A system is an organized set of related components established to accomplish a certain task. A computer system is a system that has a computer as one of its components.

Systems analysis is the process of studying an existing system to determine how it works and how it meets client and user needs.

Clients contract to have the systems analysis done. Users are people who will have contact with the system (employees and customers).

Systems design is the process of developing a plan for an improved system.

The systems analyst performs both analysis and design. Sometimes a programmer is also involved in the analysis.
Change

There must be an impetus for change and related authority for change before an analysis and design project is undertaken.

Change Agent

The systems analyst serves as a catalyst to overcomes the natural reluctance to change within an organization.

User Involvement

To overcome reluctance to change, involve the people of the client organization in the development process.

Functions of the Systems Analyst

A systems analyst has three principal functions:
- Coordination
- Communication
- Planning and Design

Coordination

An analyst must coordinate schedules and system-related tasks with a number of people.

Communication

The analyst may need to make oral presentations and write reports for clients, users, and others involved with the system.
Planning and Design
The systems analyst, along with the client organization, plans and designs the new system. This includes all the activities from beginning of the project until its final implementation.

Qualities of a Systems Analyst
Other desirable qualities of a systems analyst are:
- analytical mind
- self-discipline
- self-direction
- ability to work without tangible results

Systems Development Life Cycle (SDLC)
The SDLC has five distinct phases:
1. Preliminary investigation
2. Analysis
3. Design
4. Development
5. Implementation

1. Preliminary Investigation
The goal of this phase is to determine the problem and is sometimes called the feasibility study or system survey.

Tools of Preliminary Investigation
To determine whether to proceed with the project, the systems analyst will develop an organizational chart.

Defining Problem
Defining the problem involves determining:
- Nature of the problem
- Scope of the problem
- Objectives of the project
Nature of the Problem

The systems analyst and the users must agree on the nature of the problem.

Scope of the Problem

Determining the scope of the problem sets limitations on the eventual budget and schedules of the project.

Objectives

Determining the objectives means to express what the user thinks the system should be able to do.

2. Systems Analysis

During this phase the systems analyst must:
- Gather data
- Analyze data
- Determine system requirements
- Report to management

Gathering Data

The systems analyst relies on the following sources when gathering data:
- Written documents
- Interviews
- Questionnaires
- Observations
- Sampling

Written Documents

Gathering documents includes procedures manuals, forms, and any kind of material that might have bearing on the problems in the organization.
There are two types of interviews, structured and unstructured. **Structured** interviews include only preplanned questions. **Unstructured** interviews allow the systems analyst to digress from the formal line of questioning.

Questionnaires are ideal for gathering information from a group too large to interview.

Systems analysts must observe the flow of information in and out of an organization. Sometimes this requires them to be a temporary participant in the organization.

Sampling is the collection of data about quantities, costs, time periods, and other factors relevant to the system.

The systems analyst uses charts and diagrams to analyze the volume of data that has been collected. Techniques often used include:
- Data flow diagrams
- Decision tables

DFDs serve as a map of how data flows in and out of an organization and reveal procedures used.
Decision Tables

Unlike a data flow diagram, a decision table represents the logical decisions that must be made regarding potential conditions in a given system.

System Requirements

The final segment of the systems analysis phase leads to a list of the things the system must be able to do. This list of system requirements will determine the design of the new system.

Report to Management

- Problems identified in the current system
- Requirements for the new system
- Cost analysis
- Recommendations for future action

3. Systems Design

This is the phase in which the systems analyst actually plans the new system. Systems design is divided into two sub-phases:
- Preliminary design
- Detail design

Preliminary Design

The systems analyst will review system requirements and consider whether the system should be:
- centralized or decentralized
- networked or not
- run with purchased or custom software
- outsourced or in-house

Prototyping

A prototype of the new system is a limited working system that is developed quickly to produce output that looks like the output the finalized system will produce.
Detail Design

The systems analyst must now develop detailed design specifications, such as:
- Output requirements
- Input requirements
- Files and databases
- Systems processing
- Systems controls and backups

Output Requirements

The systems analyst must determine:
- what the client wants the system to produce.
- the medium of the output.
- the type of reports needed.
- the contents of the output.
- what forms will be used.

Input Requirements

The systems analyst must determine what input is required to give the desired output.

Files and Databases

The systems analyst will determine whether the files should be stored sequentially, directly, or by some other method. File storage must also be coordinated with the databases used by the client.

Systems Processing

Systems processing involves generating a diagram of how the flow of data works in the new system.

Systems Controls and Backup

Systems controls are designed to prevent fraud and tampering. In addition, system files should be backed up (copied) and the copies stored in a safe manner and location.
4. Systems Development

In this phase, the system is actually developed and includes:
- Scheduling
- Programming
- Testing

Scheduling

Scheduling deadlines and milestones is another task of the systems analyst.
Scheduling involves determining the allocation of people and resources, monitoring schedules, and producing status reports.

Programming

At this point in systems development, programmers are given program design specifications and they begin to write code.

Testing

After the program for the new system has been written, it must be tested under a variety of conditions.

5. Implementation

For the implementation phase to be successful, the following activities are required:
- Training
- Equipment conversion
- File conversion
- System conversion
- Auditing
- Evaluation
- Maintenance

Training

A system will only be as good as the people who use it. Therefore, training the users is very important.
Equipment Conversion
Implementing a system requires that consideration has been given to how best to convert to the new system. Issues of availability of space, accessibility, and cleanliness of the work area cannot be overlooked.

File Conversion
Converting old file structures to that needed by the new system can take a long time. Care must be taken to not corrupt old files, lose files, or disrupt normal operations of the client organization during this conversion.

System Conversion
A systems analyst will need to determine in what way the client organization should convert to the old system.

Auditing
To guard against deliberate or unintentional violations in security, the systems analyst designs an audit trail.

Evaluation
Evaluation is needed to determine if the system is:
- working
- meeting the organizational requirements
- meeting the original budget limitations

Maintenance
Maintenance is an ongoing activity and includes monitoring and making revisions throughout the life cycle of the system.
Conclusion

Each computer system is unique. A systems analyst must be able to identify and understand the unique characteristics of a client organization to develop a better system for them.