System analysis and design refers to the software development activity and that too with the design aspect of any software. It consists of more than one activities. A novice programmer may view this activity as program writing activity only on the other hand a much experienced and knowledgeable person may view it as an activity in which program writing is only part of complete activity.

Software/System development life cycle (SDLC)

It is a well defined process by which a system is planned, developed, and implemented. The system development starts with the requirement for improving their business system. The SDLC aims to produce a high quality software that meets or exceeds customer expectations, reaches completion within times and cost estimates.

- SDLC is the acronym of Software Development Life Cycle.

- It is also called as Software development process.

- The software development life cycle (SDLC) is a framework defining tasks performed at each step in the software development process.

The core of the SDLC (analysis-design-implementation) is based on the standard approach to problem solving. First, you need to figure out or define what the problem is (analysis), then you need to figure out a good approach for solving it (design), and finally you need to go ahead and do it (implementation). The number of actual steps will vary depending on which texts and sources you consult. The steps listed above are one example that addresses most of the concerns of the SDLC. There are following activities involves in SDLC.

- System study
- Feasibility study
- Analysis
- Design
- Coding
- Testing
- Documentation
- Implementation and evaluation
- Maintenance
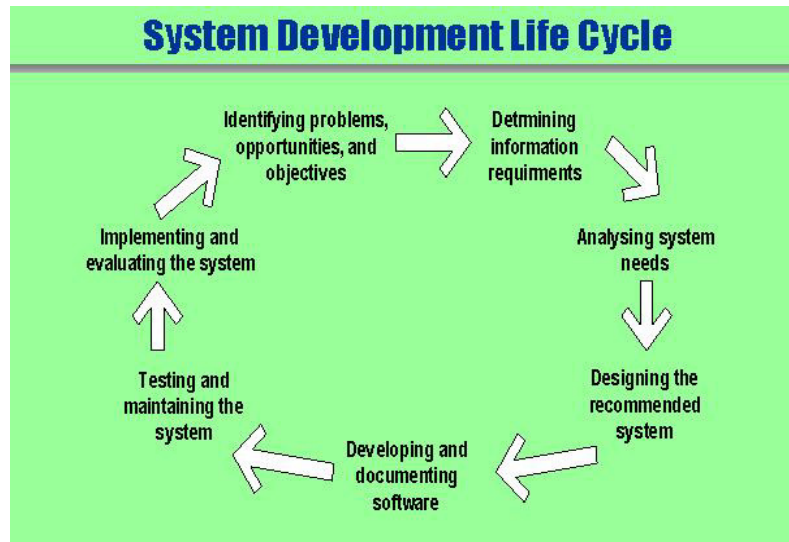
1. **Preliminary Investigation OR Problem Identification/System Study:**

   One of most difficult task of the system analyst is identifying the real problem of the existing system. It defines the user requirements or what the user expects from the new system. This also includes the rough idea of the resource requirements as well as estimated time for completion and number of persons expected to be involve in each phase.

   Problem identification helps in :-

         i.   Defining a problem
        ii.   Setting proper system goal
       iii.   Determining the boundaries of the project by considering the limitations of available resources

2. **Feasibility study:**

   It determine the possibility of either improving the existing system or developing the complete new system. It helps to obtain an overview of the problem and to get rough assessment of whether physical solution exist. The purpose of feasibility study is to determine whether the requested system successfully realizable.

   There are three aspects of feasibility study :-

         i.   Technical feasibility
        ii.   Economical feasibility
       iii.   Operational feasibility

    i.   **Technical feasibility:**

   - It involves the required and existing computer system, hardware, software & to what extent it can support the proposed application.
   - It answers following questions :-

      ☐   Whether the system can be carried out with existing equipments ?

      ☐   Whether the existing software is enough ?

      ☐   If a new technology is required how best it can be implemented ?

ii.   **Economic feasibility:**

It involves post benefit analysis to determine the benefit and savings that are expected from new system and compared with costs. It benefits out weight cost then decision is made to design and implement new system.

iii.   **Operational feasibility:**

It concerns with human, organisational and political aspects. It covers technical performance as well as acceptance within the organisation. It determines the general attitude and job skills of existing personals and whether any restructuring of jobs will be acceptable to the current user.

It also includes how strong the reaction of staff will be towards the development of new system that involves computer's use in their daily work. So resistant to change is identified.

3. System analysis:

It involves detailed understanding of all important facts of the business area under investigation. This require data collection from a verity of sources such as questionnaires, forms, interviews, study of existing documents. It can be involved the direct observation in the organisation and collected documents to understand the whole existing system.

4. System designing:

In this process the primary object is to identify user requirements and to build a system that satisfies these requirements. Design of the system is mainly the logical design that can be sketch on a paper or on a computer. It includes physical design elements, describes the data to be inputted.

The process involved in manipulation of data & output design represents:-
    i.   File structure, storage devices etc
    ii.   Database is also designed in this phase
    iii.   Changes to be made in the organisational structure of the firm are outlines
    iv.   Input, Output, files, forms and procedures are planned
    v.   Finally standards for testing, documentation, system control are designed.

5. Development of software:

Development is a phase where detailed design is used to actually construct and build the system. In this phase the system is decided whether to buy commercial software or to develop new customized program with the help of the programmers. The choice depends upon the cost of software and cost of programming.

6. System testing:

Testing is a process of making sure that the program performs the intended task. Once the system is designed it should be tested for validity. During this phase the system is used experimentally to ensure that software does not fail and it will work according to its specification. It is tested with special test data.

7. **Documentation**

Two basic types of documentation
Systems Documentation
- Information needed for the on-going maintenance and operation of the computer system
- Structured for the technical systems professional
- Examples: technical diagrams, flowcharts, database management structures, etc.

User documentation
- Easy to read (step by step) instructions for using the application system
- Structured for non-systems professional

WHY IS DOCUMENTATION IMPORTANT?
Systems Documentation
Maintenance staff must learn system

> o The original systems developers are usually not the systems maintenance staff (they move to other new development projects)

> To ensure continuity of systems development after original developers leave the company

> To facilitate the incorporation of new aspects into the system (e.g., adding to the original models) by systems development staff

User Documentation

> To reduce the number of problem telephone calls that the developer receives from customers

To minimize the amount of the new system training needed

8. **Implementation & Evaluation:**

This is the final phase of development. It consists of installing hardware, programs, collecting data and organizing people to interact with and run the system. In this phase user actually starts using the system therefore it also involves training of users and provides friendly documentation.

Evaluation is the process of verifying the capability of a system after it put into operation to see whether it meets the objective or not. It includes response time, overall reliability and limitations user behaviour.

9. **Maintenance:**

It is process of incorporating changes in the implemented existing system.

    i.   **Enhancement:**

Adding new functions or additional capability of the system.

    ii.   **Adaptation:**

Customizing the software to run in a new environment.

    iii.   **Correction:**

Correcting the bugs in the existing software.