2nClass

Information Systems Analysis and Design

فرع نظم المعلومات

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Information System Analysis & Design

Lecture 1

General Introduction

Information systems are crucial to the success of modern business organizations, and new systems are constantly being developed to make businesses more competitive. The key to successful system development is through systems analysis and design to understand what the business requires from the information system.

System analysis and design is used to analyze, design and implement improvements in the functioning of businesses that can be accomplished through the use of computerized information systems.

What is Information Systems Analysis and Design?

- A method used by companies to create and maintain systems that perform basic business functions
- Main goal is to improve employee efficiency by applying software solutions to key business tasks
- A structured approach must be used in order to ensure success

System: A collection of interrelated components that function together to achieve some outcome.

Another definition: System is a group of interrelated components working together towards a common goal by accepting inputs and producing outputs in an organized transformation process. Such a system (sometimes called a dynamic system) has three basic interaction components or functions:

1. Input: Involves capturing and assembling elements that enter the system to be processed.
2. Processing: Involves transformation processes that convert input into output. For example mathematical operations.
3. Output: involves transferring elements that have been produced by a transformation process to their ultimate destination.

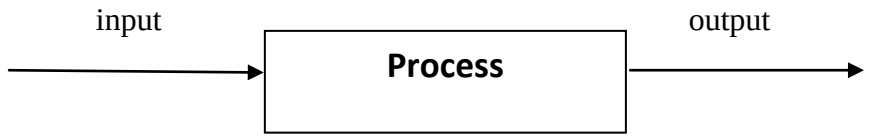

Figure (1.1): Basic System Components

Information System: A collection of interrelated components that collect, process, store, and provide as output the information needed to complete business tasks.

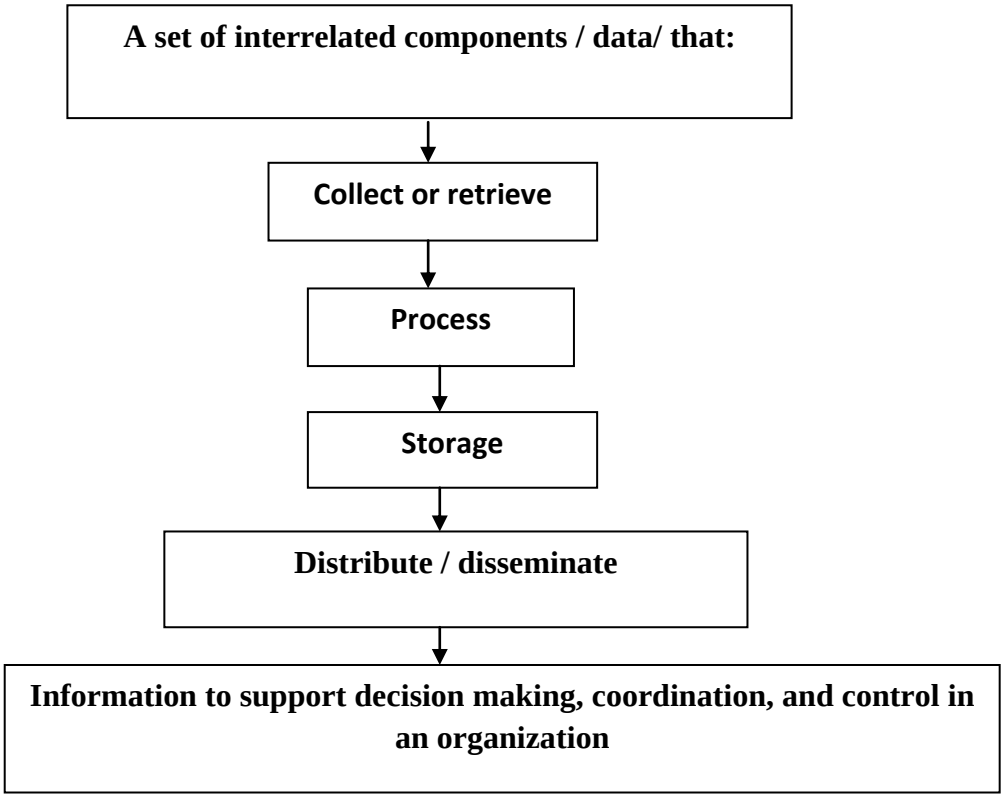

Figure (1.2): Scheme clarifies the definition of information system

Data: Streams of raw facts representing events such as business transactions.

Information: Clusters of facts that is meaningful and useful to human beings in the processes such as making decisions.

Another definition: Information is the product of data processing. Information is interrelated data. Information is equivalent to finished goods produced after processing the raw material. The information has a value in decision making.

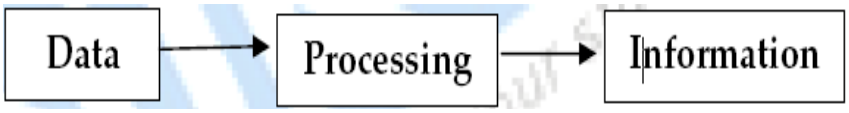

Figure (1.3): Information Generation

Characteristics of Information:

- Quality of information refers to its fitness for use, or its reliability.
- Following are the essential characteristic features:

1. **Timeliness:** Means that information must reach the recipients within the prescribed timeframes. For effective decision-making, information must reach the decision-maker at the right time, i.e. recipients must get information when they need it. A delay destroys the value of information. The characteristic of timeliness, to be effective, should also include up-to-date, i.e. current information.

2. **Accuracy:** Information should be accurate. It means that information should be free from mistakes. Wrong information given to management would result in wrong decisions.
3. **Relevance:** Information is said to be relevant if it answers especially for the recipient what, why, where, when, who and why? In other words, the MIS should serve reports to managers which are useful and the information helps them to make decisions.
4. **Adequacy:** Means information must be sufficient in quantity, i.e. MIS must provide reports containing information which is required in the deciding processes of decision-making. Inadequacy of information leads to crises, information overload results in chaos.
5. **Completeness:** The information which is given to a manager must be complete and should meet all his needs. Incomplete information may result in wrong decisions and thus may prove costly to the organization.
5. **Explicitness:** A report is said to be of good quality if it does not require further analysis by the recipients for decision making.
6. **Impartiality:** Impartial information contains no bias and has been collected without any distorted view of the situation.

Systems analysis: The process of understanding and specifying in detail what the information system should do, or is the process of investigation of a system's operation with a view to changing it to new requirements or improving its current working.

Systems design: The process of specifying in detail how the many components of information system should do physically implemented.

Information Systems Analysis and Design: Complex organizational process whereby computer-based information systems are developed and maintained

Why information system?

Serious thought to building a computerized system of information, became the basis is, for many reasons are:

1. Speed.
2. Precision.
3. Efforts to provide.
4. The amount of information.
5. Options available in the retrieval.

Information Systems Resources and Components:-

1. **People resources, include:**

   a) End Users: are people who use an information system or the information it products. (Accountants, Vendors, Engineers, Customers, managers).

   b) IS Specialists: are people who develop and operate information systems. (System analysts, programmers, and system operators).

2. **Hardware resources, include:**

   a) Machines (computers, video monitors, printers, optical scanners, magnetic disk drives).

   b) Media (floppy disk, optical disk).

   Media is all tangible objects on which data is recorded from sheets of paper to magnetic disks).

3. **Software resources, include:**

   a) Programs: operating system programs, word processing programs.

   b) Procedures: which are operating instructions for the people who will use an information system. Examples are instructions for filling out a paper form.

4. **Data resources include:** (Customer records, employee files, inventory database).

5. **Network resources include:** (Communications media, network support, modems).

Therefore information system is an organized combination of people, hardware, software, communications networks, and data resources that collects, transforms, and disseminates information in an organization.

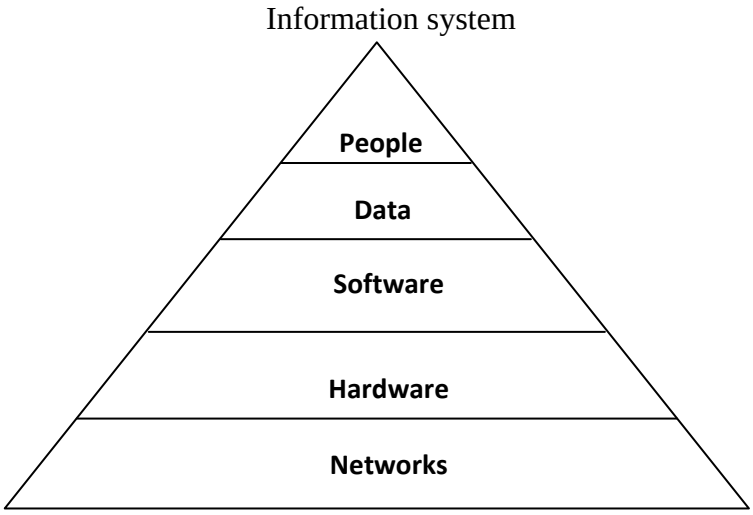

Figure (1.4): Information systems use people, data, hardware, software, and communications network resources and technologies to collect, transform, and disseminate information in an organization.

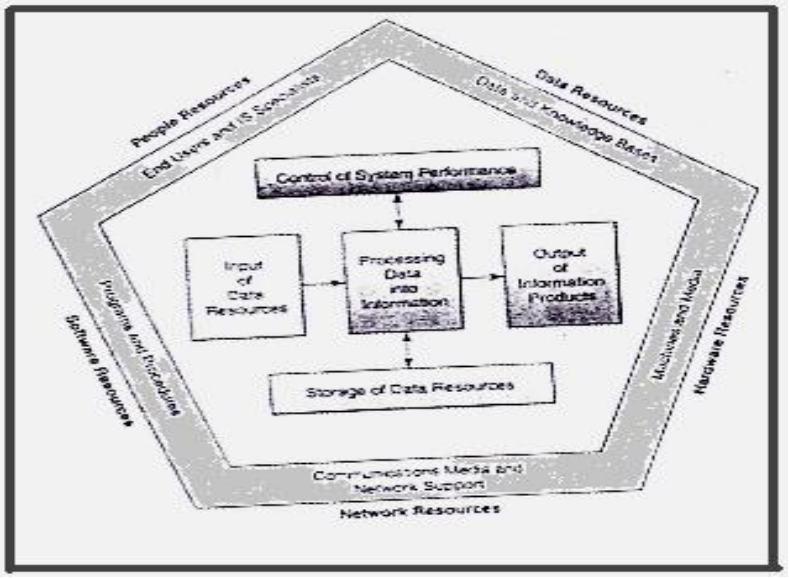

Figure (1.5): The components of an information system. All information systems use people, hardware, software, data, and network resources to perform input, processing, output, storage, and control activities that transform data resources into information products.

- The proper management of information systems is a major challenge for managers. Thus, **<u>the information system function represents:</u>**

1. A major functional area of business that is an important to business success as the functions of accounting, finance, operations management, marketing, and human resource management.
2. A major part of the resources of an enterprise and its cost of doing business, thus posing a major resource management challenge.
3. An important factor affecting operational efficiency, employee productivity and morale, and customer service and satisfaction.
4. A major source of information and support needed to promote effective decision making by managers.
5. An important ingredient in developing competitive products and services that give an organization a strategic advantage in the global marketplace.

<u>IS Specialists:</u> Are IS professionals who develop, implement, and operate computer-based information systems. Typical examples include system analysts, programmers, and computer operators.

Information Technology (IT): is reshaping the basics of business, customer service, operations, product and marketing strategies, and distribution.

The fundamental reasons for the use of information technology in business are:

1. Support of business operations.
2. Support of managerial decision making.
3. Support of strategic competitive advantage.

Information technology can be used to implement a variety of competitive strategies:

a) **Cost strategies:** Becoming a low-cost producer, lowering your customers or suppliers costs.

b) **Differentiation strategies:** Developing ways to differentiate your company's products or services from your competitors so your customers perceive your products or services as having unique features or benefits.

c) **Innovation strategies:** Introducing unique products or services, or making radical changes in your business processes that cause fundamental changes in the way business is conducted in your industry.

Information System Computer Hardware:

Computer systems are typically classified as 1) Microcomputers, 2) Midrange computers, 3) Mainframe computers**.**

In general, computers may differ in their processing speed and memory capacity, as well as in the number and capabilities of peripheral devices for input, output, and secondary storage they can support.

Computer systems can have a variety of models with different processing speeds, memory capacities, and other capabilities. This allows manufactures to provide a range of choices to customers, depending on their information processing needs.

1) Microcomputer systems:

Microcomputers are the smallest but most important category of computer systems for end users. Typically we refer to a microcomputer as a personal computer or PC.

2) Midrange computers

Also called minicomputers are larger and more powerful than most microcomputers but are smaller and less powerful than most large mainframes computer systems. In addition, midrange systems cost less to buy and maintain than mainframe computers.

Midrange computers are being used for many business and scientific applications such as they become popular as minicomputers for scientific research, engineering analysis and industrial process monitoring and control. Also, they become popular as powerful network servers to help manage large interconnected local area networks that tie together many end user microcomputer workstations and other computer devices in departments, offices and other work sites.

3) Mainframe computer systems

They are large, powerful computers that are physically larger than micros and minis and usually have one or more central processors with faster instruction processing speeds. For example, they typically process hundreds of million instruction per second (MIPS).They have large primary storage capacities. For example, their main memory capacity can range from about 64 megabytes to several gigabytes of storage.

Many mainframes models have the ability to service hundreds of users at once, For example, a single large mainframe can process hundreds of different programs and handle hundreds of different peripheral devices (disk, printers) of hundreds of different users at the same time.

Mainframe computers are designed to handle the information processing needs of major corporations and government agencies with many employees and customers or with complex computational problems. For example, large computers are necessary for organizations processing millions of transactions each day, such as major international banks, airlines, and oil companies.

Large mainframes can handle the great volume of complex calculations involved in scientific and engineering analysis.

Central processing unit (CPU)

The CPU is the most important hardware component of a computer system. It is also known as the central processor or instruction processor, The CPU can be subdividing in to two major subunits: the arithmetic logic unit and the control unit.

1) The control unit (CU) obtains instruction from those stored in the primary storage unit and interprets them .Then it transmits directions to the other components of the computer system, ordering them to perform required operation.

2) The Arithmetic logic unit (ALU) performs required arithmetic and comparison operations.

Primary and secondary storage:

The primary storage unit (also called main memory) holds data and instructions processing steps and supplies them to the control unit and arithmetic and logic unit

during processing. All data and programs must be placed in memory before they can be used in processing. Most of memory is known as RAM (Random Access Memory), others are ROM (Read Only Memory).

Secondary storage devices like magnetic and optical disks, also store data and programs, and thus greatly enlarge the storage capacities of computer systems. Also, since memory circuits typically lose their contents when electric power is turned off, most secondary storage media provide a more permanent type of storage.

However, the contents of secondary storage devices cannot be processed without first being brought into the primary storage unit. Thus, external secondary storage devices play a supporting role to the primary storage unit of a computer system.

Information System Computer Software:

Information systems depend on software resources to help end users use computer hardware to transform data resources into a variety of information products. Software is needed to accomplish the input, processing, output, storage, and control activities of information systems.

Computer software is typically classified into two major types of programs:

1. **Application software:** Programs that direct the performance of a particular use, or application of computers that meet the information processing needs of end users. Application software can be classified as:

a) General purpose Application programs: are programs that perform common information processing jobs for end users. For example, Word processing programs, spreadsheet programs, database management programs, and graphics programs.

b) Application specific programs: Thousands of application software package are available to support specific applications of end users. Major categories of such application specific programs are Business application programs (Accounting, marketing-sales analysis, human resource management-employee benefits analysis), Scientific application programs, also there are other application programs in education, video game programs, and computer-generated music and art programs.

2. **System software:** Programs that manage and support the resources and operations of a computer system as it performs various information processing tasks. These programs can be classified as:

a) System management programs:-programs that manage the hardware, software, and data resources of the computer system during its execution of the various information processing jobs of users. The most important system management programs are operating systems.

b) System support programs:-programs that support the operation and management of a computer system by providing a variety of support services. Major support programs are system utilities.

c) System development programs:-programs that help users develop information system programs and procedures and prepare user programs for computer processing. Major development programs are language translators, programming tools, and CASE (Computer- Aided Software Engineering).

Database Management Systems (DBMS):

Is system software package that controls the development, use, and maintenance of the databases of computer-using organizations. A DBMS program helps organizations use their integrated collections of data records and files known as databases. It allows different user application programs to easily access the same database. For example, a DBMS makes it easy for an employee database to be accessed by payroll, employee benefits, and other human resource programs. A DBMS also simplifies the process of retrieving information from databases in the form of displays and reports. Instead of having to write computers programs to extract information, end users can ask simple questions in a query language.

Telecommunications Monitors:

Modern information systems rely heavily on telecommunications networks to provide electronic communication links between end user workstations, other computer systems, and organizations databases. This requires system software called telecommunications monitors. These programs are used by the main computer in a network (called the host), or in telecommunications control computers such as network servers.

Telecommunications is the sending of information in any form (e.g., voice, data, text, and images) from one place to another using electronic or light emitting media.

Types of telecommunications networks:

There are many different types of telecommunications networks. However, from an end user's point of view; there are two basic types: Wide Area and Local Area Networks.

1. Wide Area Networks: Telecommunications networks covering a large geographic area are called remote network, long distance networks, or more popularly Wide Area Networks (WANs). Networks that cover a large city or metropolitan area (**Metropolitan Area Networks MANs**) can also be included in this category. Such large networks have become a necessity for carrying out the day to day activities of many business and government organizations and their end users. Thus, WANs are used by manufacturing firms, banks, transportation companies, and government agencies to transmit and receive information among their employee, customers, suppliers, and other organizations across cities, regions, countries, or the world.
2. Local Area Networks (LANs): Connect computers and other information processing devices within a limited physical area, such as an office, or other work site. LANs have become commonplace in many organizations for providing telecommunications network capabilities that link end users offices, departments, and other work groups. LANs allow end users in a work group to communicate electronically; share hardware, software, and data resources. For example, a project team of end users whose microcomputer workstations are interconnected by a LAN can send each other electronic mail messages and share the use of laser printers and hard magnetic disk units, copies of electronic spreadsheets or word processing documents, and project databases. LANs have thus become a more popular alternative for end user and work group computing than the use of terminals connected to larger computers.

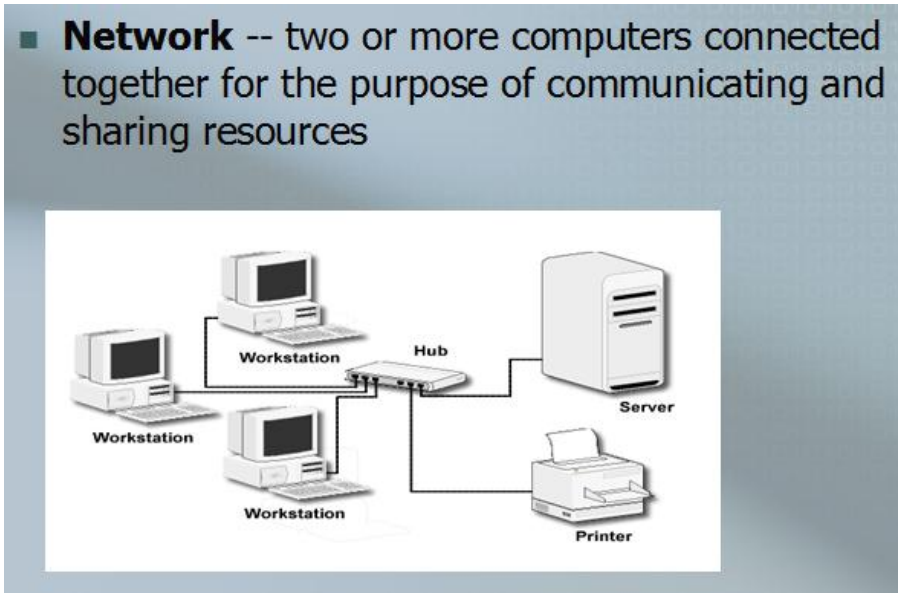

Figure (1.6): Computers network

Lecture 2

Information Systems and Management

Information systems literacy: Broad-based understanding of information systems that includes behavioral knowledge about organizations and individuals using information systems and technical knowledge about computers

Information Quality:

1. Time Dimension
   - **a.** Timeliness: Information should be provided when it's needed.
   - **b.** Currency: Information should be up to date when it's provided.
   - **c.** Frequency: Information should be provided as often as needed.
   - **d.** Time Period: Information can be provided about past, present, and future time periods.
2. Content Dimension
   - **a.** Accuracy: Information should be free from errors.
   - **b.** Relevance: Information should be related to the information needs of a specific recipient for a specific situation.
   - **c.** Completeness: All the information that is needed should be provided.
   - **d.** Conciseness: Only the information that is needed should be provided.
   - **e.** Scope: Information can have a broad or narrow scope, or an internal or external focus.
   - **f.** Performance: Information can reveal performance by measuring activities accomplished, progress made, or resources accumulated.
3. Form Dimension
   - **a.** Clarity: Information should be provided in a form that is easy to understand.
   - **b.** Detail: Information can be provided in detail or summary form.
   - **c.** Order: Information can be arranged in predetermined sequence.
   - **d.** Presentation: Information can be presented in narrative, numeric, graphic, or other forms.
   - **e.** Media: Information can be provided in the form of printed paper documents, video displays, or other media.

Types of information systems:

Conceptually, information systems in the real world can be classified several different ways. For example, several types of information systems can be classified as either **operations or management** information systems. Figure bellow illustrates this

conceptual classification of information systems. Note how this conceptual overview emphasizes the main purpose of information systems that **support business operations** and **managerial decision making**.

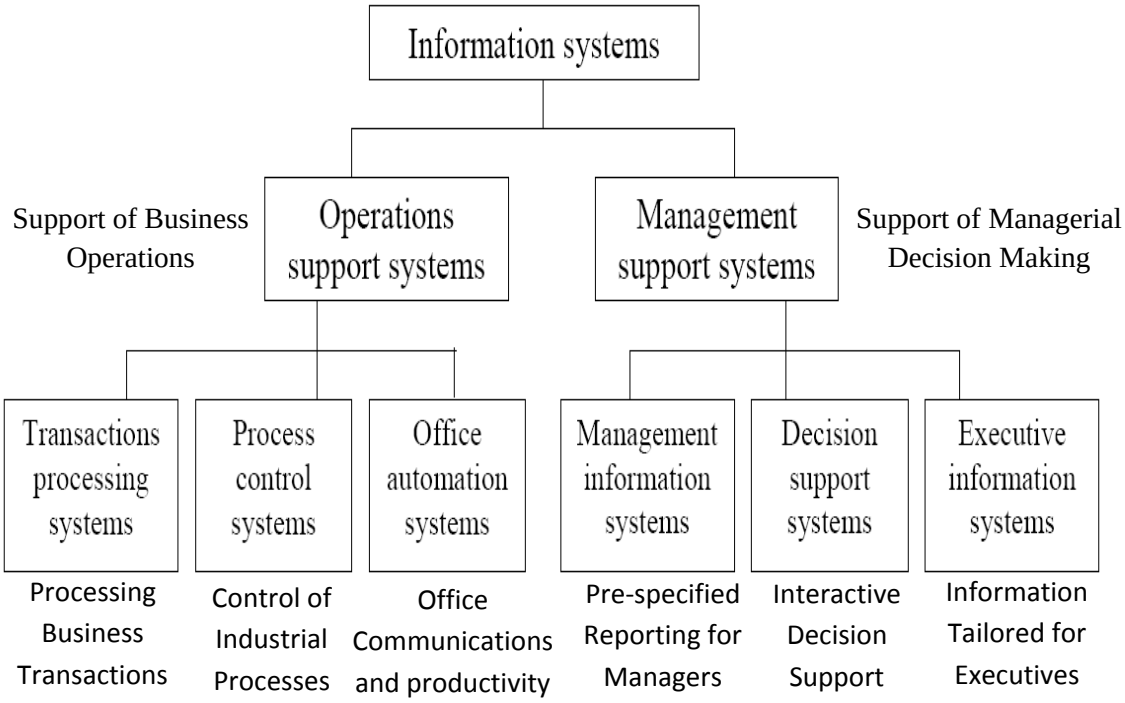

Figure (2.1): Operation and management classification of Information systems

A. Operations support systems

Operations support systems produce a variety of information product for internal and external use. However they do not emphasize producing the specific information product that can best used by manager. The role of a business firm's operations support systems is to efficiently process business transactions, control industrial process, support office communications and productivity, and update corporate databases.

1. **Transactions Processing Systems (TPS)**: Are an important example of operations support systems that record and process data resulting from business transactions. They process transactions (data) in two ways:

- **Batch processing**, transactions data is accumulated over a period of time and processed periodically. Batch processing usually involves:

a. Gathering source documents originated by business transactions, such as sales orders and invoices into groups called batches.

b. Recording transaction data on some type of input medium, such as magnetic disks or magnetic tape.

c. Sorting the transactions in a transaction file in the same sequence as the records in a sequential master file.

d. Processing transaction data and creating an updated master file and a variety of documents (such as customer invoices and paychecks) and reports.

e. Capturing and storing batches of transaction data at remote sites, and then transmitting them periodically to a central computer for processing. **This is known as Remote Job Entry (RJE).**

- **Real-time (or online) processing**, data is processed immediately after a transaction occurs. Transaction data are processed as soon as they are organized or recorded, without waiting to accumulate batches of data. Data are fed directly into the computer system from online terminal without being sorted, and they are always stored online in direct access files. Table bellow; illustrate the differences between Batches processing versus Real-time processing.

Characteristics	Batch Processing	Real-time Processing
Processing of transactions	Transaction data are recorded, accumulated into batches, sorted, and processed periodically	Transaction data are processed as generated
File update	When batch is processed	When transaction is processed
Response time/turnaround time	Several hours or days after batches are submitted for processing	A few seconds after each transaction is captured

2. **Process Control Systems**: Monitor and control physical process. For example, a petroleum refinery uses electronic sensors linked to computers to continually monitor chemical processes and make instant (real-time) adjustments that control the refinery process.
3. **Office Automation Systems**: Enhance office communications and productivity. For example, a corporation may use word processing for office correspondence, electronic mail to send and receive electronic messages, and teleconferencing to hold electronic meetings.

B. Management Support Systems

When information systems focus on providing information and support for effective decision making by managers, they called management support systems .Providing

information and support for decision making by all levels of management (from top executives to middle manager to supervisors) is a complex task. Conceptually, several major types of information systems support a variety of managerial end user responsibilities:

1. **Management Information Systems:** Also called **information reporting systems**, where still a major category of information systems. MIS produce information products that support many of the day-to-day decision making needs of management. Also provide information in the form of reports and displays to managers. For example, sales managers may use their computer workstations to get instantaneous displays about the sales results of their products and to access weekly sales analysis reports that evaluate sales made by each salesperson. There are three reporting alternatives provided by MIS:

a. Periodic Scheduled Reports: This traditional form of providing information to managers uses a pre-specified format designed to provide managers with information on a regular basis. Typical examples of such periodic scheduled reports are weekly sales analysis reports and monthly financial statements.

b. Exception Reports: In some cases, reports are produced only when exceptional conditions occur. In other cases, reports are produced periodically but contain information only about these exceptional conditions. For example, a credit manager can be provided with a report that contains only information on customers who exceed their credit limits.

c. Demand Reports and Responses: Information is provided whenever a manager demands it. For example, DBMS query language and report generators allow managers at online workstations to get immediate responses or reports as a result of their requests for information. Thus, managers don't have to wait for periodic reports to arrive as scheduled.

2. **Decision Support Systems:** Provide interactive information support to managers during the decision making process. DSS use 1) analytical models, 2) specialized databases, 3) and a decision makers own insights and judgments. For example, advertising managers may use an electronic spreadsheet package to do what-if analysis as they test the impact of alternative advertising budgets on the forecasted sales of new products.

Comparing between (MIS) and (DSS):

	MIS	DSS
Information form and frequency	Periodic, exception, demand reports and responses	Interactive inquiries and responses
Information format	Pre-specified, fixed format	Ad hoc, flexible, and adaptable format
Types of decision supported	Structured decision for operational and tactical planning and control.	Semi-structured and unstructured decisions for tactical and strategic planning and control.
Type of support	Provide information about the performance of the organization.	Provide information and decision support techniques to confront specific problem
Types of decision maker supported	Indirect support designed for many managers	Direct support to the decision making styles of individual managers

3. **Executive Information Systems:** Are information systems that combine many of the features of management information systems and decision support systems. EIS Provides critical information tailored to the information needs of executives.

EIS Components:

1. Hardware; The basic hardware needed for a typical EIS includes four components:
   - **a.** Input data-entry devices. These devices allow the executive to enter, verify, and update data immediately
   - **b.** The central processing unit (CPU).
   - **c.** Data storage files. Save useful business information, and search historical business information easily.
   - **d.** Output devices, such as monitor or printer

2. Software; The basic software needed for a typical EIS includes four components:
   - **a.** Text base software (Documents)
   - **b.** Database.
   - **c.** Graphics. Graphics can turn volumes of text and statistics into visual information for executives.
   - **d.** Models. EIS models contain routine and special statistical analysis.

3. User interface

Several types of interfaces can be available to the EIS structure, such as scheduled reports, questions/answers, menu driven, command language, natural language, and input/output.

4. Telecommunication

Telecommunications play a pivotal role in networked information systems. Transmitting data from one place to another has becomes crucial.

Advantages of EIS

- Easy for upper-level executives to use, extensive computer experience is not required in operations
- Information that is provided is better understood
- Filters data for management
- Improves tracking information
- Offers efficiency to decision makers

Disadvantages of EIS

- Limited functionality, by design.
- High implementation costs
- System may become slow, large, and hard to manage
- May lead to less reliable and less secure data

Organizations:

Key Elements:

1. **People:** Managers, knowledge workers, data workers, production or service workers
2. **Structure:** Organization chart, groups of specialists, products.
3. **Operating procedures**: Standard operating procedures (rules for action)
4. **Politics:** Power to persuade.
5. **Culture:** Customs of behavior

Management: Levels:

Figure (2.2) emphasizes that the type of information required by managers is directly related to the level of management and the amount of structure in the decision situations they face.

Figure (2.2): Levels of Management

The three levels of managerial control are:

1. **Operations management :**

At the operational level of the firm, the routine day-to- day business processes and interaction with customers occur. At this level, information systems are designed automate repetitive activities, such as sales transaction processing. Operational-level systems are primarily designed to improve the efficiency of business processes and the customer interface. Managers at the operational level, such as foremen or supervisors, make day-to-day decisions that are highly structured and recurring.

a. Make decisions using predetermined rules that have predictable outcomes make decisions.

b. Oversee the operating details of the organization.

2. **Middle management :**

At the managerial level of the organization, functional managers focus on monitoring and controlling operational level activities and providing information to higher levels of the organization. Managers at this level often referred to as mid-level managers or functional managers (for example, marketing manager). Mid-level managers typically focus on problems within a specific business function, such as marketing. Managerial-level decision making is generally referred to as ***semi-structured*** decision making

because solutions and problems are not clear-cut and often require judgment and expertise.

a. Make short-term planning and control decisions about resources and organizational objectives.

b. Decisions may be partly operational and partly strategic.

3. Strategic management:

At this level, managers focus on longer-term strategic issues facing the organization. Managers at this level include the president and chief executive officer (**CEO**), vice presidents, and possibly the board of directors. Decision making is often referred to as being ***messy or ill structured.*** For example, top managers may decide to develop a new product or discontinue an existing one. Such a decision may have vast, long-term effects on the organization.

a. Look outward from the organization to the future.

b. Make decisions that will guide middle and operations managers.

c. Work in highly uncertain decision-making environment.

d. Define the organization as a whole.

Management challenges:

1. Design competitive and effective systems, Understand system requirements of global business environment.

2. Create information architecture that supports organization's goal.

3. Determine business value of information systems.

4. Design systems people can control, understand and use in a socially, ethically responsible manner.

5. Integration: Different systems serve variety of functions, connecting organizational levels difficult, costly.

Lecture 3

Analysis and the Required Skills of the Systems Analyst

Systems Methodologies

Usually, systems are too complicated for anyone to understand without tools and techniques to help them. This is where methodologies come in. They're there to help.

Definition: A methodology is a strategy for overcoming the problems faced by the systems analyst. It's made up of techniques, tools, conventions and documents, and it lays down the tasks to be done.

One type of methodology is called *structured*. Structured methodologies are very popular with systems analysts. They lay down steps that the analyst should follow in a clear order. If the analyst follows these steps, then eventually a quality information systems design should be the outcome. Structured methodologies also allow the analyst to break down complex systems into smaller, well-defined and well-documented chunks.

The most widely used structured methodology is SSADM. (**SSADM – Structured Systems Analysis and Design Method)**

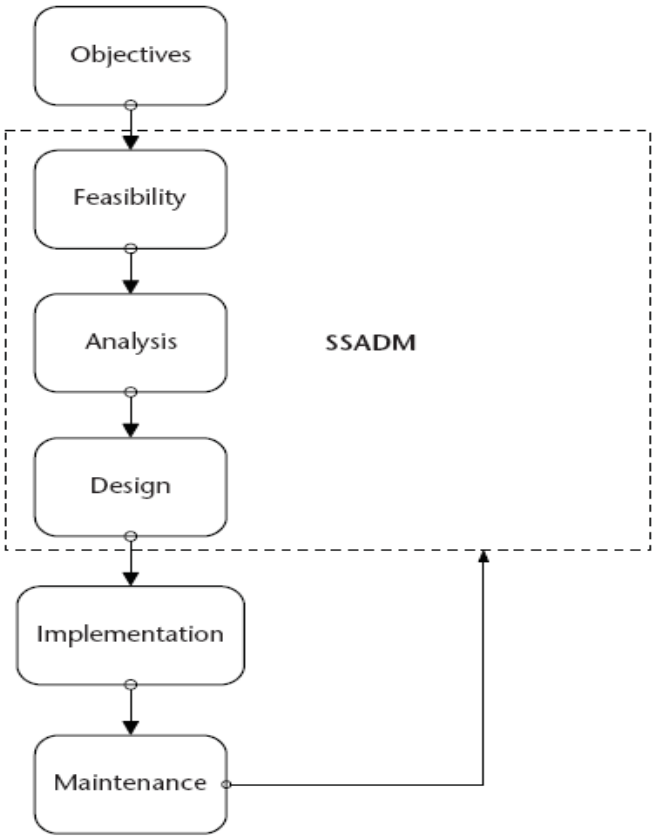

Figure (3.1): The Systems Development Life Cycle.

- However, even this may not be the end of the process, as organizations change and it may soon be time to start the whole process again.

NEED FOR SYSTEMS ANALYSIS

Business systems are usually complex. Making changes to a system without reference to its effects on other subsystems or current working practices could result in a worsening rather than improvement. Systems analysis will identify

1. Outputs and processing needed.
2. Data required providing this processing and output.
3. Role of people in the process.
4. Security aspects to ensure the efficient continuation of the business.
5. Costs of providing the system.

Definition: A system analyst is the person who selects and configures computer systems for an organization or business. His or her job typically begins with determining the intended purpose of the computers. This means the analyst must understand the general objectives of the business, as well as what each individual user's job requires. Once the system analyst has determined the general and specific needs of the business, he can choose appropriate systems that will help accomplish the goals of the business.

When configuring computer systems for a business, the analyst must select both hardware and software. The hardware aspect includes customizing each computer's configuration, such as the processor speed, amount of RAM, hard drive space, video card, and monitor size. It may also involve choosing networking equipment that will link the computers together. The software side includes the operating system and applications that are installed on each system. The software programs each person requires may differ greatly between users, which are why it is important that the system analyst knows the specific needs of each user.

To summarize, the system analyst's job is to choose the most efficient computer solutions for a business, while making sure the systems meet all the company's needs. Therefore, the system analyst must have a solid understanding of computer hardware and software and should keep up-to-date on all the latest technologies. He must also be willing to listen to the constant needs and complaints of the users he builds systems for.

Another definition: Systems analyst is a business professional who uses analysis and design techniques to solve business problems using information technology.

How can the system analyst starting the analysis:

1. Computer systems analysts start their work by asking people what they need their computers to do.
2. After analysts understand what the system needs to do, they break down the task into small steps.
3. They draw diagrams and charts to show how information will get into the computers, how that information will be processed, and how it will get to the people who need it. For example, analysts might decide how sales information will get into a store's computers and how the computer will add up the information in a way that makes it useful for store managers.
4. Analysts experiment with different computer system plans. They try various tools and steps until they find the system that is fastest, easiest, and costs the least.
5. Next, analysts decide which computers, software, and tools to buy. They also tell computer programmers how to make any new software that is needed. They give the programmers step-by-step instructions.
6. The main job for some systems analysts is getting computers to work together. They connect them into a network. Analysts decide how to get information from one computer to another. Many help people get data from the Internet.
7. After planning a system, analysts test it to make sure it works. They check to make sure that information is processed quickly and without mistakes. They also watch to see if the system is easy to use. Often, they have to change their plans to make the systems better.

- Computer systems analysts work in offices or computer labs. Some work from home. Working on a computer for a long time can give these workers eye, back, or wrist problems. Analysts usually work as part of a team. (project team)

- Many computer systems analysts have a college degree in computer science, information science, or management information systems. Some analysts get college degrees in other subjects. Then, they take computer classes and get computer experience.

- Logical thinking skills are also important. Analysts need good speaking and writing skills, too, so that they can explain their systems and give good instructions.

Systems Analyst performs analysis and design based upon:

a) Understanding of organization's objectives, structure and processes

b) Knowledge of how to exploit information technology for advantage

The analyst's approach to problem solving:

1. Research and understand the problem.
2. Verify that the benefits of solving the problem outweigh the costs.
3. Define the requirement for solving the problem.
4. Develop a set of solutions (alternatives).
5. Decide which solution is best, and make a recommendation.
6. Define the details of the chosen solution.
7. Implement the solution.
8. Monitor to make sure that you obtain the desired results.

An analyst should have fundamental technology knowledge of:-

1. Computers / peripheral devices (hardware)

2. Communication networks and connectivity

3. Database and database management systems (DBMS)

4. Programming languages (for example: VB.NET or Java)

5. Operating systems and utilities

List 4 main skills of a system analyst and briefly explain each skill.

1. **Analytical Skills** ability to see things as systems, identify, analyze, and solve problems in an optimal way for a specific organization.
2. **Technical Skills** ability to understand how computers, data networks, databases, operating systems, etc. work together, as well as their potentials and limitations.
3. **Management Skills** include organization's recourse management, project management (people and money), risk management, and change management.
4. **Communication Skills** include effective interpersonal communication (written, verbal, face-to-face conversations, presentations in front of groups), listening.

What kind of technical skills are needed for systems analysts?

1. Computers (PCs, mini, mainframes, etc.)
2. Computer networks (LAN, WAN, administration, security, etc.)
3. Operating systems (UNIX, Windows)
4. Data Exchange Protocols (FTP, HTTP, etc.)
5. Programming languages (C++, Java, XML, etc.)
6. Software applications (Office, project managements, etc.)
7. Information systems (databases, MISs, decision support systems)
8. System development tools and environments (such as report generators).

What kind of managerial skills are needed for systems analysts?

1. Resource management effectively managing the project's resources, including time, equipment, hardware, software, people, money, etc.
2. Project management determining the tasks and resources needed for a project and how they are related to each other,
3. Risk management identifying and minimizing risks,
4. Change management managing the system's (organization's) transition from one state to another

What kind of communication skills are needed for systems analysts?

1. Clear and effective interpersonal communication, whether written, verbal, from writing reports to face–to–face conversations, to presentations in front of groups.
2. Listening (accepting opinions and ideas from other project team members).
3. Group facilitation or formal technical reviews (**FTR**) skills:
   - **a.** Setting an agenda.
   - **b.** Leading discussions.
   - **c.** Involving all parties in the discussion.
   - **d.** Summarizing ideas.
   - **e.** Keeping discussions on the agenda.

People Knowledge and Skills

Systems analysts need to understand how people:

1. Think
2. Learn
3. React to change
4. Communicate

5. Work (in a variety of jobs and levels)

Interpersonal and communication skills are crucial to:

1. Obtaining information
2. Motivating people
3. Getting cooperation
4. Understanding the complexity and workings of an organization in order to provide necessary support

Integrity and Ethics:

Analyst has access to confidential information such as salary; an organization's planned projects, security systems, etc.

1) Must keep information private
2) Any impropriety can ruin an analyst's career
3) Analyst plans security in systems to protect confidential information

The Analyst's Role in Strategic Planning

1. Special projects affecting executives
    - Business process reengineering – radical improvements to existing processes
2. Strategic planning development process
3. Information systems strategic planning
    - Application architecture plan (business focus)
    - Technology architecture plan (infrastructure focus)

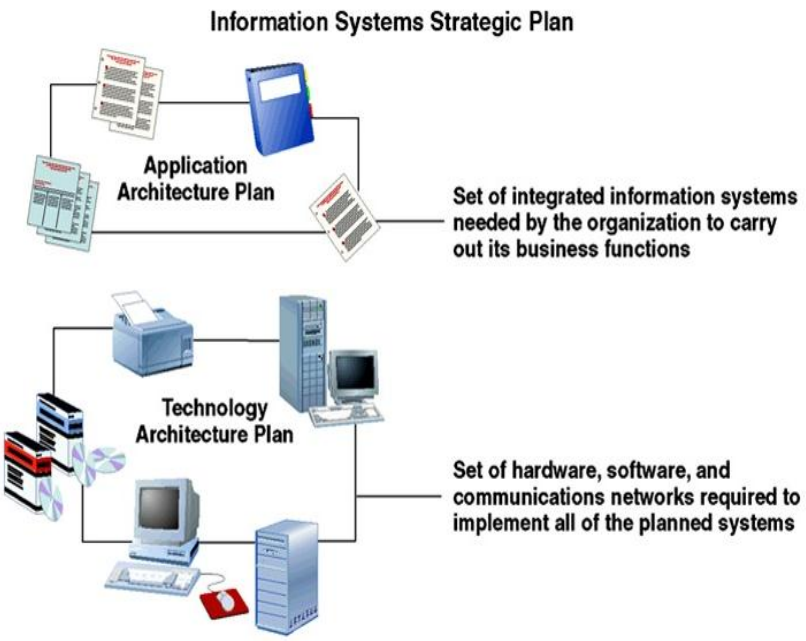

Figure (3.2): Components of an information systems strategic plan

Stakeholders: Are the people involved in or affected by project activities. A stakeholder is any person, group, or organization affected by the proposed system or system changes.

Stakeholders include:

1. Project manager
2. Sales manager
3. Accounting manager
4. Customers
5. Users
6. Suppliers

Characteristics of a high-performance system analysis and design team?

1. shared vision or goal
2. Sense of team identity
3. result-driven structure
4. Competent team members
5. Commitment to the team
6. Mutual trust
7. Interdependence among team members

8. Effective communication

9. Sense of autonomy

10. Small team size

11. High level of enjoyment