Course Overview

INTRODUCTION

Information System Analysis and Design Systems is one of the courses offered by School of Information and Communication Technology at Asia e University. This course is worth 3 credithours and should be covered over 8 to 14 weeks.

COURSE ANALYSIS

This course is offered to all learners taking the Bachelor of Information and Communication Technology programme. The course provides learners with a firm foundation in covering the concepts, skills, methodologies, techniques, tools and perspectives essential for developers, system analysts, and project managers to successfully develop information system.

COURSE SYNOPSIS

This course is divided into 10 chapters. The synopsis for each chapters is as follows:

PART ONE (FUNDAMENTALS)

The introductory part helps open your mind to the opportunities of the systems analysis and design field and to the engaging nature of system works.

CHAPTER 1 Introduction to Information System

The key to success in business is the ability to gather, organise and interpret information. Information system analysis and design is an organisational improvement process. System are built and rebuilt for organisational benefits. Chapter 1, explains the fundamental of system, system characteristics, information system components, different kinds of information system, the varied roles of systems analyst and finally the needs of systems analysis and design.

CHAPTER 2 Information System Development

To develop a complete and comprehensive system, all the elements related to the system must be taken into account. This includes the process of understanding the current system, the process of analysis, the process of developing a new design, and finally the process of implementing and maintaining the new system. Chapter 2, explains definition of methodology, model, tool, techniques, system development methodology, other alternatives approaches to development and finally phases in the System Development Life Cycle.

CHAPTER 3 Project Management

Project management skills are greatly in demand in the Information System development. Effective project management helps to ensure the systems development projects meet customer expectations and delivered within budget and time constraint. Chapter 3 addresses project manager's role and the project management process. This chapter presents techniques for reporting project plans using Work Breakdown structure, Gantt charts and network diagrams and a reference of project management resource in managing information system projects.

PART TWO (PLANNING)

Planning develops a better understanding of the scope of the potential system change and the nature of the needed system features.

CHAPTER 4 System Planning

Organisation can benefit from a formal process in System Planning. Chapter 4 divides system planning into two primary activities. Project identification and selection focuses on activities during which the need for a new or enhanced system is recognised. Project initiation and planning is where projects are accepted for development, rejected or redirected. A feasibility study were use to measure a project planning in meeting the criteria determined.

PART THREE (ANALYSIS)

Analysis is where you begin to understand, in depth, the need of system changes.

CHAPTER 5 System Requirements

Chapter 5 focus on gathering information by learning the current system, the organisation the replacement system will support and user requirement or expectations for the replacement system. This chapter introduces to a wide range of techniques for discovering system requirements sources such as interviews, observation, questionnaires, document review, JAD and prototyping.

CHAPTER 6 Structuring Requirements: Process Modeling

Process Modeling is a formal way of explaining how a system operates. It shows processes, activities, business functions and data flow among them. This chapter focuses on one tool that is used to coherently represent the information gathered as part of system requirement - Data Flow Diagrams (DFD). Explanations about DFD begin with symbols, rules, decomposition, balancing, DFD drawing guidelines and finally conclude with logical and physical DFD.

CHAPTER 7 Structuring Requirements: Logic Modeling

Logic modeling involves representing internal structure and functionality of processes depicted on a DFD. Chapter 7 introduces to techniques use during the analysis phase to model the logic within processes such as Structured English, Decision Tables and Decision Tree. This chapter concludes with explanation on development strategies in creating new software which are by: Custom software, purchase commercial off-the-shelf software package and outsourced to an application service provider.

PRIOR KNOWLEDGE

Ideally, learners need to have basic knowledge of computer system and computer programming. Learners also need to have solid background of computing literacy.

REFERENCES

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CHAPTER 1 Introduction to Information System

LEARNING OUTCOMES

By the end of this chapter, you should be able to:

1. Define systems and information system;
2. Define systems and information system;
3. Describe information system components;
4. Describe types of information systems; and
5. Describe systems analyst roles and qualities.

INTRODUCTION

To begin, you might want to watch this interesting video clip to get some ideas on life of system analyst in an organisation.

A Day in the Life – Computer Systems Analyst

Watch the video clip below and see what are among the roles of a computer system analyst. Listen to the talk.

Source:http://www.youtube.com/watch?v=tChuHB4eHQM

The key to success in business is the ability to gather, organise and interpret informat ion. Information system analysis and design is a proven methodology that helps both large and small businesses reap the rewards of utilising information to its full capacity. Information system analysis and design is an organisational improvement process. System are built and rebuilt for organisational benefits. Benefits result from adding value during the process of creating, producing and supporting the organisation's product and services. Thus the information system analysis and design is based on your understanding of the organisation's objectives, structure and processes as well as your knowledge of how to exploit information technology advantage.

A system analyst plays the major role in system analysis and design. Systems analyst helps system user and business managers define their requirement for new or enhanced information services. This chapter explains the fundamental of system, system characteristics, information system components, different kinds of information system, the varied roles of systems analyst and finally the needs of systems analysis and design.

1.1 SYSTEM

What is a system?

It is sometimes assumed that a system always refers to a computer system, but of course there are many other types of system. The human body, for example, is a complex system made up of many smaller systems: the respiratory system, the digestive system etc.

We could loosely define a system as anything with a purpose. A system must do something. If you put something into it, you should get something different out of it. So in this module we will learn about systems analysis and design.

Formally **system** is defined as an interrelated set of business procedures used within one business unit working together for a purpose. For example, a system in the university keeps track of student enrollment, whereas the classroom system keep track keeps track of schedules. The two systems mentioned are separated in purpose.

Figure 1.1: An example of student registration system

It is true that every system is made up of smaller systems, and also that every system is part of a larger system. The university you attend is a system, though it might not always seem like one. It is made up of departments, classes and students, all of which are systems themselves. Expanding upwards, the university is a part of the education system of the country, which in turn is part of the public services, and so on.

A system has nine characteristics, seven of which are shown in Figure 1.2. A system exists within an environment. A boundary separates a system from its environment. The system takes input from outside, process it and sends the result back to its environment. The arrows in figure show the interaction between the system and the world outside of it.

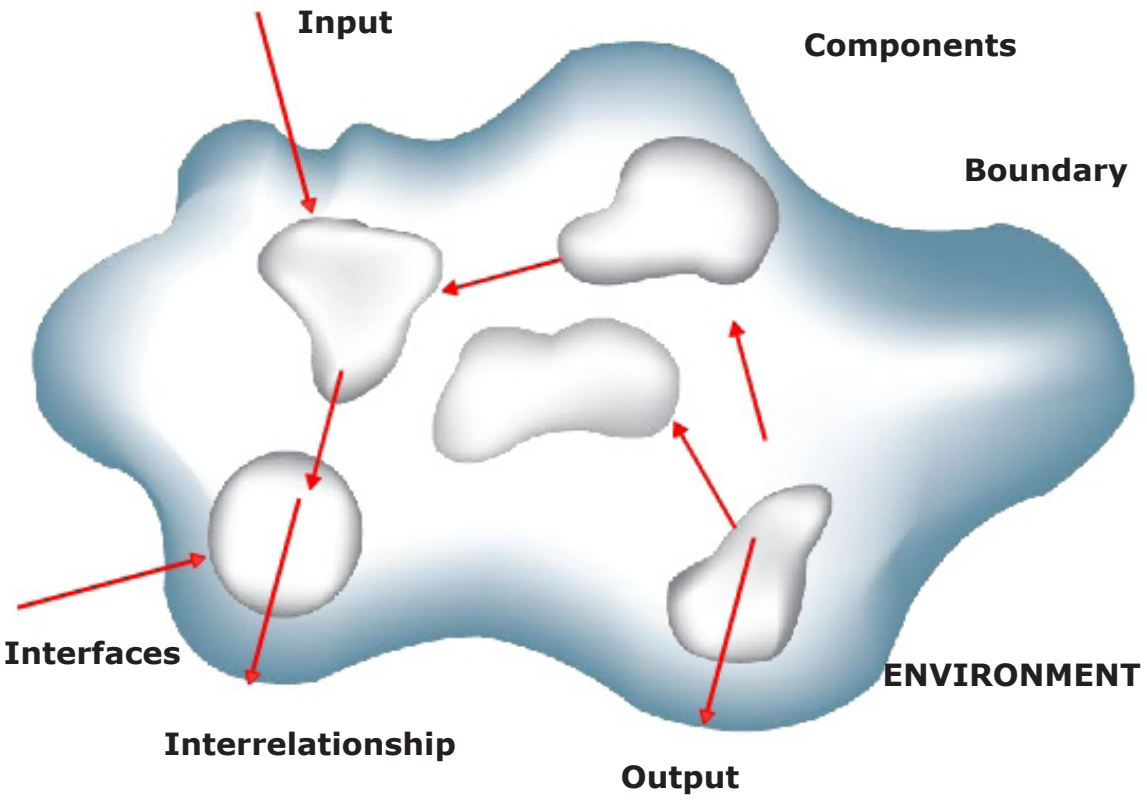


Figure 1.2 Seven characteristics of a system Source: Adapted from Valacich et al (2004)

1.1.1 Characteristics of a System

As mentioned earlier, a system has nine characteristics. Refer to Figure 1.3 below to view a complete all nine characteristics.

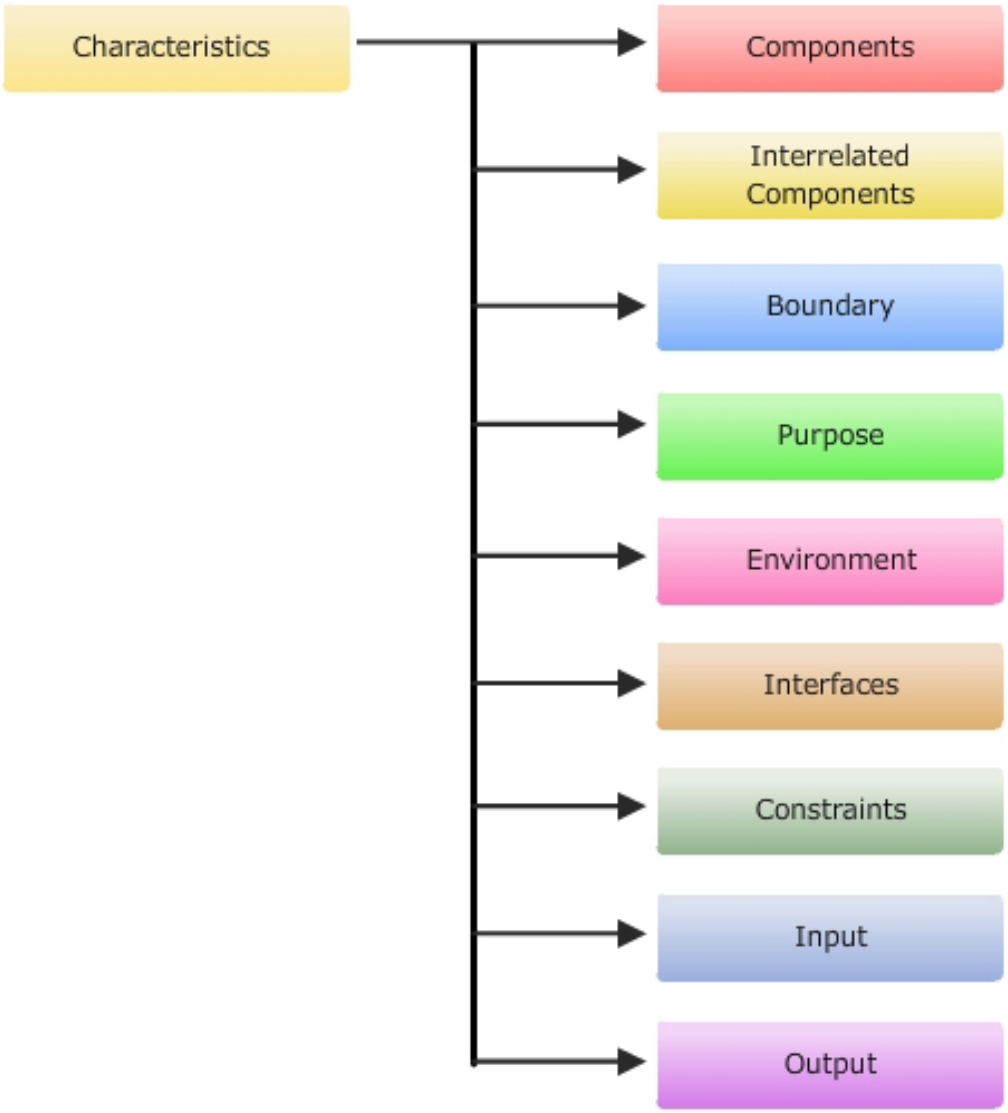


Figure 1.3 Characteristics of a system

A system is made up of **components**. A component is also known as subsystem. For example, just with an automobile or a stereo system, with proper design, we can repair or upgrade the system by changing individual components without having to make changes throughout the entire system.

The components are **interrelated** means that the function of one is tied to the function of others. For example producing daily report of customer orders received may not progress successfully until the work of another component is finished. A system has boundary, it limits the system and separating it from other system. Components within the **boundary** can be changed whereas systems outside the boundary cannot be changed. All of the components work together to achieve overall **purpose** for the larger system: the system's reason for existing.

A system exists within an environment - everything outside the system's boundary influences the system. For example, the environment of a state university includes prospective students, foundations and funding agencies and the news media. The points at which the system meets its environment are called interfaces, and there also interfaces between subsystems.

A system must face constraints in its functioning because there are limits (in terms of capacity, speed or capabilities) to what it can do and how it can achieve its purpose within its environment. Some of these constraints are imposed inside the system (eg. A limited number of staff available) and others are imposed by the environment (eg. due date, regulations or policy).

A system takes input from its environment in order to function (eg. People take in food, oxygen and water from the environment as input). Finally returns output to its environment as a result of its functioning and thus achieves its purpose.

A car is a system with several subsystems, including the braking subsystem, the electrical subsystem, the engine, the fuel subsystem, the climate-control subsystem, and the passenger subsystem. Draw a diagram of a car as a system and label all of its system characteristics.

1.2 INFORMATION SYSTEMS

Most, if not all, organisations have an information system. It might be quite primitive, like a list of names and addresses stuffed into a shoebox, or it might be hugely sophisticated. Either way, the aims will be pretty much the same: to help provide an effective customer service and to help management make the best decisions. An information system has five key components as shown in Figure 1.4 below:

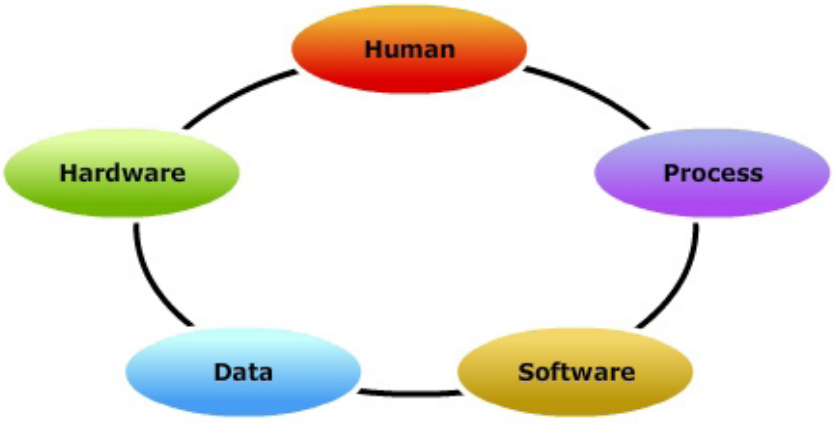


Figure 1.4: Information System Components

1.2.1 Information System Components

(a) Hardware

Hardware consists everything in the physical layer of the information system. For example hardware can include servers, workstation, networks telecommunication equipment, cables, computers, scanners and other technology-based infrastructure. As new technology emerge, manufacturers race to market the innovations and reap the rewards. Hardware purchasers today face a wide array of technology choices and decisions. Fortunately as hardware became more powerful, it became less expensive.

To understand in greater detail on the functions and examples of the computer hardware, you can refer to Table 1.1.

Table 1.1: Functions of the Basic Hardware of a Computer

Types of hardware	Function	Example
Input	Giving data input to the system.	Keyboard, mouse, pointer, screen, touch ball and scanner.
Processing	Operating the computer system.	Central processing unit and memory.
Output	Can display results or output which are generated from the computer system.	Screen, microphone and printer.
Storage	For storing data inside the computer.	Hard disk, floppy disk, CD- ROM and magnetic tape.

(b) Software

Software refers to programs that control the hardware and produce the desired informationor results. Software consists of system software and application software as shown in Figure 1.5.

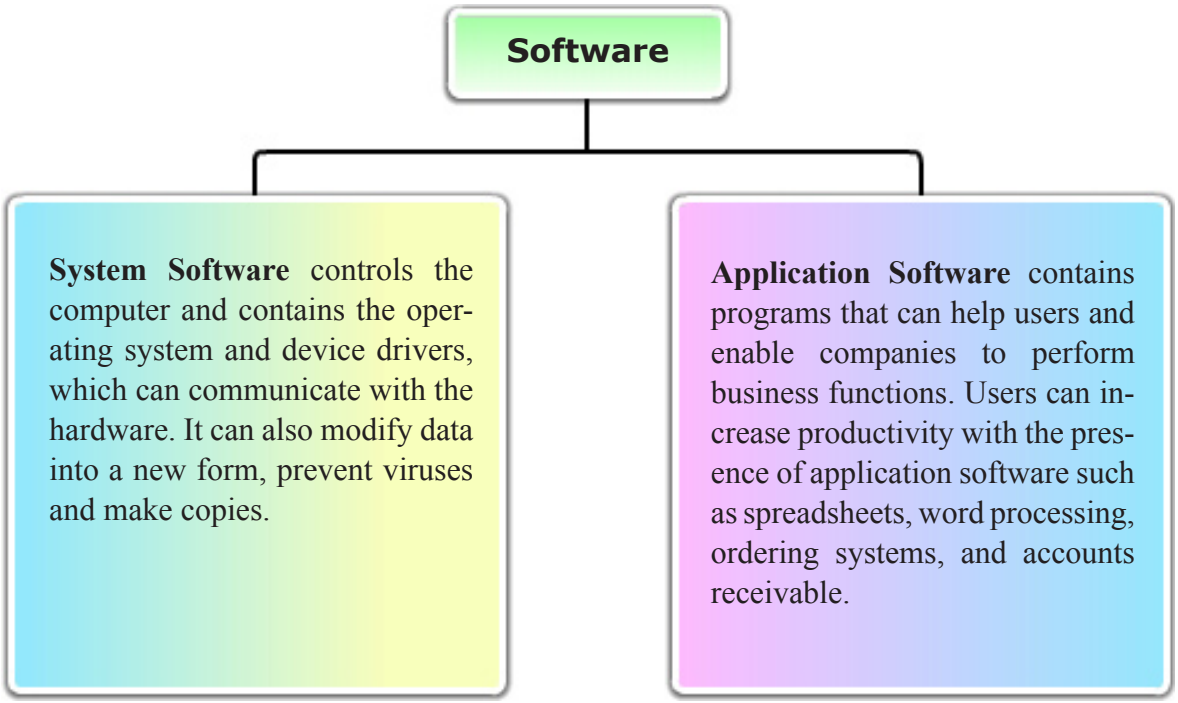


Figure 1.5: The Software Component

(c) Data

In order to understand how information systems can help organisations, you need to understand the difference between data and information. Data is raw facts or figures such as: 42, 12, 45, 13, 9 and 34. These numbers have no meaning until you know the context. They might be lottery numbers, map coordinates or a secret code. They need to be processed in some way to turn them into something useful. When this has been done, you have information.

Information is data that is organised and meaningful. Information is useful as it tells you something you didn't know before. Sometimes it's not that important and can be ignored; sometimes it's priceless. How much would advance information about the September 11th 2001 terrorist attacks have been worth? Of course, information systems in businesses won't provide that type of information, but they might make the difference between success and failure. Figure 1.6 shows how information systems work in essence.

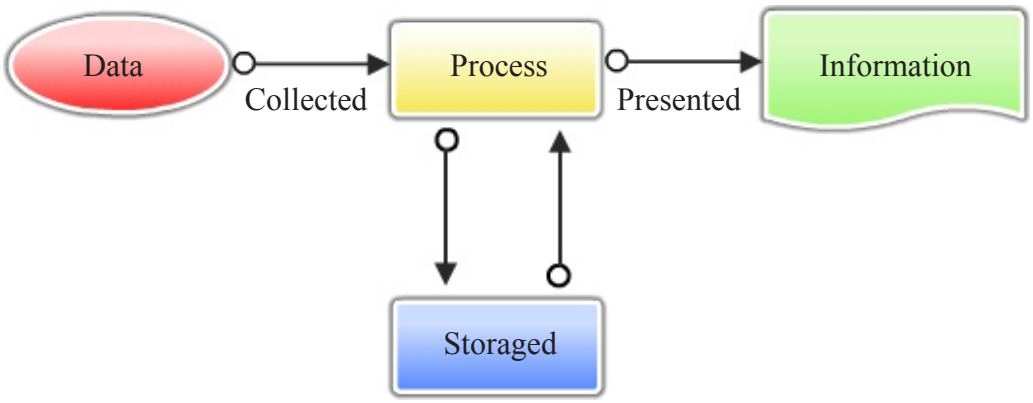


Figure 1.6: How Information System works

The raw data needs to be processed in some way to produce information. The data might be sorted into alphabetical order or key elements of the data might be filtered out or it might just be presented in a more understandable way. It's the job of system analyst, in conjunction with the user, to decide what processing of data takes place and how it happens.

(d) Process

Process is a guide consisting of orderly steps, which need to be followed and implemented in order to get a certain decision on a certain matter. It explains the activities carried out by users, managers and staff. Process is important for supporting a certain business model available as written documents or as reference materials on-line. To build successful information system, analyst must understand business processes and document them carefully. For example processes involve in student registration such as check student status, approve registration and update registration list.

(e) Human

Human is the users of the information system. The primary purpose of an information system is to provide valuable information to users. Users can be broken up into three categories as shown in Figure 1.7.

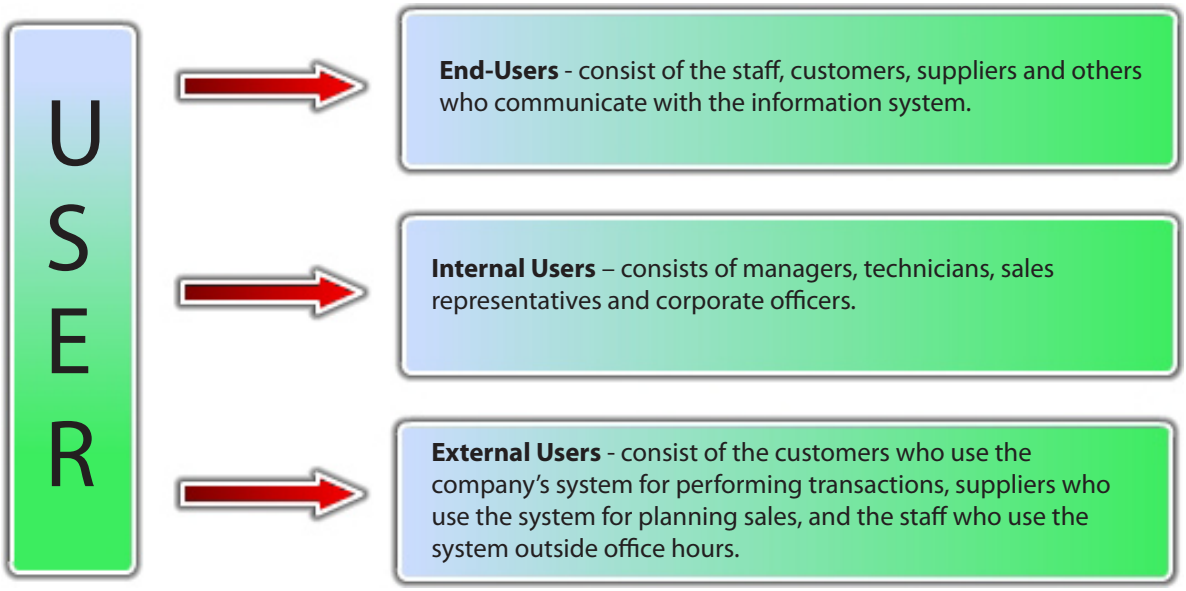


Figure 1.7: The three categories of user

The success or failure of an information system depends on whether the system that has been developed:

(i) fulfill the user's requirements;
(ii) provide good results; and
(iii) operate effective and efficiently.

A successful system requires integrated efforts from information technology experts such as the system analysts, programmers and the information technology managers so as to fulfill business's needs and to support company's objectives.

Explain with examples the difference between data and information.

1.2.2 Types of Information System

Now there are several approaches to solving a certain problem. There are also several types of information systems, which are developed to overcome specific problems, besides trying to fulfill the user's requests in general. In a large organisation, solving business problems such as the management of staff salaries, processing of business data and others are normally done by the use of large computers with internal and external networks.

Every type of information system has a role to play. If you look at the functions and the scope of usage, information systems can be divided into six types or more. Table 1.2 gives the explanation for each type of information systems.

Table 1.2: Types of information system

IS Types	Explanation
Transaction Processing System (TPS)	• Better known as TPS and is one of the first systems to be automated. • Can access and record information about all transactions related to the organisation such as reservation system and library loan system. • Transactions occur whenever there exist activities involving sales order processing, accounts receivable, accounts payable, inventory and ordering as well as payroll. • These transactions involve credit and debit in the company's ledger account. • The output from this transaction is the account statement, which is used to generate financial reports. • TPS now uses the latest technology which uses the e-commerce concept. This is a new challenge in the field of transaction processing which begins to shift to the on-line tran action processing system.
Management Information System (MIS)	• This system will take the information that has been extracted from TPS and generate reports which are required by the management for planning and controlling a company's business. Used by middle managers. An example is an annual budgeting system. • This system is capable of fulfilling the needs of management in acquiring the information that: - is brief and useful. - can be obtained and processed at the right time to make a decision.
Executive Information System (MIS)	• Also known as an Executive Support System (ESS) • It provides executives information in a readily accessible, interactive format. They are a form of MIS intended for top-level executive. • An EIS/ESS usually allows summary over the entire organisation and also allows drilling down to specific levels of detail. They also use data produced by the ground-level TPS so the executives can gain an overview of the entire organisation. • Used by top-level (strategic) management. They are designed to the individual. They let the CEO of an organisation tie in to all levels of the organisation. They are very expensive to run and require extensive staff support to operate.

Decision Support System (DSS)	• Supports business and organisational decision-making activities. A properly-designed DSS is an interactive software-based system intended to help decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.
	• They are flexible, adaptable and quick. The user controls inputs and outputs. They support the decision process and often are sophisticated modeling tools so managers can make simulations and predictions.
	• Typical information that DSS might gather and present would be:
	  • an inventory of all of your current information assets;
	  • comparative sales figures between one week and the next;
	  • projected revenue figures based on new product sales assumptions; and
	  • the consequences of different decision alternatives, given past experience in a con text that is described.

Office Automation System (OAS)	• OAS provides individual's effective ways to process personal and organisational data, perform calculations, and create documents. e.g. word processing, spreadsheets, file managers, personal calendars, presentation packages • Used to digitally create, collect, store, manipulate, and relay office information needed for accomplishing basic tasks and goals. Office automation helps in optimizing or automating existing office procedures. • They are used for increasing personal productivity and reducing "paper warfare". OAS software tools are often integrated (e.g. Word processor can import a graph from a spreadsheet) and designed for easy operation.
Expert System (ES)	• A system that produces a decision which is almost similar to decisions made by an expert in a certain discipline. • This information system can imitate the way humans think and consider in making a decision. • An expert system will combine the use of knowledge, facts and techniques to make a decision. • An expert can always give a certain decision which is accurate as well as ensuring maximum benefit to all the people concerned. Unfortunately, the sources for expert services are limited. • Realising the high value of knowledge and the expertise owned by the expert, researchers have tried to transfer and save in the computers the knowledge and expertise owned by the experts. Through this work, the expert system is made.

Define the term expert systems. How do expert systems differ from decision support systems?

1.3 ROLES OF THE SYSTEMS ANALYST

Systems analyst has a major role in the systems development process where by they bring the users and owner's ideas together to create a solution for their business needs. The main tool of a systems analyst is Information Technology (IT), which is "a contemporary term that describes the combination of computer technology (hardware and software) with telecommunication technology (data, image, and voice networks)." In general, it is their job to bend information technology to the companies' specific business needs and wants.

The systems analyst systematically assesses how users interact with technology and business function by examining the inputting and processing of data and the outputting of information with the intention of improving organisational processes. Definition of systems analyst is broad. The analyst must be able to work with people from all levels and also has depth knowledge in working with computers. The analyst needs to play many roles, balancing several at the same time. The roles of system analyst are shown in Figure 1.8.

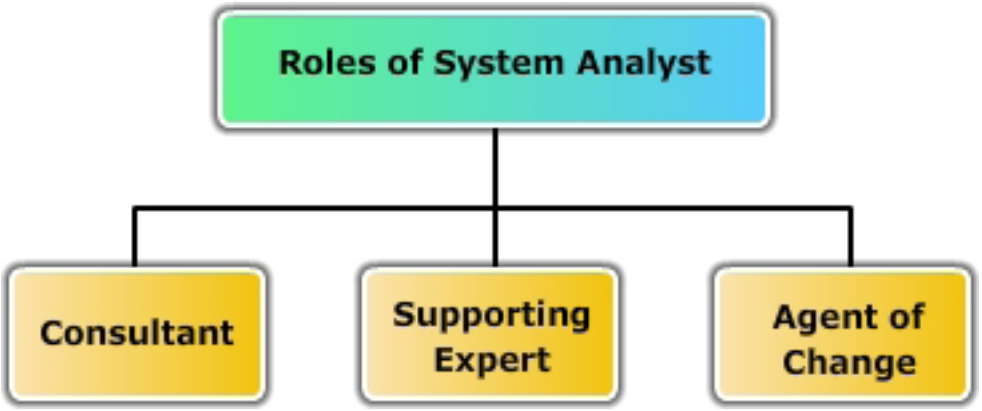


Figure 1.8: Roles of System Analysts

(a) Systems analyst as consultant

Systems analyst frequently acts as a systems consultant to and may be hired specifically to address information systems issues within a business. The hiring can be an advantage because outside consultants can bring with them a fresh perspective that other people in an organisation do not possess. However, an external analyst may not work effectively as he/she might not understand the internal organisational structure.

(b) Systems analysts as supporting expert

In this role the analysts draws on professional expertise concerning computer hardware and software and their uses in the business. As the support expert, you are not managing the project, you are merely serves as a resource for those who are working on and managing other projects. If you are a systems analyst employed by a

manufacturing or service organisation, many of your daily activities may be encompassed by this role.

(c) Systems analyst as agent of change

The most comprehensive and responsible role of system analyst is to become an agent of change, whether internal or external to the business. You are known as an agent of change whenever you are required to perform any of the activities in the systems development life cycle by having interaction with users and the business for an extended period.

An **agent of change** can be defined as a person who serves as a catalyst for change, develops a plan for change, and works with others in facilitating that change. As a systems analyst acting as an agent of change, you advocate a particular avenue of change involving the use of information systems. You also teach users the process of change, because changes in the information system do not occur independently but cause changes in the rest of the organisation as well.

1.3.1 Qualities of the Systems Analyst

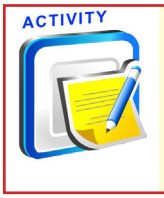
The successful systems analyst must possess a wide range of qualities. There are many qualities that can be mentioned, however listed here are the most desirable.

Above all, system analyst is a problem solver, he or she is a person who views the analysis of problems as a challenge and enjoys devising workable solutions. When necessary, the analyst must be able to systematically tackle the situation at hand through skillful application of tools, techniques and experience.

The analyst must also be a good communicator which means having good oral and written communication skills, he or she capable of relating meaningfully to other people over extended periods over time. Systems analysts need to be able to understand

humans' needs in interacting with technology and they need enough computer experience to program, to understand the capabilities of computers, glean information requirements from users, and communicate what is needed to programmers.

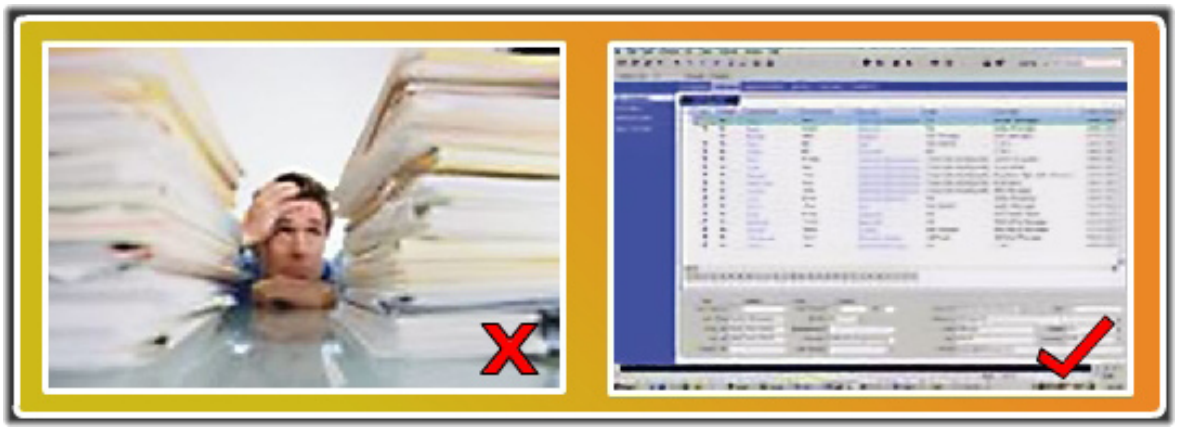
The analyst also need to posses strong personal and professional ethics to help them shape their client relationships. They must be a self-disciplined and self-motivated individual who is able to manage and coordinate other people as well as innumerable project resources.



What personal qualities are helpful to the systems analyst? List them.

1.4 NEED FOR SYSTEMS ANALYSIS AND DESIGN

Systems analysis and design, as performed by systems analysts, seeks to understand what humans need to analyse data input or data flow systematically, process or transform data, store data and output information in the context of a particular business.Furthermore, systems analysis and design is used to analyse, design and implement improvements in the support of users and the functioning of businesses that can be accomplished through the use of computerised information systems.



Installing a system without proper planning leads to great user dissatisfaction and frequently causes the system to fall into disuse. Systems analysis and design lends structure to the analysis and design of information systems, a costly endeavor that might otherwise have been done in haphazard way.

User involvement throughout the systems project is critical to the successful development of information system. Systems analysts whose plays a major role are the essential component in developing useful information systems.

Explain the advantages of using systems analysis and design techniques in approaching computerised information systems for business.

SUMMARY

1. The writing process consists of three distinct stages:
   (a) Pre-writing
   (b) Writing
   (c) Re-writing
2. Pre-writing involves researching the topic and planning your approach. The techniques that can help you come up with ideas for your writing assignments include:
   (a) Narrowing down your topic from general to very specific topic.
   (b) Brainstorming which consists of listing, freewriting and clustering.
3. Writing involves completing the first full draft of the essay.
4. Re-writing involves re-drafting, revising and proofreading your work.
5. How long you spend on each stage will vary according to the nature of the writing task and the amount of time you have been given to complete it. Try, however, to leave yourself two or three days to correct and edit your draft, and to re-write sections of it if necessary. Bear in mind your purpose for writing and your target audience.

KEY TERMS

Agent of change

Application software

Boundary

Component

Constraint

Data Decision Support System (DSS)

End-user

Environment

Executive Information system (EIS)

Executive Support System (ESS)

Expert System (ES)

External-user

Hardware

Information

Interfaces

Internal-user

Interrelated

Management Information System (MIS)

Office Automatio System (OAS)

Process Purpose Software System

System analyst and design

System software

System analyst

Systems consultant

Transaction Processing System (TPS)

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