

⇒ System :- System is a word derived from the Greek word 'Systema' which means an organized relationship among components.

A system may be defined as orderly grouping of inter-dependent components linked together according to a plan to achieve a specific goal. Each component is a part of total system and it has to do its own share of work for the system to achieve the desired goal.

⇒ Characteristics of a System :-

10. ① Organization :- It implies structure and order. It is an arrangement of components that helps to achieve objectives.
15. ② Interaction :- Interaction refers to the procedure in which each component functions with other components of the system.
- ③ Interdependence :- Interdependence means that one component of the system depends on another component of the system.
20. ④ Integration :- Integration is concerned with how a system is tied together. It is more than sharing a physical part or location. It means that parts of system work together within the system even though each part performs a unique function.

25. ⑤ Central Objective :- A system should have a central objective. Objectives may be <sup>(actual)</sup> real or <sup>(stated)</sup> stated. Although a stated objective may be the real objective, it is quite common that an organization may set one objective and operate to achieve another. The important point is that the users must be aware about the central objective well in advance.

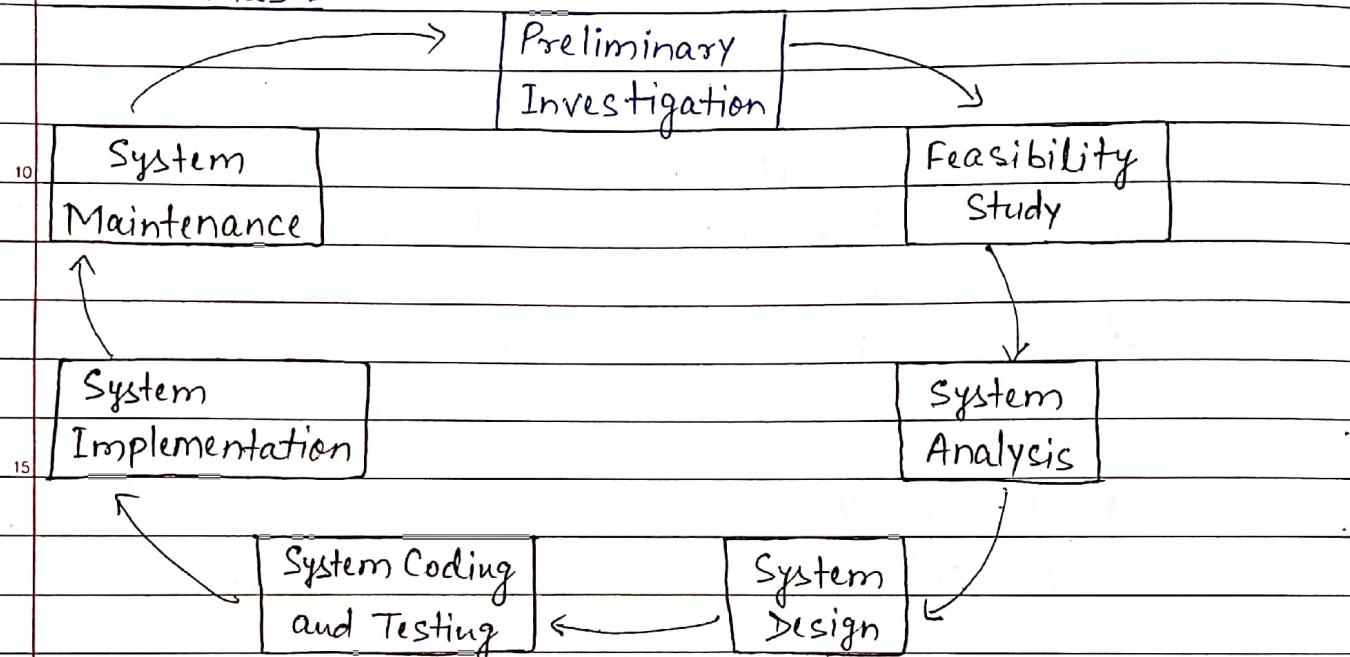
30. ⇒ Systems Development Life Cycle (SDLC) :-

The system development life cycle (SDLC) is a common methodology

for system development in many organizations, featuring various phases that mark the progress of the system analysis and design effort.

or A SDLC is a framework that describes the activities performed at each stage of a software development project.

⇒ SDLC Phases:-



### ① Preliminary Investigation:-

Tasks - @ What is the problem?

⑥ Determine if a new system is needed.

⑦ Whether an alternative system will solve the problem.

Results -

⑧ Need for improving the existing system is recognized.

### ② Feasibility Study:- Means Possible or Impossible

Tasks - @ Evaluate alternatives based upon:

(i) Economic feasibility:- Do benefits justify costs?

(ii) Technical feasibility:- Is reliable technology and training available?

(iii) Operational feasibility:- Will the managers and users

Support it?

Results -

- ① Problem is clearly stated.
- ② Feasibility report is created.
- ③ Management Recommend Top Alternative based upon:
  - (i) System fit into the Organization.
  - (ii) Flexibility for the future.
  - (iii) Costs vs. benefits.

10 ④ System Analysis :- Tasks -

- ① Detailed study of various operations performed by the system.
- ② Define the boundaries of the candidate system.
- ③ Data Collection or Data Gathering. [Data means facts]

Tools -

- 15 ④ Data Flow Diagrams
- ⑤ Interviews
- ⑥ On-site observations
- ⑦ Questionnaires
- ⑧ Data Dictionaries

20 Results :-

- ⑨ SRS (Software / System Requirement Specification) document is finalized which includes :
  - (i) functional and non-functional requirements.
  - (ii) What the system will do and what it is not expected to do.
  - (iii) Information about other systems with which system must interface.

25 ⑩ System Design :-

- Most creative and challenging phase.
- Translates the performance requirements into design specifications.
- Here we prepare logical design that can be sketched on a paper or on a computer terminal.

## Tasks:-

1. How should the problem be solved?
2. Input Data and Master files are designed.
3. Output formats are designed.

## Results:-

5. Detailed System Document

- (a) Procedural Flowcharts.
- (b) Record layouts
- (c) Report layouts
- (d) Workable plan for implementing system. candidate

## 10. 5. System Coding and Testing:-

- Build the system to the design specifications
  - (a) Develop the software
  - (b) Acquire the hardware

- 15. • Test the system for acceptance

- (a) Program Testing (Unit testing)
  - (b) String Testing (Integration Testing)
  - (c) System Testing
  - (d) User Acceptance Testing

→ In this case the Analyst should decide whether to buy a commercial software or to develop new customized programs with the help of programmers. The choice depends on the cost of the software and the cost of programming such software. In large organizations the work is entrusted (रिह इट) to programmers, whereas in small organizations, the job is assigned to outside organizations.

30. Programmers are also responsible for documenting the programs. The documents should include comments that provide explanation of the procedures coded in the programs.

## ⑥ System Implementation:-

- (a) Convert from old system to new system
- (b) Train users
- (c) Compile final documentation
- (d) Evaluate the new system
  - i) To assess the system i.e. how the system is functioning, what the response time, overall reliability and level of utilization is etc.
  - ii) To find the limitations in the system.
  - iii) To identify whether the new system developed would be beneficial to the organization under operating conditions.
  - iv) To judge the attitude of different persons in the organization regarding the newly developed system.
  - v) Evaluation of cost, time and effort taken for the overall project.

## • Types of Conversion:-

- (i) Direct / Plunge (मूँढ़ आकर्षण) / Crash approach :- entire new system completely replaces entire old system, in one step.
- (ii) Parallel approach :- Both systems are operated side by side until the new system proves itself.
- (iii) Pilot approach :- Launched new system for only one group within the business.
- (iv) Phased / incremental approach :- Individual parts of new system are gradually phased - in over time.

## ⑦ System Maintenance:- keeping everything running..

### Types of Maintenance -

- (a) Correction of new bugs found (corrective).
- (b) System adjustments to environmental changes and user's changing needs (adaptive).
- (c) Enhancing the performance, changes to use better

techniques when they become available (perfective).

→ Definition of System Analysis and Design :-

- 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, we 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 -

1. Systems
2. Processes
3. Technology

→ What is a System?

→ Constraints of a System -

A system must have three basic Constraints-

- (i) A system must have some 'structure and behavior' which is designed to achieve a predefined objective.
- (ii) 'Interconnectivity and interdependence' must exist among the system components.
- (iii) The 'objectives of the organization' have a 'higher priority' than the objectives of its subsystems.  
For example, traffic management system, payroll system, automatic library system, human resources information system.

→ Properties of a System -

A system has the following properties -

- (i) Organization
- (ii) Interaction
- (iii) Interdependence
- (iv) Integration
- (v) Central Objective.

Another way to define all the properties -

(i) Organization :-

Organization implies structure and order.

It is the arrangement of components that helps to achieve predetermined objectives.

(ii) 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.

(iii) 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 ~~not~~ required by other subsystem as input.

#### (iv) Integration:-

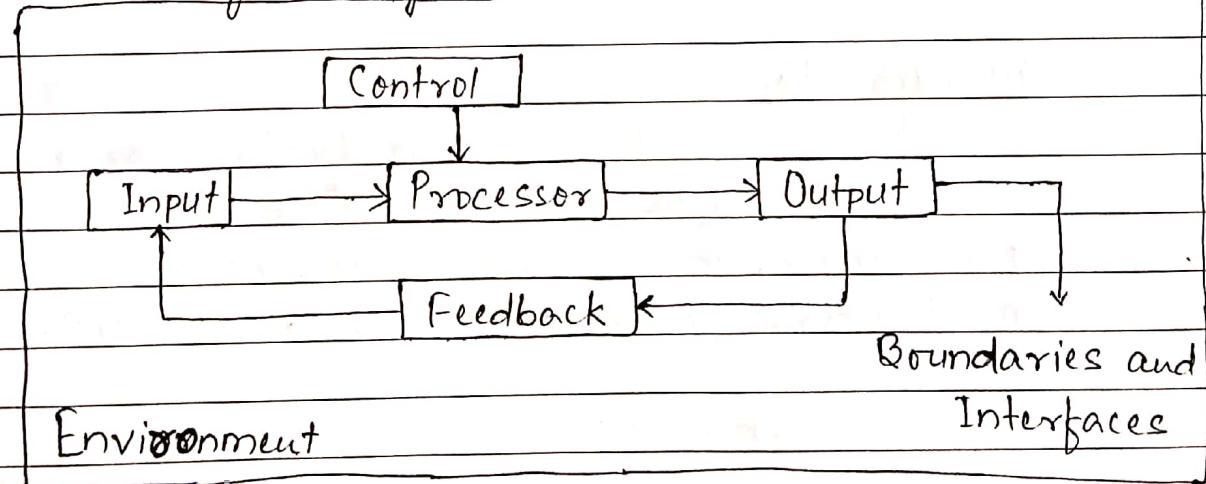
Integration is concerned with how a system components are connected together. It means that the parts of the system work together within the system even if each part performs a unique function.

#### (v) Central Objective:-

The objective of system must be central. It may be <sup>(actual)</sup> real or stated(declared). 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:-

(i) The main aim of a system is to produce an output which is useful for its user.

(ii) Inputs are the information that enters into the system for processing.

(iii) Output is the outcome of processing.

- Processor(s):-

(i) The processor is the element of a system that involves the actual transformation of input into output.

(ii) It is the operational component of a system. Processors may modify the input either totally or partially, depending on the output specification.

- Control:-

(i) The control element guides the system.

(ii) It is the decision-making subsystem that controls the pattern of activities governing input, processing, and output.

(iii) 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:-

(i) Feedback provides the control in a dynamic system.

(ii) Positive feedback is routine in nature that encourages the performance of the system.

(iii) Negative feedback is informational in nature that provides the controller with information for action.

- Environment:-

(i) The environment is the "supersystem" within which an organization operates.

(ii) It is the source of external elements that strike on the system.

(iii) 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 :-

- (i) 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.
- (ii) Each system has boundaries that determine its sphere of influence and control.
- (iii) 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 :-

System may be classified as follows:

(a) Physical System :-

Physical systems are tangible or visible entities. It can be seen, touched, counted etc.

Physical system may be static or dynamic in nature. For example, desks and chairs are the physical parts of Computer center which are static. An air-conditioning unit is a dynamic physical system which responds to the environment and stops or starts operating depending on the temperature.

(b) Abstract System :-

Abstract systems are conceptual or non-physical entities. For example, a model, an algorithm or an equation are abstract systems. It is a conceptualization and a representation. Abstract models are often used to

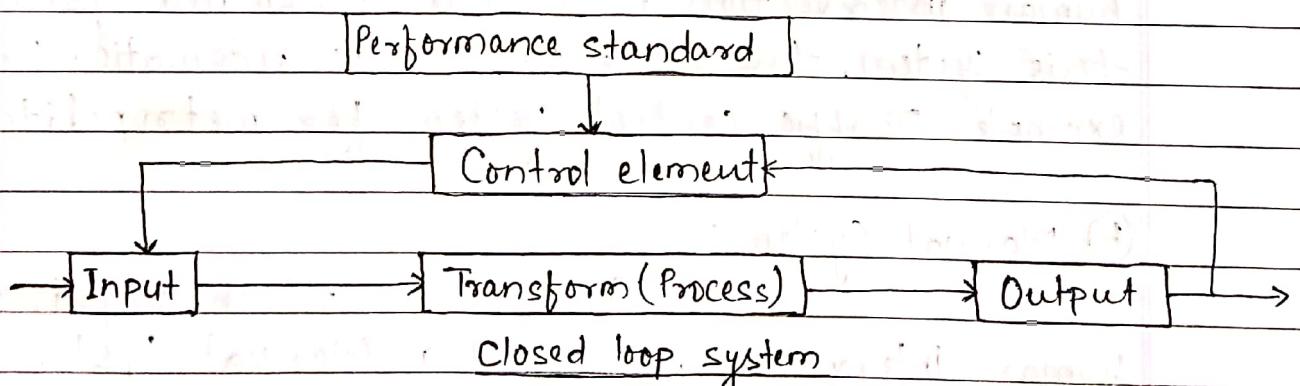
understand physical systems, their components, interrelationships etc.

### (c) Open System:-

An open system is a system that interacts freely with its environment. It receives input from environment and provides output to environment. When the environment changes, an open system must also change in order to adapt itself to the environment. Otherwise the system will be labelled as outdated. for example Any real life system, Information System, educational system, business system and all other systems which take input and return output come in the category of open systems

### (d) Closed System:-

A closed system is a system that is cut off from its environment and does not interact with it. That is, a closed system is isolated from its environment and remains unaffected by the changes in the environment. It is also defined as a system that includes a feedback loop, a control element and feedback performance standard.



Above figure shows a Closed loop system. Performance Standard is defined as objective that the system has to meet. A feedback loop is defined as a portion of the system that

enables the system to regulate itself. Signals are obtained from the system describing the system status and are transmitted to the control mechanism. A control element compares the output with the performance standard and adjusts the system input accordingly.

### (e) Formal System :-

A formal system is one that is planned in advance and is used according to schedule. In this system policies and procedures are documented well in advance. For example; to conduct a scheduled meeting at the end of every month in which agenda of the meeting has already been defined well in advance.

### (f) Informal System :-

An informal system is the system that is not described by procedures. It works on as need basis. For example, sales order processing system through telephone calls.

### (g) ~~Manual~~ Automated System :-

The system, which does not require human intervention is called automated system. In this system, the whole process is automatic. For example, traffic control system for metropolitan cities.

### (h) Manual System :-

The system, which requires human intervention, is called a manual system. For example, face to face information centre at places like railway stations etc.