UNIT – I

SYSTEM DEVELOPMENT LIFE CYCLE

GOALS

- An effective System Development Life Cycle (SDLC) should result in a high quality system that meets customer expectations, reaches completion within time and cost evaluations, and works effectively and efficiently in the current and planned Information Technology infrastructure.
- System Development Life Cycle (SDLC) is a conceptual model which includes policies and procedures for developing or altering systems throughout their life cycles.
- Systems analysis and design is the study of a problem domain of any organization which help to recommend improvements and specify the requirements for the solution whereas the systems study is the specification of computer based solution for the requirements identified in a system analysis.
- A systems development lifecycle (SDLC) has three primary objectives: ensure that high quality systems are delivered, provide strong management controls over the projects, and maximize the productivity of the systems staff.

- System development life cycle allows the user to build and maintain a computer-based information system. These are special software and hardware solutions that allow you to automate manual data.

System

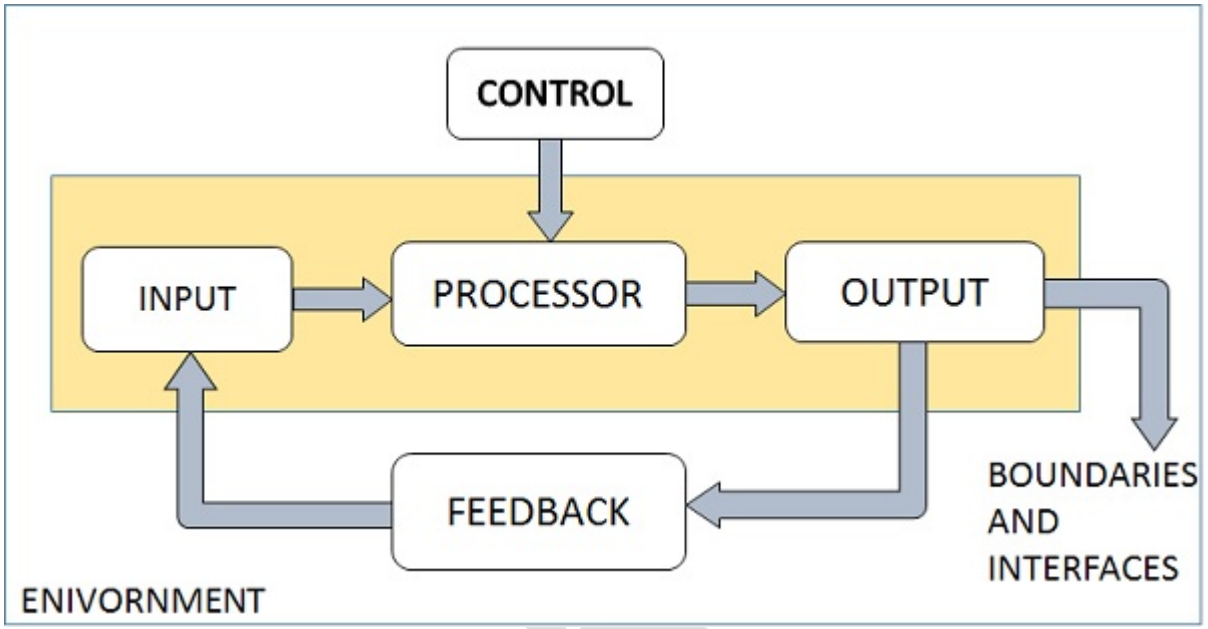
The word System is derived from Greek word Systema, which means an organized relationship between any set of components to achieve some common cause or objective. A system is "an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal."

A system may be defined as a set of procedures established or formulated to carry out a specific activity to solve a problem. It is a set of interrelated elements forming a complete structure to perform a specific task. ... In short,

System Analysis and Design (SAD), mainly deals with the software development activities.

Elements of a System

The following diagram shows the 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.

COMPUTER BASE BUSSINESS SYSTEM

Computer Based Information Systems (CBIS) is a data processing system into a high-quality information and can be used as tools that support decision-making, coordination and control as well as visualization and analysis.

Computer(-Based) Information System is essentially an IS using computer technology to carry out some or all of its planned tasks. The basic components of computer based information system are:

- **Hardware**– Hardware is the most obvious part of a computer-based information system. Hardware refers to the computers themselves, along with any and all peripherals, including servers, routers, monitors, printers and storage devices. A CBIS may use a single computer or thousands. These are the devices like the monitor, processor, printer and keyboard, all of which work together to accept, process, show data and information.
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Software– Without software, the hardware wouldn't be very useful. Software, the second element of a CBIS, is what tells the hardware how to function. It gathers, organizes and manipulates data and carries out instructions. Everything you do using a computer is done by the software. Software are the programs that allow the hardware to process the data.

Databases– are the gathering of associated files or tables containing related data. Data, or information, is the third element of a CBIS. Just as hardware cannot function without software, software cannot function without data. This is the information part of an information system, and whether that is statistical

data, sets of instructions, lists of names or even graphics and animations, it is all key to a CBIS.

Procedures

Procedures– are the commands for combining the components above to process information and produce the preferred output.It is commonly said that "procedures are to people what software is to hardware." The fourth element of CBIS, procedures are the rules, descriptions and instructions for how things are done. In computer-based information systems, procedures are frequently covered in instruction or user manuals that describe how to use the hardware, software and data.

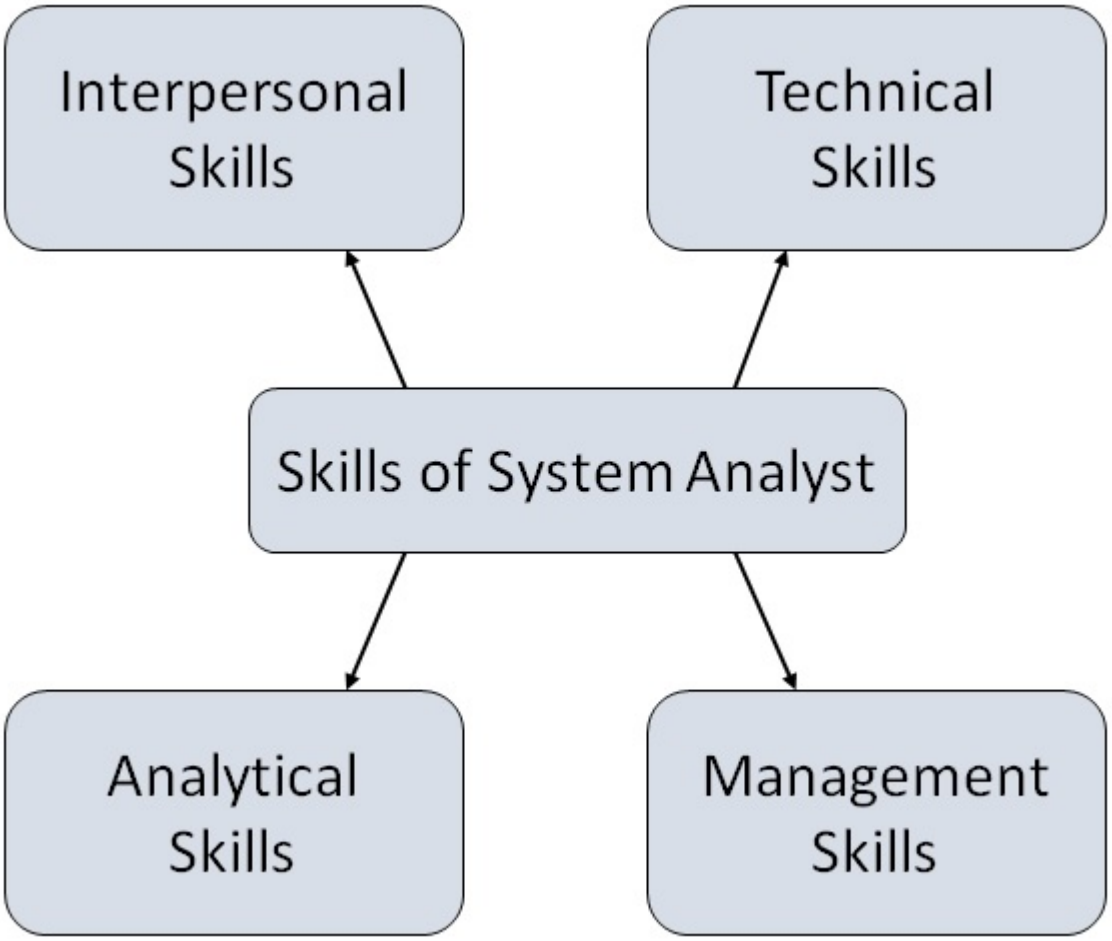
People

People are the most often overlooked and most important part of a computer-based information system. It is people who design and operate the software, input the data, build the hardware and keep it running, write the procedures and it is ultimately people who determine the success or failure of a CBIS.

PERSONAL TRAITS OF ANALYST

1. Communication Skills – System analyst should have the ability to articulate and speak and knack of working with all levels of managerial positions of the organization.

2. Understanding – System analyst should have the ability to identify problems and assess their solution, grasping of company goals and objectives, show sensitivity to the impact of the system on people at work and understanding their problems,



3. Teaching & selling ideas – System analyst should have the skill to educate other people in the use of computer systems and selling ideas and promoting innovations in problem solving using computers.

The various TECHNICAL SKILLS that a system analyst should have are as follows –

1. Creativity – The analyst should be creative to help the users to model ideas into real plans and developing candidate systems to match user requirements. 2. Problem Solving & project management – System analyst should have the skill of problem solving, developing alternative solutions, scheduling, overcome constraints, coordinating team efforts and managing costs and accounts.

3. Dynamic interface – System analyst should be a perfect blend of both technical and non-technical skills in functional specifications and general design. He should also have a questioning attitude and inquiring mind. 4. Thorough knowledge of computers – System analyst should have the knowledge of basics of computers and business functions. A graph

showing the involvement of interpersonal and technical skills during the system development phase for a good system analyst is shown below –

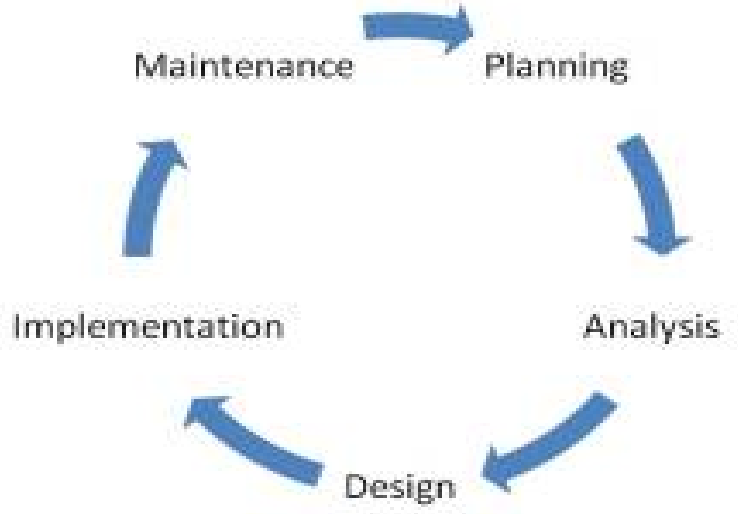
in addition to these personal qualifications, the system analyst should have proper academic qualifications in system analysis and design or other computer oriented similar degrees.

SYSTEM LIFE CYCLE

System Development Life Cycle – It is a process of creating information systems, and the models and methodologies that people use to develop these systems. The SDLC process was designed to ensure that end-state solutions meet user requirements in support of business strategic goals and objectives. SDLC is used to develop, maintain and replace Information System. Systems are so big and complex that teams of architects, analysts, programmers, testers and users must work together to create the millions of lines of custom-written code that drive enterprises. SDLC is used to correct problems in existing system, and to improve the system quality and structure. It certainly eases the process of building a system and helps reduce failures such as unclear objectives, possibility of not meeting user needs, or cost overruns. The most important part in SDLC is communication. Without good communication it is not possible to satisfy the customer, and that may lead to errors and omissions which can be expensive in the end.

SDLC has five stages:

1. Planning – this phase begins after the project has been defined and appropriate resources have been committed. The first part of this phase involves collecting, defining and validating functional, support and training requirements. The second portion is developing initial life cycle management plans, including project planning, project management, Configuration Management (CM), support, operations, and training management. We cannot just go and build the system.



2. Analysis – system requirements are studied and structured in this phase. System analysts collect facts from existing system users in order to develop limitations and details. They will also define new system objectives. They use different data gathering techniques such as interviews, observations and surveys. This is an attempt to understand all aspects of the current system and eventually indicate how things may be improved by a new system.

3. Design – Describes how the system will fulfil the user requirements. To achieve this, logical and physical design must be created. The **logical design** produced during the analysis is turned into a **physical design** – a detailed description of what is needed to solve original problem. Input, output, databases, forms, codification schemes and processing specifications are drawn up in detail. In the design stage, the programming language and the hardware and software platform in which the new system will run are also decided. Data structure, control process, equipment source, workload and limitation of the system, Interface, documentation, training, procedures of using the system, taking backups and staffing requirement are decided at this stage.

4. Implementation – this is followed by testing and then implementation. During this phase, the new or enhanced system is installed in the production environment, users are trained, data is converted, the system is turned over to the sponsor, and business processes are evaluated. This stage includes efforts required to implement, resolve system problems identified during the implementation process, and plan for sustainment. **Coding** – the physical design

specifications are turned into working computer code. **Integration and Testing**– a testing environment is created where all components are brought together. **Installation** – here the new system is rolled out.

5. Maintenance – After having the user acceptance of the new system developed, the implementation phase arises. Implementation is the stage of a project during which theory is turned into practice. The major steps involved in this phase are: Acquisition and Installation of Hardware and Software

Conversion

User Training

Documentation

The hardware and the relevant software required for running the system must be made fully operational before implementation. The conversion is also one of the most critical and expensive activities in the system development life cycle. The data from the old system needs to be converted to operate in the new format of the newly developed system. The database needs to be set-up with security and recovery procedures fully defined. Bugs must be rectified and requested changes completed.

PRELIMINARY SYSTEM ANLYSIS

Preliminary investigation is the first step in the system development project. It is a way of handling the user's request to change, improve or enhance an existing system. System investigation includes the following two stages:

1. Problem definition:

The first responsibility of a system analyst is to prepare a written statement of the objectives of the problem. Based on interviews with the user, the analyst writes a brief description of his/her understanding of the problem and reviews it with both the groups. People respond to written statements. They ask for clarifications and they correct obvious errors or misunderstandings. That is why a clear statement of objectives is important. In other words, proper understanding of the problem is essential to discover the cause of the problem and to plan a directed investigation by asking questions like what is being done. Why? Is there an underlying reason different from the one the user identifies? Following are some possible definitions of problems:

a. The existing system has a poor response time

b. It is unable to handle the workload.

c. The problem of cost, that is the economic system is not feasible.

d. The problem of accuracy and reliability

e. The required information is not produced by the existing system

f. The problem of security.

Definition of Fact-finding Techniques

Fact finding is process of collection of data and information based on techniques which contain sampling of existing documents, research, observation, questionnaires, interviews, prototyping and joint requirements planning. System analyst uses suitable fact-finding techniques to develop and implement the current existing system. Collecting required facts are very important to apply tools in System Development Life Cycle because tools cannot be used efficiently and effectively without proper extracting from facts. Fact-finding techniques are used in the early stage of System Development Life Cycle including system analysis phase, design and post implementation review. Facts included in any information system can be tested based on three steps: data- facts used to create useful information, process- functions to perform the objectives and interface- designs to interact with users.

Fact-finding techniques

Interviews

Interviewing Systems analyst collects information from individuals or groups by interviewing. The analyst can be formal, legalistic, play politics, or be informal; as the success of an interview depends on the skill of analyst as interviewer

Advantages of Interviewing

- This method is frequently the best source of gathering qualitative information.
- It is useful for them, who do not communicate effectively in writing or who may not have the time to complete questionnaire.
- Information can easily be validated and cross checked immediately.
- It can handle the complex subjects.

- It is easy to discover key problem by seeking opinions.
- It bridges the gaps in the areas of misunderstandings and minimizes future problems.

Questionnaires

This method is used by analyst to gather information about various issues of system from large number of persons. There are two types of questionnaires:

- Open-ended Questionnaires: It consists of questions that can be easily and correctly interpreted. They can explore a problem and lead to a specific direction of answer.
- Closed-ended Questionnaires: It consists of questions that are used when the systems analyst effectively lists all possible responses, which are mutually exclusive.

Advantages of questionnaires

- It is very effective in surveying interests, attitudes, feelings, and beliefs of users which are not co-located.
- It is useful in situation to know what proportion of a given group approves or disapproves of a particular feature of the proposed system.
- It is useful to determine the overall opinion before giving any specific direction to the system project.
- It is more reliable and provides high confidentiality of honest responses.
- It is appropriate for electing factual information and for statistical data collection which can be emailed and sent by post.

Review of Records

Review of Records, Procedures, and Forms Review of existing records, procedures, and forms helps to seek insight into a system which describes the current system capabilities, its operations, or activities.

Advantages

- It helps user to gain some knowledge about the organization or operations by themselves before they impose upon others.

- It helps in documenting current operations within short span of time as the procedure manuals and forms describe the format and functions of present system.

- It can provide a clear understanding about the transactions that are handled in the organization, identifying input for processing, and evaluating performance.

- It can help an analyst to understand the system in terms of the operations that must be supported.

Observation

This is a method of gathering information by noticing and observing the people, events, and objects. The analyst visits the organization to observe the working of current system and understands the requirements of the system.

Advantages

- It is a direct method for gleaning information.

- It is useful in situation where authenticity of data collected is in question or when complexity of certain aspects of system prevents clear explanation by end-users.

- It produces more accurate and reliable data.

- It produces all the aspect of documentation that are incomplete and outdated

2.Feasibility Study

Feasibility Study can be considered as preliminary investigation that helps the management to take decision about whether study of system should be feasible for development or not.

- It identifies the possibility of improving an existing system, developing a new system, and produce refined estimates for further development of system.

- It is used to obtain the outline of the problem and decide whether feasible or appropriate solution exists or not.

- The main objective of a feasibility study is to acquire problem scope instead of solving the problem.

- The output of a feasibility study is a formal system proposal act as decision document which includes the complete nature and scope of the proposed system.

Steps Involved in Feasibility Analysis The following steps are to be followed while performing feasibility analysis:

1. Form a project team and appoint a project leader.

2. Develop system flowcharts.

3. Identify the deficiencies of current system and set goals.

4. Enumerate the alternative solution or potential candidate system to meet goals.

5. Determine the feasibility of each alternative such as technical feasibility, operational feasibility, etc.

6. Weight the performance and cost effectiveness of each candidate system.

7. Rank the other alternatives and select the best candidate system.

8. Prepare a system proposal of final project directive to management for approval.

Types of Feasibilities

Economic Feasibility

- It is evaluating the effectiveness of candidate system by using cost/benefit analysis method.
- It demonstrates the net benefit from the candidate system in terms of benefits and costs to the organization.
- The main aim of Economic Feasibility Analysis (EFS) is to estimate the economic requirements of candidate system before investments funds are committed to proposal.
- It prefers the alternative which will maximize the net worth of organization by earliest and highest return of funds along with lowest level of risk involved in developing the candidate system.

Technical Feasibility

- It investigates the technical feasibility of each implementation alternative.
- It analyzes and determines whether the solution can be supported by existing technology or not.

- The analyst determines whether current technical resources be upgraded or added it that fulfill the new requirements.

- It ensures that the candidate system provides appropriate responses to what extent it can support the technical enhancement.

Operational Feasibility

- It determines whether the system is operating effectively once it is developed and implemented.

- It ensures that the management should support the proposed system and its working feasible in the current organizational environment.

- It analyzes whether the users will be affected and they accept the modified or new business methods that affect the possible system benefits.

- It also ensures that the computer resources and network architecture of candidate system are workable.

Behavioral Feasibility

- It evaluates and estimates the user attitude or behavior towards the development of new system.

- It helps in determining if the system requires special effort to educate, retrain, transfer, and changes in employee's job status on new ways of conducting business.

Schedule Feasibility

- It ensures that the project should be completed within given time constraint or schedule.

- It also verifies and validates whether the deadlines of project are reasonable.