UNIT 2

PROCESS OF SYSTEM DEVELOPMENT

Lesson Structure

2.0 OBJECTIVES

After going through this unit, you would be able to:

- understand and define Information Systems Analysis and Design;
- describe the information systems development life cycle; and
- compare the advantages and disadvantages of SDLC Development to its alternatives.
- understand the role and responsibility of a system analyst
- learn about the attributes a system analyst should have.

2.1 INTRODUCTION

Information Systems Analysis and Design is a complex and stimulating process that is used to develop and maintain computer based information systems. The analysis and design of information systems are driven from an organizational point of view. An organization might consist of whole enterprise, specific departments or individual work groups. Information Systems Analysis and Design is, therefore, an organizational improvement process. Systems are built and rebuilt (enhanced) for organizational benefits. Benefits result by adding value during the process of creating, producing and supporting the organization's services and products. Thus, Information Systems Analysis and Design is based on the understanding of objectives, structure and processes of organization and the knowledge about the application of Information Technology for this purpose. Most organizations find it beneficial to use standard sets of steps, called a systems development methodology, to develop and support their Information systems (IS). Like many processes, the development of Information Systems often follows a life cycle called Systems Development Life Cycle. For example, a product follows a life cycle when it is created, tested and introduced in the market. Its sale increases and goes to peak point and after that it declines and a new product or next version of the existing product is introduced in the market to replace it. SDLC is a common methodology for systems development in many organizations, consisting of various phases that mark the progress of system analysis and design effort.

2.2 SYSTEMS DEVELOPMENT LIFE CYCLE

Most organizations find it beneficial to use a set of steps, called a system development methodology, to develop and support their information system. Like many processes, the development of information system often follows a life cycle. The Systems 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.

Although any life cycle appears at first glance to be a sequentially ordered set of phases but actually it is not. The specific steps and their sequence are meant to be adapted as required for a project, consistent with management approach. For example, in any given SDLC phase, the project can return to an earlier phase, if necessary. If a commercial product does not perform well just after its introduction, it may be temporarily removed from the market and improved before being re-introduced. In the system development life cycle, it is also possible to complete some activities in one phase in parallel with some other activities of another phase. Sometimes, life cycle is iterative; that is, phases are repeated as required until a satisfactory and acceptable system is found. Such an iterative approach is special characteristic of rapid application development methods, such as prototyping. Some people consider life cycle to be spiral, in which we constantly cycle through the phases at different levels of detail. The life cycle can also be thought of a circular process in which the end of the useful life of one system leads to the beginning of another project that will develop a new version or replace an existing system altogether. However, the system development life cycle used in an organization is an orderly set of activities conducted and planned for each development project? The skills of a system analyst are required to be applied to the entire life cycle.

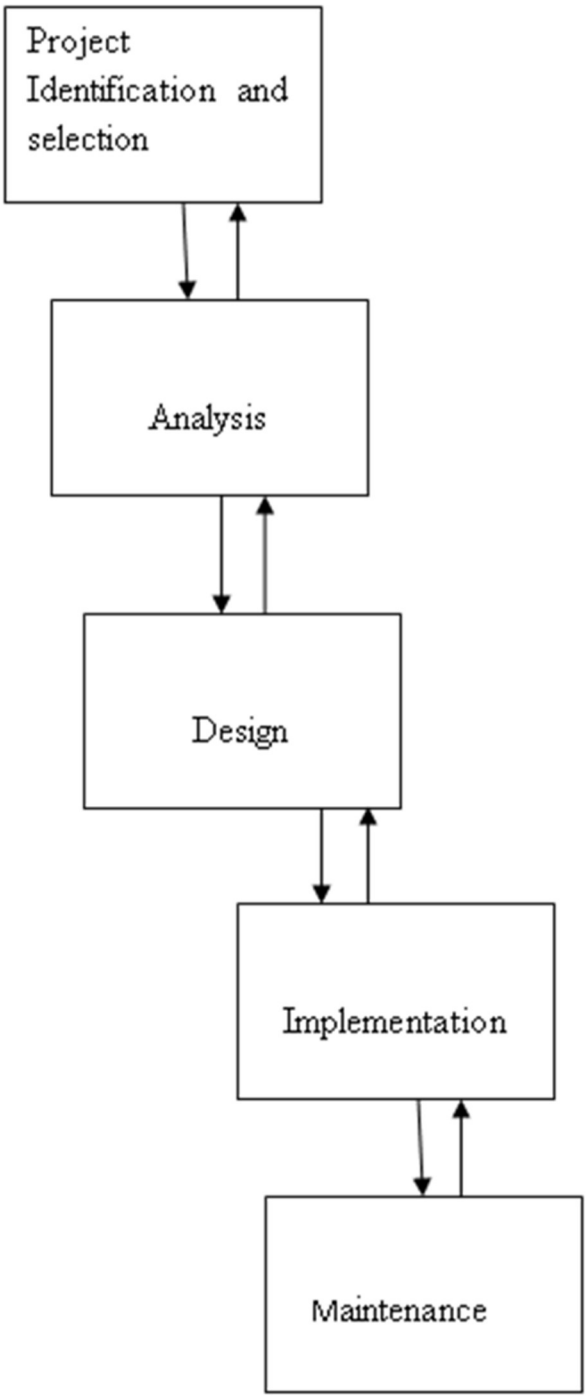


Figure: 1: Phases of System Development Life Cycle

Every custom software producer will have its own specific detailed life cycle or system development methodology. Even if a particular methodology does not look like cycle, you will discover that many of SDLC steps are performed, SDLC

techniques and tools are used.

The model in the figure 1 resembles a staircase with arrows connecting each step to the step before and to the step after it. This representation of the system development life cycle

(SDLC) is sometimes referred to as the "waterfall model". We use this SDLC as one

example of methodology but more as a way to arrange the steps of systems analysis

and design. Each phase has specific outputs and deliverables that feed important

information to other phases. At the end of each phase, system development project

reaches a milestone and, as deliverables are produced, parties outside the project team

often review them.

2.3 PHASES OF SDLC

SDLC consists of mainly seven steps. These are:

1. Project Identification and Selection

2. Project Initiation and Planning

3. Analysis

4. Logical Design

5. Physical Design

6. Implementation

7. Testing.

2.3.1 Project Identification and Selection

The first phase in the SDLC is called project identification and selection. In this

phase, the user identifies the need for a new or improved system.

The two main activities involved in this phase are

- Identification of need
- Prioritization and translation of need into a development schedule

In large organizations, this identification may be part of a systems planning process.

Information requirements of the organization as a whole are examined, and projects to meet these requirements are proactively identified. The organization's information system requirements may result from requests to deal with problem in current system's procedures, from the desire to perform additional tasks, or from the realization that information technology could be used to capitalize on an existing opportunity. These needs can then be prioritised and translated into a plan for the Information System department including a schedule for developing new major systems. In smaller organizations, determination of which systems to develop may be affected by user request submitted as the need for new or enhanced systems arises as well as from a formal information planning process. In either case, during project identification and selection, an organization determines whether or not resources should be devoted to the development or enhancement of each information system under consideration. The outcome of the project identification and selection process is a determination of which systems development projects should be undertaken by the organization at least in terms of an initial study.

2.3.2 Project Initiation and Planning

The second phase is project initiation and planning. The problems that are identified should be investigated and a decision to implement the information system or not for the organization should be taken. This phase also involves two main activities which are

- Formal preliminary investigation of the problem at hand
- Presentation of reasons why system should or should not be developed by the organization

A critical step at this point is determining the scope of the proposed system. The project leader and initial team of system analysts also produce a specific plan for the proposed project, which the team will follow using the remaining SDLC steps. Now, this baseline project plan customizes the standardized Development SDLC and specifies the time and resources needed for its execution.

The formal definition of a project is based on the likelihood that the organization's information system department is able to develop a system that will solve the problem or use the opportunity and determine whether the costs of developing the system outweigh the benefits it could provide. The final presentation with the subsequent project phases is usually made by the project leader and other team members to someone in management or to a special management committee with the job of deciding which projects the organization will undertake.

2.3.3 Analysis

Analysis is the next phase. During this phase, the analysis has several sub-phases which can be discussed as given below

- The first is requirements determination. In this sub-phase, analysts work with users to determine the expectations of users from the proposed system. This sub-phase usually involves a careful study of current systems, manual or computerized that might be replaced or enhanced as part of this project.

- Next, the requirements are studied and structured in accordance with their inter-relationships and eliminate any redundancies.

- Third, alternative initial design is generated to match the requirements. Then, these alternatives are compared to determine which alternative best meets the requirement in terms of cost and labour to commit to development process.In this phase, feasibility study of the proposed system is also performed. Various types of feasibilities are:

1) Technical feasibility
2) Economic feasibility
3) Behavioural feasibility
4) Operational feasibility
5) Legal feasibility

6) Time feasibility.

If the proposed system is not feasible to develop, it is rejected at this very step.

The output of the analysis phase is a description of (but not are detailed design for) the alternative solution recommended by the analysis team. Once, the recommendation is accepted by those with funding authority, you can begin to make plans to acquire any hardware and system software necessary to build or operate the system proposed.

System Design: After analysis phase is complete, design of the system begins. The design consists of logical and physical design of the system. The fourth and fifth phases are devoted to design of the new and enhanced system.

Design occurs in two phases, viz., logical design and physical design.

2.3.4 Logical Design

Logical design is not tied to any specific hardware and systems software platform. Theoretically, the system could be implemented on any hardware and systems software. The idea is to make sure that the system functions as intended. Logical design concentrates on the business aspects of the system.

2.3.5 Physical Design

In physical design, the logical design is turned into physical or technical specifications. For example, you must convert diagrams that map the origin, flow, and processing of data in a system into a structured systems design that can then be broken down into smaller and smaller units known as modules for conversion to instruction written in a programming language. You design various parts of the system to perform the physical operations necessary to facilitate data capture, processing, and information output. During the physical design, the analyst team decides the programming language in which the computer instructions will be written in, which database system and file structure will be used for the data, the platform that will be

used and the network environment under which the system will be run. These decisions finalize the hardware and software plans initiated at the end of the analysis phase. Now, proceedings can be made with respect to acquisition of any new technology not already present in the organization. The final product of the design phase is the physical system specification in a form ready to be turned over to programmers and other system builders for construction. The physical system specifications are turned over to programmers as the first part of the implementation phase.

2.3.6 Implementation

During implementation, you turn system specification into working system that is tested and put into use. Implementation includes coding, testing and installation. During coding, programmers write programs that make up the system. During testing, programmers and analysts tests the individual programs and the entire system in order to find and correct errors. During installation, the new system becomes a part of the daily activities of the organization. Application is installed or loaded, on existing or new hardware and users are introduced to new system and trained. The analysts begin planning for testing and installation as early as the project initiation and planning phase, since testing and installation require extensive analysis in order to develop the right approach.

Installation of the system can be done in the following three ways:

• Direct conversion: In this type of conversion, the software is directly installed at user's site.

• Parallel conversion: In this type of conversion, both the old and new systems are run in parallel for some time. After monitoring the new system for a reasonable period of time and if it is performing well, then, the new system is implemented replacing the old one.

• Phased conversion: In this type of conversion, the system is installed module by Development

module.

Implementation activities also include initial user support such as the finalization of documentation, training programs, and ongoing user assistance. Note that documentation and training programs are finalized during implementation. Documentation is produced throughout the lifecycle. Implementation can continue for as long as the system exists since ongoing user support is also part of implementation. Despite the best efforts of analysts, managers, and programmers, however, installation is not always a simple process. Many well-designed systems can fail if implementation is not well managed. The management of implementation is usually done by the project team.

2.3.7 Maintenance

The final phase is maintenance. When a system is operating in an organization, users sometimes find problems with how it works and often think of better ways to perform its functions. Also, the organization's requirements with respect to the system change with time. During maintenance, programmers make the changes that users ask for and modify the system to reflect and support changing business conditions. These changes are necessary to keep the system running and useful. Maintenance is not separate phase but a repetition of the other lifecycle phases required to study and implement the needed changes. Thus, maintenance is an overlay to the life cycle rather than a separate phase. The amount of time and effort devoted to maintenance depends a great deal on the performance of the previous phase of life cycle. There comes a time, however, when an information system is no longer performing as desired, when maintenance cost becomes prohibitive, or when the organization's needs has changed substantially. Such problems are an indication that it is the time to begin designing the system's replacement, therefore, completing the loop and starting the life cycle over again. Often, the distinction between the major maintenance and new development is not clear, which is another reason why maintenance often resembles the lifecycle

itself.

Maintenance is of three types:

Corrective maintenance: In this type, the errors that creep into the system are removed. Hence the name corrective maintenance.

Adaptive maintenance: It is done to adapt with the changing external factors. For example, if the government rules change regarding the Dearness Allowance from 52% to 58%, then the changes have to be made in the Information System to adapt with the changing scenario.

Perfective maintenance: This is done to satisfy the users' requirements to make the system more and more perfect.

The SDLC is a highly linked set of phases where output of one phase serves as input to the subsequent phase. Throughout the systems development life cycle, the systems development project needs to be carefully planned and managed. Therefore, the larger the project, the greater is the need for project management.

2.4 PRODUCTS OF SDLC PHASES

• **Project Identification and Selection**: Priorities for systems and project, architecture for data, networks, hardware and Information System Management are the result of the associated system.

• **Project Initiation and Planning**: Detailed work plan for project, specification of system scope and high level system requirements, assignment of team members and other resources.

• **Analysis:** Description of current system, need to enhance or replace current system, explanation of alternative systems and justification of alternatives.

• **Logical Design:** Functional and detailed specification of all system elements (data, process, input and output).

• **Physical design**: Technical, detailed specifications of all system elements, i.e. programs, files, network, system software, etc. and acquisition plan for new technology.

• **Implementation:** Code, documentation, training programs and support capabilities.

• **Maintenance:** New version of software with associated updates of documents, training and support.

2.5 APPROACHES TO DEVELOPMENT

In the continuing effort to improve the systems analysis and design process, several approaches have been developed. Attempts to make system development less of an art and more of a science usually referred to as engineering techniques, are applied to system development. We will discuss prototyping, followed by introduction to joint application design and participatory design.

2.5.1 Prototyping

Designing and building a scaled down but fundamental version of a desired system is known as prototyping. A prototype can be built with any computer language or development tool to simplify the process. A prototype can be developed with some fourth generation languages (4GLs) such as query, screen and report design tools of a data base management system (DBMS), and with tools called computer aided software engineering (CASE) tools.

Using prototyping as a development technique, the analyst works with user to determine the initial or basic requirements of the system. The analyst then builds a prototype. When the prototype is completed, the user works with it and tells the analyst what they like and do not like about it .The analyst uses this feedback to improve the prototype and take the new version back to the user. This process is iterated until the users are satisfied. Two key advantages of the prototyping technique are the large extent to which proto typing involves the user in analysis and design and its ability to capture requirements in concrete rather than verbal or abstract form. In addition to being used stand-alone, prototyping can also be used to augment the SDLC.

Prototyping is a form of rapid application development or RAD. The fundamental principle of any RAD methodology is to delay producing detailed system design document until the user requirements are clear. The prototype serves as the working description of needs. RAD methodologies emphasize gaining user acceptance of the human system interface and developing core capabilities as quickly as possible.

2.5.2 Joint Application Design

In the late 1970s, systems development personnel at IBM developed a new process for collecting information system requirements and reviewing systems designs. The process is called Joint Application Design (JAD). The basic idea behind JAD is to bring structure to the requirements determination phase of analysis and to the reviews that occur as part of design. Users, managers, and system developers are brought together for a series of intensive structured meetings run by a JAD session leader who maintains the structure and sticks to the agenda. By gathering the people directly Development affected by an Information System in one room at the same time to work together to agree on system requirements and design details, time and organizational resources are better put to use. An added advantage is that, group members are more likely to develop a shared understanding of what the information system is supposed to do.

2.5.3 Participatory Design (PD)

Participatory Design (PD) represents a useful alternative approach to the SDLCPD emphasizes the role of the user much more than other techniques do. In some cases, PD may involve the entire user community in the development process. Each user has an equal share in determining system requirements and in approving system design. In other cases, an elected group of users control the process. These users represent the larger community. Under PD, systems analysts work for the users. The organization's management and outside consultants provide advice rather than control. PD is partly a result of the role of labour and management in the workplace where labour is more organized and is more intimately involved with technological changes.

2.6 SYSTEM ANALYST

A computerized system enables an organization to provide accurate information and respond faster to the queries, events etc. If a business needs computerized information system, a systems analyst is required for analysis and design of that system.

Information systems evolved from the need to improve the use of computer resources for the information processing needs of business application.

Three groups of people are involved in developing information systems for organizations. They are managers, users of the systems and computer programmers who implement systems. The systems analyst coordinates the efforts of all these groups to effectively develop and operate computer based information systems.

Systems analysts develop information systems. For this task, they must know about concepts of systems. They must be involved in all the phases of system development life cycle i.e. from preliminary investigation to implementation. Success of development depends on skills and the dedication of Systems analysts.

2.6.1 Role of a System Analyst

Analysing, designing and implementing systems to suit organizational needs are the functions of systems analyst. S/he plays a major role in evaluating business benefits from computer technology. Systems analyst is basically a problem solver with unique skills. A systems analyst deals with people, procedures and technologies.

The success of an information system development is based on the role of Systems analyst. Among several roles, some important roles are described below:

• **Change Agent**: The analyst may be viewed as an agent of change. A candidate system is designed to introduce change and reorientation in how the user organization handles information or makes decisions. Then, it is important that the user accepts change. For user acceptance, analysts prefer user participations during design and implementation. Analyst carefully plans, monitors and implements change into the user domain because people inherently resist changes. In the role of a change agent, Systems Analyst may use different approaches to introduce changes to the user organization.

• **Investigator and Monitor**: A systems analyst may investigate the existing system to find the reasons for it's failure. The role of an investigator is to extract

the problems from existing systems and create information structures that uncover previously unknown trends that may have a direct impact on organization. The role of a Monitor is to undertake and successfully complete a project. In this role, analysts must monitor programs in relation to time, cost and quality.

• **Architect** :The analyst's role as an architect is liaison between the user's logical Profession design requirements and the detailed physical system design. As architect the analyst also creates a detailed physical design of candidate systems. A systems analyst makes the design of information system architecture on the basis of end user requirements. This design becomes the blue print for the programmers.

• **Psychologist**: In system development, systems are built around people. The analyst plays the role of psychologist in the way s/he reaches people, interprets their thoughts, assesses their behaviour and draws conclusions from these interactions. Psychologist plays a major role during the phase of fact finding.

• **Motivator:** System acceptance is achieved through user participation in its development, effective user training and proper motivation to use the system. The analyst's role as a motivator becomes obvious during the first few weeks after implementation and during times when turnover results in new people being trained to work with the candidate system.

• **Intermediary:** In implementing a candidate system, the analyst tries to appease all parties involved. Diplomacy in dealing with people can improve acceptance of the system. The analyst's goal is to have the support of all the users. S/he represents their thinking and tries to achieve their goals through computerization.

These multiple roles require analysts to be orderly, approach a problem in a logical way, and pay attention to details. They prefer to concentrate on objective data, seek the best method, and be highly prescriptive. They appear to be cool and studious.

They focus on method and plan, point out details, are good at model building, perform best in structured situations, and seek stability and order.

2.6.2 Responsibility of a System Analyst

The responsibility of a systems analyst is to coordinate the efforts of all groups to effectively develop and operate computer based information systems. The responsibilities of a systems analyst are as following:

• **Defining Requirements**: The most important and difficult duty of an analyst is to understand the user's requirements. Several fact-finding techniques are used like interview, questionnaire, and observation, etc.

• **Prioritising Requirements by Consensus**: There is a need to set priority among the requirements of various users. This can be achieved by having a common meeting with all the users and arriving at a consensus. This duty of systems analyst requires good interpersonal relations and diplomacy. S/he must be able to convince all the users about the priority of requirements.

• **Analysis and Evaluation**: A systems analyst analyses the working of the current information system in the organization and finds out the extent to which they meet user's needs. On the basis of facts and opinions, systems analyst finds the best characteristics of the new or modified system which will meet the user's stated information needs.

• **Solving Problems**: Systems analyst is basically a problem solver. An analyst must study the problem in depth and suggest alternate solutions to management.Problem solving approach usually incorporates the following general steps:

• Identify the problem

• Analyse and understand the problem

• Identify alternative solutions and select the best solution.

• **Drawing up Functional Specifications:** The key duty of systems analyst is to obtain the functional specifications of the system to be designed. The specification must be non-technical so that users and managers understand it.The specification must be precise and detailed so that it can be used by system implementers.

• **Designing Systems:** Once the specifications are accepted, the analyst designs the system. The design must be understandable to the system implementer. The design must be modular to accommodate changes easily. An analyst must know

the latest design tools to assist implementer in his task. An Analyst must also create a system test plan.

• **Evaluating Systems:** An analyst must critically evaluate a system after it has been in use for a reasonable period of time. The time at which evaluation is to be done, how it is to be done and how user's comments are to be gathered and used, must be decided by the analyst.

2.6.3 Attributes of a Systems Analyst

A systems analyst must fulfil the following requirements:

• Working knowledge of information technology

• Computer programming experience and expertise

• General business knowledge

• Problem solving skills

• Communication skills

• Interpersonal skills

• Flexibility and adaptability

• Thorough knowledge of analysis and design methodologies.

In summary, the attributes that are required may be classified into the following:

• Analytical skills

• Technical skills

• Management skills

• Interpersonal skills.

Analytical Skills

As the designation of person is Systems Analyst, possession of analytical skills is very important. Analytical skills can be classified into the following sets:

• System study

• Organizational knowledge

• Problem identification

• Problem analysis and problem solving.

System Study: The first important skill of systems analyst is to know about system. It means that Systems Analyst should be able to identify work assignment as a system. It involves identification of each of the system's characteristics such as inputs, outputs, processes etc. Information systems can be seen as subsystems in larger organizational systems, taking input and returning output to their organizational environments.

Data flow diagram clearly illustrates inputs, outputs, system boundaries, the environment, subsystems and inter-relationship. Purpose and constraints are much more difficult to illustrate and must therefore be documented using other notations. In total, all elements of logical system description must address all characteristics of a system.

Organizational Knowledge: Whether a person is an in-house (in traditional organization) or contract software developer (in modern organization), s/he must understand how organization works. In addition s/he must understand the functions and procedures of the particular organization (or enterprise) s/he is working for.

Selected areas of organizational knowledge for a systems analyst are given below:

(1) How work officially gets done in a particular organization: In this area, knowledge about the following is required:

• Terminology, abbreviations and acronyms

• Policies

• Standards and procedures

• Formal organization structure

• Job description.

(2) Understanding the organization's internal politics: In this area, knowledge is required about the following:

• Influence and inclinations of key personnel

• Finding the experts in different concerned subject areas

• Critical events in the organization's history

• Informal organization structure

• Coalition membership and power structures.

(3) Understanding the organization's competitive and regulatory environment: In this area, knowledge is required about the following:

• Government regulations

• Competitors from domestic and international fronts

• Products, services and markets

• Role of technology.

(4) Understanding the organization's strategies and tactics: In this area, the requisite knowledge is given below:

• Short as well as long term strategy and plans

• Values and missions.

Problem Identification: A problem can be defined as the difference between an existing situation and a desired situation. The process of identifying problem is the process of defining differences. So, problem solving is the process of finding a way to reduce differences. A manager defines differences by comparing the current situation to the output of a model that predicts what the output should be. In order to identify problems that need to be solved, the systems analyst must develop a repertoire of models to define the differences between what is present and what ought to be present.

Problem Analysis and Problem Solving: Once a problem has been identified, systems analyst must analyse the problem and determine how to solve it. Analysis entails more about the problem. Systems analyst learns through experience, with guidance from proven methods, the process of obtaining information from concerned people as well as from organizational files and documents. As s/he seeks out additional information, s/he also begins to formulate alternative solutions to the problem. The next step is that the alternatives are compared and typically one is

chosen as best solution. Once the analyst, users and management agree on the general suitability of a solution (feasibility), they devise a plan for implementing it.

Herbert Simon has first proposed this approach. According to her/him, this approach has four phases namely intelligence, design, choice and implementation. This approach is similar to system development life cycle.

Intelligence: During this phase, all information relevant to the problem is collected.

Design: During this phase, alternatives are formulated.

Choice: During this phase, the best alternative solution is chosen.

Implementation: During this phase, the solution is put into practice.

Technical Skills

Many aspects of the job of systems analyst are technically oriented. In order to develop computer based information systems, systems analyst must understand information technologies, their potentials and their limitations. A systems analyst needs technical skills not only to perform tasks assigned to him/her but also to communicate with the other people with whom s/he works in systems development. The technical knowledge of a Systems Analyst must be updated from time to time.

In general, a Systems Analyst should be as familiar as possible with such families of technologies such as:

• Microcomputers, workstations, minicomputers, and mainframe computers,

• Programming languages,

• Operating systems, both for PC's and networks,

• Database and File management systems,

• Data communication standards and software for local and wide area networks,

• System development tools and environments (such as forms & report generators and graphical user interface design tools), and

• Decision support systems and data analysis tools.

S/he should know all of the above as well as modern methods and techniques for Profession

describing, modeling and building systems.

Management Skills

When a systems analyst is asked to lead a project team then management skills are required. Systems analyst needs to know the process of managing his/her own work and how to use organizational resources in the most productive ways possible. Selfmanagement is important skill for an analyst. There are four categories of management skills:

- Resource management
- Project management
- Risk management
- Change management.

Resource Management: A systems analyst must know how to get the most out of a wide range of resources i.e. system documentation, information technology and money. A team leader must learn how to best utilize the particular talents of other team members. S/he must also be able to delegate responsibility, empower people to do the tasks they have been assigned.

Resource management includes the following capabilities:

- Predicting resource usage (budgeting)
- Tracking and accounting for resource consumption
- Learning how to use resources effectively
- Evaluating the quality of resources used
- Securing resources from abusive use
- Relinquishing resources when no longer needed and releasing the resources when they can no longer be useful.

Project Management: A project is defined as a sequence of unique, complex and connected activities having one goal or purpose and that must be completed by a specific time, within budgets and according to specifications.

Project management is defined as the process of scoping, planning, staffing, organizing, directing and controlling the development of acceptable system at minimum cost within a specified time frame. In the role of project manager, s/he first needs to decompose a project in to several independent tasks. The next step is to determine how the tasks are related to each other and who will be responsible for each task.

Risk Management: A risk is any unfavorable event or circumstance that can occur while a project is underway. If a risk comes true, it can hamper the successful and timely completion of a project. Therefore, it is necessary to anticipate and identify different risks, a project is susceptible to, so that contingency plans can be prepared in advance to control the effects of each risk. Once, risk to the project has been identified, project manager must be able to minimize the likelihood that those risks will actually occur. It also includes knowing where to place resources (such as people) where they can do the best and prioritising activities to achieve better productivity.

Change Management: Introducing a new or improved information system into an organization is a change process. In general people do not like change and tend to resist it. Therefore, any change in the way people perform their duties in an organization must be carefully managed. Change management is a very important skill for systems analyst. The systems analyst must know how to get people to make a smooth transition from one information system to another, giving up their old ways of doing things and accepting new ways. Change management also includes the ability to deal with technical issues related to change, such as obsolescence and reusability.

2.7.4 Interpersonal Skills

Systems analyst works extensively with staff in key positions in an organization. So, interpersonal skills are necessary for success of him/her. These skills can be classified as:

• Communication skills

• Working alone as well as in a team

• Facilitating groups

• Managing expectations.

Communication skills: A Systems analyst should be able to communicate clearly and effectively with others. S/he must establish a good relationship with clients early in the project and maintain it throughout the project. Communication takes many forms from written to verbal to visual. The analyst must be able to master as many forms of communication as possible. Interpersonal communication subjects are:

• Business speaking

• Business writing

• Interviewing

• Listening

• Technical discussion

• Technical writing.

Working alone as well as in a team: A Systems analyst must be able to organize and manage his/her own schedule, commitments and deadlines because many people in the organization will depend on his/her individual performance, but systems analyst must work with the team towards achieving project goals. To work together effectively and to ensure the quality of the product, the team must establish standards of cooperation and coordination that guide their work. There are 12 characteristics of a high performance team that influence team work:

• Shared and elevated vision

• Sense of team identity: Result-driven structure

• Competent team members

• Commitment to the team

• Mutual trust

• Interdependency among team members

• Effective communication

• Sense of autonomy

• Sense of empowerment

• Small team size.

Facilitating groups: This skill is required when systems analyst works in Joint application development approach. In this approach systems analyst works with group during system development. Analysts use JAD sessions to gather systems requirements and to conduct design reviews. Systems analyst can be asked to work as a facilitator. Facilitation necessarily involves a certain amount of neutrality on the part of the facilitator. The facilitator must guide the group without being a part of the group and must work to keep the effort on track by helping the group resolve differences. Guidelines for a facilitator are given below:

• Purpose should be made clear

• Make sure that the group understands what is expected of them and of you

• Use physical movement to focus on yourself or on the group

• Reward group member participation with thanks and respect

• Ask questions instead of making statement Profession

• Wait patiently for answers

• Be a good listener

• Encourage group members to feel ownership of the group's goal and of their attempts to reach those goals.

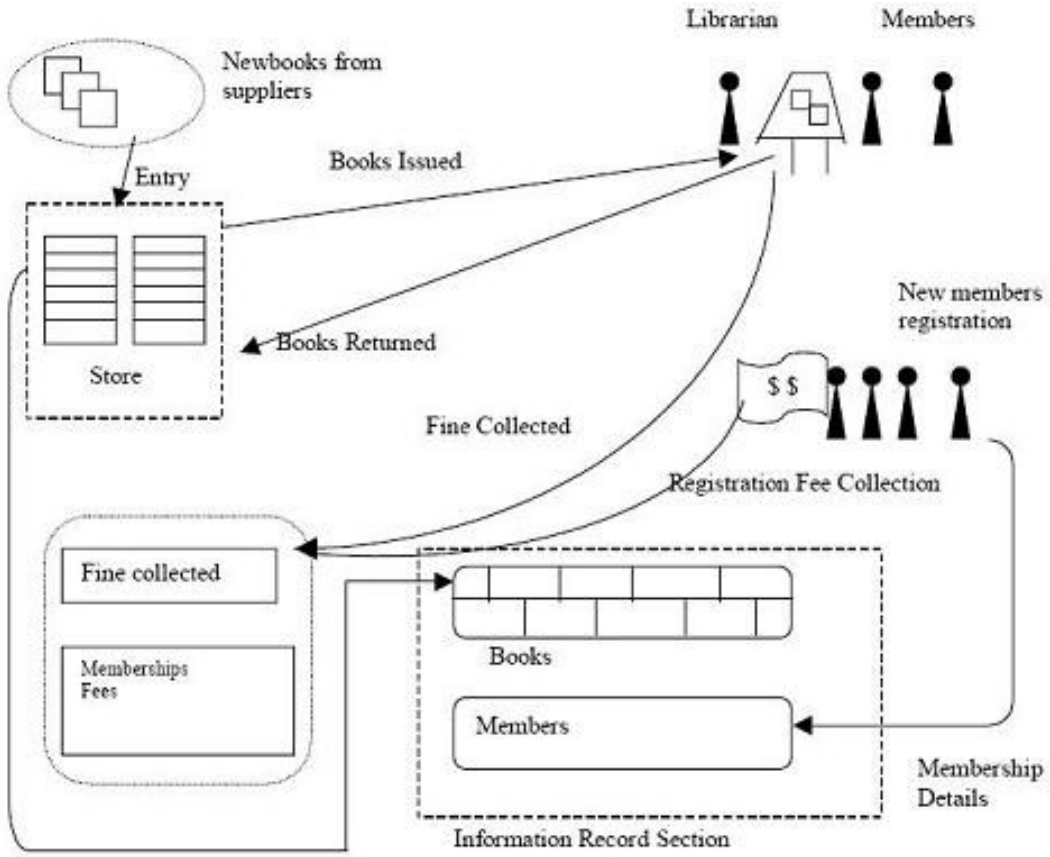
Managing expectations: System development is a change process, and members of any organization greet any organizational change with anticipation and uncertainty. Organizational members will have certain ideas about what new information system will be able to do for them. The systems analyst needs to understand the technology. S/he must understand the work flows that the technology will support and how the new system will affect them. The important ability of systems analyst is to communicate a realistic picture of the new system and what it will do for users and managers. Managing expectations begins with the

development of the business case for the system and extends all the way through training people to use the finished system.

2.7CASE STUDY: Noida Library System

Noida Public Library is the biggest library in Noida. Currently it has about 300 members. A person who is 18 or above can become a member. There is a membership fee of Rs 400 for a year. There is a form to be filled in which person fills personal details. These forms are kept in store for maintaining members' records and knowing the membership period. A member can issue a maximum of three books. He/she has three cards to issue books. Against each card a member can issue one book from library. Whenever a member wishes to issue a book and there are spare cards, then the book is issued. Otherwise that request is not entertained. Each book is to be returned on the specified due date. If a member fails to return a book on the specified date, a fine of Rs 2 per day after the due return date is charged. If in case a card gets lost then a duplicate card is issued. Accounts are maintained for the membership fees and money collected from the fines. There are two librarians for books return and issue transaction. Approximately 100 members come to library daily to issue and return books. There are 5000 books available out of which 1000 books are for reference and can not be issued. Records for the books in the library are maintained. These records contain details about the publisher, author, subject, language, etc. There are suppliers that supply books to the library. Library maintains records of these suppliers. Many reports are also produced. These reports are for details of the books available in the library, financial details, members' details, and supplier's details. Currently all functions of the library are done manually. Even the records are maintained on papers. Now day by day members are increasing. Maintaining manual records is becoming difficult task. There are other problems also that the library staff is facing. Like in case of issue of duplicate cards to a member when member or library staff loses the card. It is very difficult to check the genuinity of the problem. Sometimes the library staff needs to know about the status of a book as to whether it is issued or not. So to perform this kind of search is very difficult in a manual system. Also management requires reports for books issued, books in the library, members, and accounts. Manually

producing the reports is a cumbersome job when there are hundreds and thousands of records. Management plans to expand the library, in terms of books, number of members and finally the revenue generated. It is observed that every month there are at least 50-100 requests for membership. For the last two months the library has not entertained requests for the new membership as it was difficult to manage the existing 250 members manually. With the expansion plans, the management of the library aims to increase its members at the rate of 75 per month. It also plans to increase the membership fees from 400 to 1000 for yearly and 500 for half year, in order to provide its members better services, which includes increase in number of books from 3 to 4. Due to the problems faced by the library staff and its expansion plans, the management is planning to have a system that would first eradicate the needs of cards. A system to automate the functions of record keeping and report generation. And which could help in executing the different searches in a faster manner. The system to handle the financial details.



The first thing we studied is systems. In our case study Noida Public Library is our system. Every system is a set of some functional units that work together to achieve some objective. The main objective of library system is to provide books to its members without difficulty. The above figure depicts our library system pictorially. Our system has many functional units. The different functional units of the library are:

- Books issue and return section,
- books record unit,
- members record unit,
- accounts, and
- report generation units

Each functional unit has its own task. However,each of these work independently to achieve the overall objective of the library.

Data is an important component of any system. Here, data is pertaining to the details of members, books, accounts, and suppliers. Since people can interact with the system this system is an open system.

The system is mainly concerned with the management of data it is an information system. If this system were to be automated as conceived by the management, then role of the system analyst would be to study the system, its workings, and its existing problems. Also the analyst needs to provide a solution to the existing problem. Now that the management has decided for an automated system the analyst would perform the above tasks.

As the analyst did the study of the system, the following problems were identified

• Maintaining membership cards

• Producing reports due to large amount of data

• Maintaining accounts

• Keeping records for books in library and its members

• Performing searches

Now that the analyst has studied the system and identified the problems, it is the responsibility of

the analyst to provide a solution system to the management of the library.

The next stage of System Development Life Cycle is analysis phase which deals with the study of the current system, finding problems and establishing whether the new system will benefit the organization. In this library presently all transactions are done manually. Each member is allowed a certain number of books to borrow. He/she has cards to borrow books. Against each card a member can borrow one book from library.

Whenever a member wishes to issue a book and there are spare cards, then the book is issued. Otherwise that request is not entertained. The numbers of members are increasing day by day. It is becoming a problem to manage the cards of members. So an automated system is required that can maintain the details about the books borrowed by different system. As we have studied the system, we now know about the existing problems. And we can positively establish the need for the automated record keeping system. In analysis, a detail study of system is performed. Each operation is looked into more details. From the preliminary analysis we know that the members are increasing and managing their cards is now difficult task for the library staff.

Let us find out why increasing members is a problem. There might be a case when a card gets misplaced either by library staff or by member itself. If this is indeed the case then a duplicate card is made. But a member can lie about it and can make a duplicate card even if the card is not lost. In that case that particular member is having more than maximum allowed cards. There is no means to identify such members.

Presently there is a need to have a system that can record the details about the books issued to members. Card system needs to be discarded. To solve this situation our library needs a computer application that has a database that contains details corresponding to each book issued. It should also have facilities to check if the number of books issued to a particular

member doesn't exceed the maximum books allowed to him/her. Now we know what type of system is required, we can move to the next stage that is design stage. From analysis phase it is clear that we need a database to implement our new system.

In design stage it is decided as to which type of database will be used in system. Secondly we'll identify what data should this database store and in what format. After that various operations like issuing and returning books are finalized. Various checks like number of books issued not to exceed the maximum number are finalized. Various interfaces that are to be used for input are decided.

Once all these details are finalized, these are properly documented .These documents are used in building the system during the development stage, which follows the design stage. Using the design details the new system is built. Only things that are identified during the design stage are incorporated into the system.

There is no deviation from the design specifications. Suppose in the design phase the database to be used in the system is decided to be Oracle RDBMS then during development of the system only Oracle database is used. Similarly each design specification is taken care of and whole new system is build.

Now we have developed our new system. But before it is implemented at our user's site it needs to be tested for accuracy. So the system is tested to determine if it is performing correctly according to the requirements identified during the analysis phase. Each function of the system is tested. For example, we have issue book and return book functions. In return function it is checked if it is incrementing the count of variable that signifies how many books that member can issue more. In the issue function, it should be tested that this variable is decreased by one unit. Similarly whole of the system is tested.

After testing the system, it is implemented at the user's site. Now we have tested our new system for the library, it is implemented at the user's site i.e., library in our case.

After implementation, the systems require time to time maintenance. Maintenance can be for the software and hardware. Suppose two years after the implementation of the system, there occurs an alarming increase in number of members of the library. A situation can arise when all the memory for keeping the details have been exhausted then there will be a need to increase the memory of the system. Similarly the speed of processing requests might slow down. Then there will be a need for a faster processor. All these issues are maintenance issues. So maintenance, though it is final stage of the system development, is equally important.

2.8 SUMMARY

In this unit, you learned about the basic framework that guides systems analysis and design, the systems development life cycle, with its seven major phases: project identification and selection, project initiation and planning, analysis, logical design, physical design, implementation, and maintenance. The life cycle has had its share of criticism, which you read about, and other frameworks have been developed to address the life cycle's problems. These alternative frameworks include: Prototyping (Rapid Application Development approach), Joint Application Design and Participatory Design. We also discussed the skills necessary for a System Analyst which an organization needs for the replacement of existing system with the computerized system. A systems analyst may work on a project basis or may be part of client's team as a permanent employee who works about changes to be implemented to the existing system in the client organization. A systems analyst takes various roles to work in a team for the benefit of the organization and to develop successful information systems. Some of the roles are: Change Agent, Investigator and Monitor, Architect, Psychologist, Motivator, Intermediary.
The requisite skills for systems analyst are analytical, technical, management and interpersonal.

2.9 QUESTION FOR EXERCISE

Q1. What is SDLC? What is the purpose of SDLC?

Q2. What are the phases of SDLC? Discuss each phases in detail.

Q3. What are the roles of a system Analyst? Explain.

Q4.What are the qualities and qualifications of a system Analyst.

Q5.Define Joint Application Design and Prototyping.

2.10 FURTHER READINGS

- Kendall & Kendall; Systems Analysis and Design; PHI; Fifth Edition.
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