UNIT 2 SYSTEMS ANALYST – A PROFESSION

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2.0 INTRODUCTION

The work of a systems analyst who designs an information system is the same as an architect of a house. 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.
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.

2.1 OBJECTIVES

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

- know the need of systems analyst in the business and in the development of information system;
- know the job responsibilities of systems analysts in the traditional business and in the modern business;
- know the role of systems analyst in a team for the benefit of the organization and success of developed information system;
- know different analytical skills that are important to systems development, including problem identification, problem solving and systems thinking;
- know the need for basic technical skills even when systems are developed using rapid prototyping and code generators;

- know the way systems analysts use their skills in managing resources, projects, risk, and change; and
- know the importance of interpersonal skills for a systems analyst, in communicating, working with teams, facilitating groups, and managing exceptions.

2.2 WHY DO BUSINESSES NEED SYSTEMS ANALYSTS?

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. Customer defines the business problems to be solved by the computer. Project managers, Analysts, Programmers and Customers apply information technology to build information systems that solve those problems. Information technology offers the opportunity to collect and store enormous volume of data, process business transactions with great speed and accuracy and provide timely and relevant information for taking correct decision by management. This potential could not be realized without the help of a systems analyst since business users may not fully understand the capabilities and limitations of modern information technology. Similarly, computer programmers and information technologists do not fully understand the business applications they are trying to computerize or support. A communication gap has always existed between those who need computer based business solutions and those who understand information technology. Systems analyst bridges this gap.

2.3 USERS

System users are defined as the people who use information systems or who are affected by the information system on a regular basis i.e. capturing, validating, entering, responding to, storing and exchanging data and information apart from others. A common synonym is client. System users are concerned with business requirements. There are two main classes of system users and they are discussed below.

- **Internal Users** are employees of the business for which an information system is built. Examples are clerical and service staff, technical and professional staff, supervisors, middle level managers and executive managers. Remote and mobile users are the new class of internal users. They are geographically separated from the business. Examples of mobile users are sales and service representatives. An example of remote user is the person who is associated with telecommunication i.e. working from home. The person can be connected to the company's information system through modern communications technology.

- **External Users:** Modern information systems are now reaching beyond the boundaries of the traditional business to include customers and other businesses as system users. In business-to-business information systems, each business becomes an external user of the other business's information systems. For example, in the case of direct purchasing of product through the Internet, customer becomes an external user of the retailer's order processing information systems. Another example is that if a business connect their purchasing systems directly to the order processing systems of their suppliers then both become external users to each other.

2.4 ANALYSTS IN VARIOUS FUNCTIONAL AREAS

Today the systems analyst's job presents a fascinating and exciting challenge. It offers high management visibility and opportunities for important decision-making and creativity that may affect an entire organization.

2.4.1 Systems Analyst in Traditional Business

In the traditional business, information services are centralized for the entire organization or for a specific location. In this organization, the staff of information services (refer to Figure 2.1) report directly to the chief executive officer (CEO). The highest-ranking officer is sometimes called a chief information officer (CIO) and the rest of information services are organized according to the following functions or areas:

- **System Development** : In traditional business, systems analysts and programmers are organized into permanent teams that support the information systems and applications for specific business function. System development unit includes a *centre for excellence*, which is a group of experts (experienced systems analysts, system designers, and system builders) who establish and enforce methods, tools, techniques and quality for all system development projects.

- **Data Administration**: Data and other Information Resources of the organization are managed. This includes databases that are used by system developers to support applications. Systems analysts who are experts in data analysis can work here. These analysts are known as *Data Analysts*. They analyse database requirements, design and construct (sometimes) the corresponding databases.

- **Telecommunications**: Here, computer networks that play a critical role in the success of any business are designed, implemented and managed. Here, Network *analysts* perform many of the tasks as applied to designing local and wide area networks that will ultimately be used by systems and applications.

- **End-user Computing**: The growing base of personal computers and local area networks in the end user community are supported. This provides installation services, training and helps desk services. Analyst also provides standards and consulting to end users that develop their own systems with PC power tools such as spreadsheets and PC database management systems. In this centre, analysts may work as *End-user computing consultants.*

- **Computer Operations**: All of the shared computers including mainframes, minicomputers and other computers are put to operation and the same is coordinated. Systems Analysts may work as *Capacity Analysts* in this area.

Every analyst should know the management structure of a traditional information services organization.

2.4.2 Systems Analyst in Modern Business

Many medium-to-large information services units for the modern business have reorganized to be decentralized with a focus on empowerment and dynamic teams. In modern business, systems analyst may be reassigned to different projects at time to time. During the project, the systems analyst and other team members are directly accountable to the business unit for which the system is being developed. In this type of organization, the information services try to get closer to users and management to

improve services and value. Today's analysts should also know about a modern information services organization.

In modern business, two new trends are used for software development: outsourcing and consulting. *Outsourcing* is the act of contracting an outside vendor to assume responsibility for one or more IT functions or services. *Consulting* is the act of contracting with an outside vendor to assume responsibility for or participate in one or more IT projects.

Check Your Progress 1

1. What are the differences between problem identification and problem solving?
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2. What is the difference between a logical system description and a physical system description?
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3. Why is the development of information systems, sometimes done by an independent consultant?
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4. Differentiate between systems analyst and a business analyst.
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2.5 ROLE OF A SYSTEMS ANALYST

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 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 DUTIES OF A SYSTEMS ANALYSTS

The duty of a systems analyst is to coordinate the efforts of all groups to effectively develop and operate computer based information systems. The **duties** of a systems analyst are 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.

Check Your Progress 2

1. Are excellent programmers necessarily excellent systems analysts? Justify your answer.
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2. List at least eight tasks performed by systems analysts.
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3. List at least six attributes of a systems analyst.
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4. Why should a systems analyst be able to communicate well?
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2.7 QUALIFICATIONS 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 skills that are required may be classified into the following:

- Analytical skills
- Technical skills
- Management skills
- Interpersonal skills.

2.7.1 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.

2.7.2 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 describing, modeling and building systems.

2.7.3 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. Self-management 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 unfavourable 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
- 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. Ginzberg found that successfully managing user expectations is related to successful systems implementation. 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.

The relationship between a systems analyst's skills and systems development life cycle are depicted in figure 2.1.

Figure 2.1: SDLC and Skills of Systems Analyst (refer to Fig 2.3 in unit-2.jpg)

Check Your Progress 3

1. What are the business and technology trends that affect the players in the field of information systems?

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2.8 SUMMARY

In this unit, we discussed the skills necessary for success as a systems analyst. An organization needs systems analyst for the replacement of existing system with 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 SOLUTIONS/ ANSWERS

Check Your Progress 1

1. In problem identification, a systems analyst compares the current situation in an organization to the desired situation. Problem identification involves measurement, not decision making. Problem solving is the process of finding one or more ways to reduce these differences and then select the best approach for implementation.

2. A *logical system description* portrays the purpose and function of the system without tying the description to any specific physical implementation. A *physical system description* of a system focuses on how the system will be materially constructed.

3. Time constraints, limited number of internal personnel and need for a better expertise are reasons for hiring an outside consultant.

4. A systems analyst facilitates most of the activities to develop or acquire an information system. S/he studies the problems and needs of an organization to determine how people, data, processes, communication and information technology can best accomplish improvement of the business.

   A business analyst is a systems analyst who specializes in business problem analyses and technology independent requirements analysis.

Check Your Progress 2

1. An excellent programmer is not necessarily an excellent systems analyst. A programmer is given clear specification (often in writing) and designs efficient and maintainable programs. S/he need not have good communication skills and inter-personal relations. S/he need not have knowledge of functionality of organizations.
   A programmer works with clear specifications whereas an analyst has to arrive at clear specifications from fuzzily stated requirements.

2. Tasks performed by systems analysts are:

   - Define requirements,
   - Draws up ordering of requirements,
   - Gather data, facts and opinion of users,
   - Analyses the existing systems in the organization and uses this knowledge to improve systems,

- Provides solutions to problems posed by management,
- Makes specification of information systems,
- Designs the information system, and
- Evaluates the information system.

3. The desirable attributes of a systems analyst:

   - Must know how organizations function,
   - Must know latest developments in computer hardware and software,
   - Can get along with diverse people from top level managers to the last level of employees,
   - Must be able to express himself and absorb information by being a good listener,
   - Must have an analytical mind, and
   - Must have a broad general knowledge.

4. S/he has to understand the users' requirements mostly by interviewing them and thus s/he has to ask the right questions, listen carefully and summarize the gist of conversation. S/he should also be able to present and explain orally to the users, the system designed by her/him and clarify doubts they may have after the oral presentation. His main job is to interact with the management, users' and the programmers. So, it is obvious that s/he must posses' good communication skills.

Check Your Progress 3

1. Players in the field of information systems are being affected by a number of business and technology trends including the following:

   - Total quality management, a comprehensive approach to facilitating quality improvements and management within a business.
   - Business process redesign, the study, analysis, and redesign of fundamental business processes to reduce costs and/or improve value added to the business.
   - Continuous process improvement, the continuous monitoring of business processes to reduce costs and add value.
   - Enterprise resource planning, the selection and implementation of a single vendor's fully integrated information system that spans most basic business functions required by a major corporation.
   - Electronic commerce, a new way of doing business that involves the conduct of both internal and external business over the internet, intranets and extranets.

2.10 FURTHER READINGS

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