System Concept

What is System?

The term system is derived from the Greek word systema, which means an organized relationship among functioning units or components. A system exists because it is designed to achieve one or more objectives. We come into daily contact with the transportation system, the telephone system etc. Similarly we talk of the business system and of the organization as a system consisting of interrelated departments such as production, sales, personnel.

- A system is an organized collection of highly integrated parts or subparts to complete a specific purpose target.
- The system has several inputs which go under certain procedures to generate particular outputs, all of which fulfill the specified objective of the system.
- A **system** is a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. A system, surrounded and influenced by its environment, is described by its boundaries, structure and purpose and expressed in its functioning. Systems are the subjects of study of systems theory and other systems sciences.

Three basic concepts of the system:

- The system was created or designed in such way that to complete specific predetermined objectives.
- Parts and subparts of the system must have interdependence and interrelationships among them.
- The goals of the organization always have high priority rather than the goals of the subsystem.

CHARACTERISTICS

There are five types of characteristics for a system. Such as: ***Organization, Interaction, Interdependence, Integration and A central objective***

Organization:

- This implies structure and order.
- It can also be defined as the arrangement of components that help to achieve objectives.
- For example, Hierarchical system in a company.

Interaction:

- This shows the manner in which each component functions with other components of the system.
- It specifies there should be an interrelationship between every component of a system.
- For example, the main memory holds the data that has to be operated by the ALU.

Interdependence

- This means the components of a computer system depend on one another.
- Each component should depend on other components of the system.
- One component depends on the input of another component for proper functioning.
- The output of one subsystem is the 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. None of the persons can perform properly without the required input from others in the computer center subsystem.

Integration

- It is concerned with how a system is tied together.
- It is more than sharing physical components or locations.
- It means that components of the system work together within the system even though each component performs a unique function.

Central Objective

- Systems always have a central goal.
- These goals may be real or stated.
- The important point is that users must know the central objective of a computer application early in the analysis for a successful design and conversion.

Applications

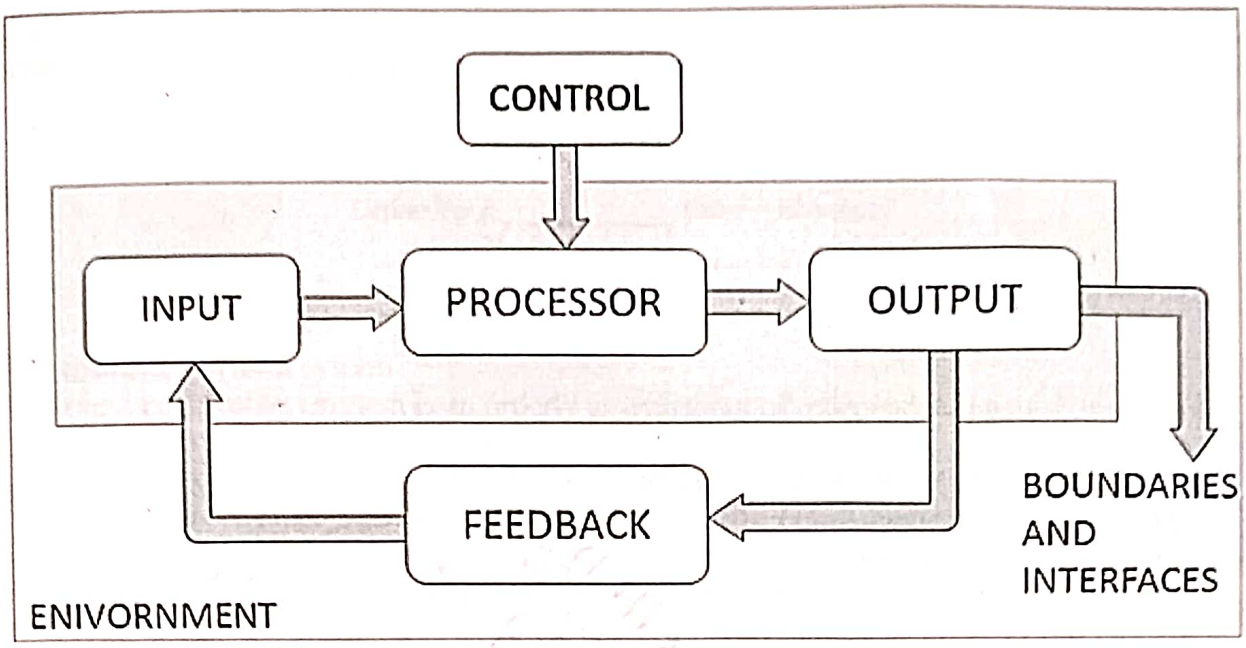
Systems modeling is generally a basic principle in engineering and in social sciences. The system is the representation of the entities under concern. Hence inclusion to or exclusion from system context is dependent on the intention of the modeler. No model of a system will include all features of the real system of concern, and no model of a system must include all entities belonging to a real system of concern.

1. Information and computer science
2. Engineering and physics
3. Sociology, cognitive science and management research
4. Pure logic
5. Strategic thinking

ELEMENTS OF SYSTEM

All the characteristics of the system are determined by the system elements, their properties and relationships. The system elements are 1. Input 2. Processor 3. Output These elements are common to all systems. These are the elements by which all systems are described. They are set in a fixed position which helps the system analyst to design & work with system more easily.

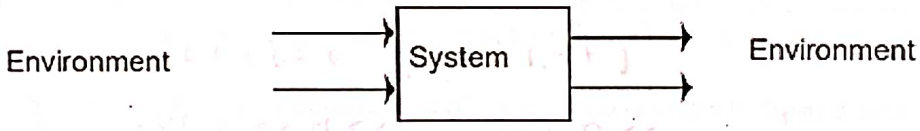
1. Input : It is defined as energizing or start up component on which system operates. It may be raw material, data, physical source, knowledge or any energy to decide the nature of output.
2. Processor : It is defined as the activity that makes possible the transformation of input to output. When data is processed through computer it is processed through logical steps. However these steps are required to be instructed in series to the computer.
3. Output : It is end result of the operation. In other words it is the purpose or the main objective for which the system is designed. Though output is largely dependent on input, its nature or format may vary vastly from the input. For example: If data keyed is in numerical form it may display output which is in form of graph or pictorial form.



INFORMATION SYSTEM ENVIRONMENT

Following model represents a system with its elements which keeps the system in equilibrium. 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

I. Boundary & environment: Every system has its limits that determine the sphere of influence & control is called as Boundary of the system. 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.

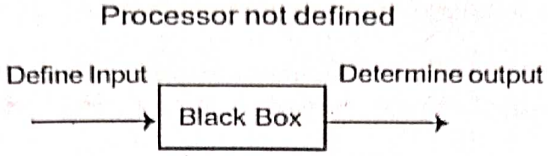


II. Subsystem: A complex system is difficult to implement when consider as a whole. However if we divide it into smaller functional units which are of manageable sizes then every small function unit becomes a subsystem. In the formation of subsystem the components performing same or similar functions are grouped. For example: In a business organization system, marketing, production, sales can be considered as subsystems. Module: A collection of function or data. In other words module encapsulates related functions. Ideal module is that module which can be reused in other development projects.

III. 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.

IV. 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.

V. 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.



Conceptual & Physical system

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

Natural & Artificial systems

1. Natural systems: All the naturally occurring systems are called as natural systems For example: Solar system.
2. Artificial system: All manmade systems are called as artificial systems.

Open & Closed systems

1. 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.
2. 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.

Deterministic & probabilistic system:

1. Deterministic system: It is a system which operates in predictable manner. Stepwise execution is always possible & output is sure. For example: computer system.
2. 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.

Integrated system

System integration is the combination of related subsystems to form a larger subsystem or total system. For example: Airline reservation system.

TYPES OF SYSTEMS

System is **classified** in various ways.

According to the Creation

Natural system: Existing naturally- solar system, river system etc.

Man-made system: Transportation system, lighting system. Man-made system is designed and operated by man. The man utilizes the inputs taken from the natural systems.

According to the Flexibility

Flexible system: The system which is adjusting to maintain the balance or equilibrium between the system and is changing environment. Example: most of the life forms, economic, political and social systems.

Rigid system: which cannot be modified or will not adjust for modification. Example: highway. Even the man tries to build some flexibility into every system designed or constructed. Example: Building.

Based on Human Involvement

Manual system: A production system completely man operated one. Example: Coir thread making.

Automatic machine system: completely automated.

To have equilibrium, man-machine relationships exist for production.

Based on System Output:

System that produces: a production system

System that serves clients/ customers: hospital, restaurant, etc.

Subsystem

A **subsystem** is a set of elements, which is a system itself, and a component of a larger system. The IBM Mainframe *Job Entry Subsystem* family (JES1, JES2, JES3, and their HASP/ASP predecessors) are examples. The main *elements* they have in common are the components that handle input, scheduling, spooling and output; they also have the ability to interact with local and remote operators. A subsystem description is a system object that contains information defining the characteristics of an operating environment controlled by the system. The Data tests are performed to verify the correctness of the individual subsystem configuration data (e.g. MA Length, Static Speed Profile etc.) and they are related to a single subsystem in order to test its Specific Application (SA)

SYSTEM ANALYST

The system analysis is concerned with: 1. Investigating 2. Analyzing 3. Designing 4. Implementing 5. Evaluating information system in organizations.

The **system analyst** is the key person who is brain of the system development life cycle who acts as interface between user (client) and the organization. System analyst is not a mere programmer of the system but more like a manager who I. Determines the design of the overall system II. Obtains the necessary technical help from programmers, specialist and equipment engineers. III. Follows the system through design, implementation and evaluation.

ROLE OF SYSTEM ANALYST

System analyst is a multitasking personality. He has to perform different roles at different stages of the system development. His task can be divided into five important areas of efforts where he has to do various roles.

1. Problem identification: System analyst is the middle man between end user and the development team. So he has to communicate between the two ends as well as to understand customer's needs, identify the exact nature of the problem. Then he discusses it with the development team in order to have different solution alternatives.
2. Evaluation & synthesis: After having various alternatives from the development team a good analyst should be able to evaluate the solution on the basis of cost, time and technology which is called as feasibility test.
3. Modeling: Once a proper choice of the alternatives is done by end user a model or prototype is prepared by system analyst with the help of development .Good logical and analytical mind helps him to understand the information contents of the data, functional processing, and behavioral operations and control flow of the system in order to model the system.
4. Verification of the model: The system analyst evaluates the length of the model with respect to cost & time required for the implementation of the system and these parameters are checked with the customer & then testing details are sent to the development team. Once the

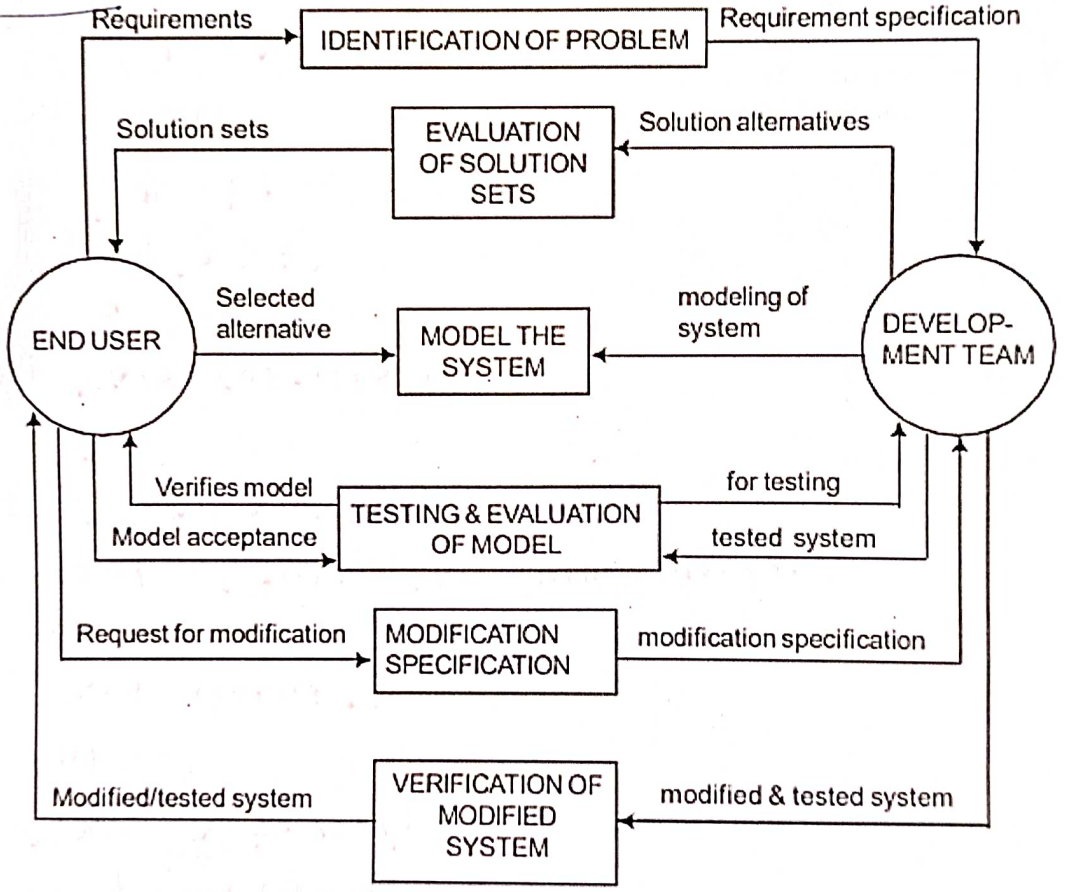
model is accepted by the user, the development team sends the tested system to the analyst for verification of the result.

5. Modification: Then the system is sent to the user for acceptance. Many times it happens that at the beginning the user is not very clear about all of his needs. So after acceptance of the system when the user starts working on it he requests the analyst for the modifications. Here again the analyst has to evaluate the request on the scale of same parameters. Then the modification specifications are prepared and sent to the development team. Again the team works on the system and the modified & tested system is sent to the analyst for verification. And after having verified the modified system is finally delivered to the client.

Functions of system analyst

- Collects the facts of the existing system,
- Analyses the collected information, basic methods and procedures of current system
- Determines and specifies the needs
- Designs the information system
- Prepares the model
- Modify redesigns, verifies and integrate according to required specifications.

Thus the main objective of a system analyst is to provide right type of information at right time in right quality and right quantity in right way and right cost to the management and the client.



System Development Approaches

Developing a successful information system for business application is a challenging task. System development process includes the activities like understanding, planning, designing, implementation and maintenance of systems. System development approaches have undergone reforms as per the changes in software development technology. Software technology has changed from modular to structure and now to object oriented technology. Basic goal in system development process is to produce high quality information system for solving business applications. It provides a framework that is used to structure, plan and control the process of developing a system. Various methods have been evolved and being practiced over the years. A few major methods are:

I. System Development Life Cycle method (or traditional method))
II. Structured Analysis Development method
III. Waterfall method
IV. Prototype method
V. Spiral method
VI. Object oriented Development method

Each of these methods has its own strengths and weaknesses. One method may not be suitable for all type of systems. It depends on technical nature of a system, organizational requirements, knowledge of developers etc. Basically all these methods follow either *linear* or *iterative* approach or combination of these two approaches for development of systems. In linear approach, above mentioned activities are followed in a sequence with or without overlapping of some activities to develop a system. In iterative approach, the activities may or not be repeated for improvement after getting users feedback.