design: It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements. Before planning, you need to understand the old system thoroughly and determine how computers can best be used in order to operate efficiently.

System Design focuses on how to accomplish the objective of the system.

System Analysis and Design (SAD) mainly focuses on:

- Systems
- Processes
- Technology

What is a System?

The word System is derived from Greek word Systema, which means an organized relationship between any set of components to achieve some common cause or objective. A system is "an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal."

Constraints of a System:

A system must have three basic constraints:

1. A system must have some structure and behavior which is designed to achieve a predefined objective.

2. Interconnectivity and interdependence must exist among the system components.
3. The objectives of the organization have a higher priority than the objectives of its subsystems

Properties of a System:

A system has the following properties:

1. **Organization**: Organization implies structure and order. It is the arrangement of components that helps to achieve predetermined objectives.
2. **Interaction**: It is defined by the manner in which the components operate with each other. For example, in an organization, purchasing department must interact with production department and payroll with personnel department.
3. **Interdependence:** Interdependence means how the components of a system depend on one another. For proper functioning, 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.
4. **Integration**: Integration is concerned with 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.
5. **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.

Elements of a System

Outputs and Inputs

- The main aim of a system is to produce an output which is useful for its user.
- Inputs are the information that enters into the system for processing.

• Output is the outcome of processing.

Processor(s)

• The processor is the element of a system that involves the actual transformation of input into output. • It is the operational component of a system. Processors 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. • It is the decision–making subsystem that controls the pattern of activities governing input, processing, and output.

• The behavior of a computer System is controlled by the Operating System and software. In order to keep system in balance, what and how much input is needed is determined by Output Specifications.

Feedback

• 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 "supersystem" 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:

1) **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.
2) **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.