

Management Information System

Unit-1

Foundation of Information Systems

Information Systems is the study of the interaction between people, organizations and information technology. **Information system** is an integrated set of components for **collecting, storing, and processing data** for providing **information or knowledge**.

Information systems are extremely critical for the expansion and survival of business organizations in competitive world. All sectors of the industry are entirely dependent on these for the management of important information and data. Small organizations to large, powerful businesses such as high street banks and central and local government need assistance of information systems to control their data.

“An information system is a software system to capture, convey, store, retrieve, manipulate, or exhibit information, thus supporting people, organizations, or other software systems.”

Basically, Information systems capture data from the organization (internal data) and its environment (external data). They store the database items over an extensive period of time. When particular information is required, the suitable data items are manipulated as necessary, and the user receives the resulting information. Depending on the type of information system, the information output may take the form a query response, decision outcome, expert-system advice, transaction document, or a report. Prescribed information systems rely on procedures for collecting, storing, manipulating, and accessing data in order to obtain information.

Information System

Many organizations work with large amounts of data. Data are basic values or facts and are organized in a database. Many people think of data as synonymous with information; however, information actually consists of data that has been organized to help answers questions and to solve problems.

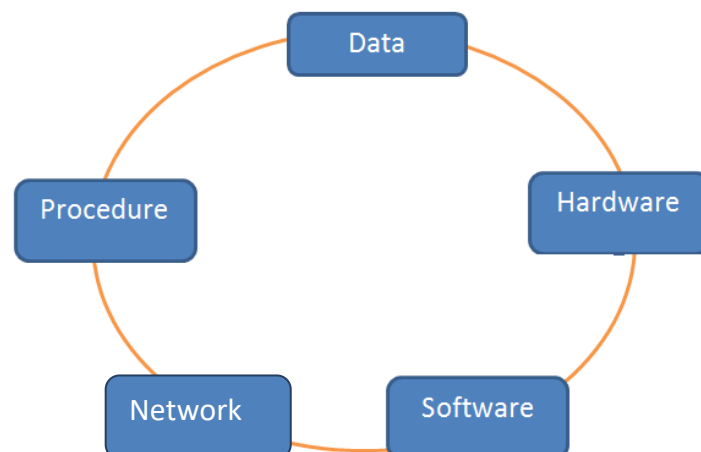
An **information system** is defined as the **software** that helps organize and analyze data. So, the purpose of an information system is to **turn raw data** into **useful information** that can be used for decision making in an organization.



Components of Information Systems

While information systems may differ in how they are used within an organization, they typically contain the following components:

- **Hardware:** This is the physical technology that works with information. Computer-based information systems use computer hardware, such as processors, monitors, keyboard and printers. Hardware can be as small as a smart-phone that fits in a pocket or as large as a supercomputer that fills a building. Hardware also includes the peripheral devices that work with computers, such as keyboards, external disk drives, and routers.
- **Software:** The hardware needs to know what to do, and that is the role of software. These are the programs used to organize process and analyze data. Software can be divided into two types: system software and application software. The primary piece of system software is the operating system, such as Windows or iOS, which manages the hardware's operation. Application software is designed for specific tasks, such as handling a spreadsheet, creating a document, or designing a Web page.
- **Databases:** This component is where the “material” that the other components work with resides. A database is a place where data is collected and from which it can be retrieved by querying it using one or more specific criteria. A data warehouse contains all of the data in whatever form that an organization needs. Information systems work with data, organized into tables and files.
- **Network/People:** This component connects the hardware together to form a network and also connects people of organization. Connections can be through wires, such as Ethernet cables or fiber optics, or wireless, such as through Wi-Fi. A network can be designed to tie together computers in a specific area, such as an office or a school, through a local area network (LAN). If computers are more dispersed, the network is called a wide area network (WAN). The Internet itself can be considered a network of networks. Different elements need to be connected to each other, especially if many different people in an organization use the same information system.
- **Procedures:** This is the final, and possibly most important, component of information systems. This describes how specific data are processed and analyzed in order to get the answers for which the information system is designed.



The first four components are part of the general information technology (IT) of an organization. Procedures, the fifth component, are very specific to the information needed to answer a specific question.

System Definition

A system is a group of interrelated components working together toward a common goal by accepting inputs and producing outputs in an organized transformation process. A system (sometimes called a dynamic system) has three basic interacting components or functions. These include:

- **Input** involves capturing and assembling elements that enter the system to be processed.
- **Processing** involves transformation processes that convert input into output.
- **Output** involves transferring elements that have been produced by a transformation process to their ultimate destination.

Feedback and Control:

Two additional components of the system concept include feedback and control. A system with feedback and control components is sometimes called a cybernetic system, that is, a self-monitoring, self-regulating system.

- **Feedback** is data about the performance of a system.
- **Control** involves monitoring and evaluating feedback to determine whether a system is moving towards the achievement of its goals. The control function then makes necessary adjustments to a system's input and processing components to ensure that it produces proper output.

Functional areas of Information systems in business:

- Accounting
- Finance
- Marketing
- Human Resources
- Manufacturing
- Retail
- Customer Services

Information system in business and its importance

The information in organization is very useful as it directly links to how it helps decision makers realize the organization's goals. Computers and information systems assist organizations to improve the business operations. If management has good knowledge of the potential impact of information systems and having the ability to put this knowledge to work, it can result in a successful personal career and in organizations that reach their goals.

Minimizing human error and maximizing work efficiency are **the essential goals** of any company owner. But they can't be achieved without an excellent information system which is capable of providing the data we need in a matter of seconds. Investing in business information systems is **crucial** for every professional organization and here is some reasons of importance of IS:

1) **Organized Data**

With a great information system, our company will be well organized, come up with quick solutions and make faster decisions under any circumstance. The employees will be able to manage all their information and improve the execution of their business processes.

2) **Information Storage**

Keeping a log of activities is important for all the organizations, to understand the reason for the problems and so to provide solution to the same. Information System makes it simple to **store operational data, revision histories, communication records and documents**. The storing of data manually involves a lot of time and money. A sophisticated Information system stores the information in the database which simplifies the process of finding the data easily.

3) **Better Decision Making**

Business Information System eases the process of decision making and simplifies the process of delivering the required information and hence assists in taking better decisions instantly.

4) **Efficient functioning**

Businesses can constantly improve their efficiency of their operations in order to achieve higher profitability. They can do this by constantly having the correct amount of stock in store so consumers can always get what they want.

5) **New product services and business models**

I.S systems play a major role for businesses in creating new products and services. New business models can be created and these can describe how a company produce, create and sell their products.

6) **Customer and Supplier intimacy**

The better services a company provides its consumers with more likely they are to come back to them and as a result the more they will buy off the supplier therefore creating a good relationship with both parties.

7) **Day to Day survival**

Business invests in these systems to make their jobs as easy as possible. An example is Citibank introduced the first ATM machine to make it easier for customers to access their money and to cut down queues in their banks.

8) **Data Control**

Having complete control over the company's information is essential when it comes to the safety and stability of the information system. Therefore, the IS has the ability to control our data and provide the information we need for various processes instantaneously.

9) **Avoiding Crisis**

Some time ago, companies weren't able to analyze the share market and their organization at the highest level, which resulted in a devastating business crisis. Using a high-quality information system, our company can

analyze stocks and see their past performance in order to predict a potential crisis. The IS keeps track of margins and profits to have every data necessary for analyzing and averting a crisis.

10) Competitive advantage

If companies achieve any of these reasons to use I.S they will generally create a competitive advantage over their rivals.

Although information systems can provide huge benefits, they have many drawbacks. Some drawbacks are minor, such as receiving unwanted e-mail (Staff, 2009). Barriers to Information systems:

- 1. Privacy of customers**
- 2. Privacy of employees**
- 3. Social imbalance**
- 4. Language challenge**
- 5. Time and distance challenges**

Other problems using information system can be severe, where people's personal data, including Social Security and credit card numbers, can be lost or stolen that results in credit card fraud and ruined credit. In the United States, reports of the Privacy Rights Clearinghouse estimates that since early 2015, about 150 million computer records have been stolen or exposed to fraud. This type of data loss can cost companies hundreds of dollars per lost record. Some companies have spent huge money to examine and counteract stolen computer records. Computer-related errors and waste are also a major issue in information system.

There are many global challenges in information systems. Changes in society due to increased international trade and cultural exchange, known as globalization, have a significant impact on organizations and their information system.

To summarize, Information systems is vital part of contemporary organizations and businesses and are designed to support management activities and making wise decision for the success and gaining competitive advantage. It is described by management theorists as an information system that can be any organized combination of people, hardware, software, communications network, and data resources that collects, transforms, and disseminates information in an organization. It can be established that the information system has imperative role in the organization by satisfying the various needs through a variety of systems such as **Query systems, Analysis systems, Modeling systems and Decision support systems.**

Solving business problems with Information Systems (IS)

A Systems Approach to Problem Solving describes and gives examples of the steps involved in using a systems approach to solve business problems.

A. The Scientific Method vs. The Systems Approach

The Scientific Method

The scientific method consists of five steps:

1. Recognize phenomena in the real world.

2. Formulate a hypothesis about the causes or effects of the phenomena.
3. Test the hypothesis through experimentation.
4. Evaluate the results of the experiments.
5. Draw conclusions about the hypothesis.

The Systems Approach

The systems approach is a modification of the scientific method. It stresses a systematic process of problem solving. Problems and opportunities are viewed in a systems context. Studying a problem and formulating a solution becomes an organized system of interrelated activities.

1. Define a problem or opportunity in a systems context.
2. Gather data describing the problem or opportunity
3. Identify alternative solutions.
4. Evaluate each alternative solution.
5. Select the best solution.
6. Implement the selected solution.
7. Evaluate the success of the implemented solution.

It is important to realize that the steps of the systems approach may overlap each other. Some activities can be used in more than one step of the process. The completion of activities in one step may extend into the performance of another. Sometimes it may be necessary to cycle back to a previously completed step for another try.

The activities and steps of the systems approach are typically grouped into a smaller number of stages of problem solving:

- a. Understanding a problem or opportunity (steps 1 and 2).
- b. Developing a solution (steps 3 through 5).
- c. Implementing a solution (steps 6 and 7).

B. Understanding a Problem or Opportunity

To solve a problem or pursue an opportunity requires a thorough understanding of the situation at hand. This implies viewing the problem/opportunity in a systematic fashion within a systems context.

1. **Defining Problems and Opportunities.** Problems and opportunities must be identified when using the systems approach. Symptoms must be separated from problems. Symptoms are merely signals of underlying problems.

- a. A problem is a basic condition that causes undesirable results.
- b. An opportunity is a condition that presents the potential for desirable results.

2. **Gathering Data and Information.** Data and information need to be captured to gain sufficient background into the problem or opportunity situation. In the context of a business systems problem, information gathering may encompass the following:

- a. Interviews with employees, customers, and managers.

- b. Questionnaires to appropriate end users in the organization.
- c. Personal observation or involvement in business operations.
- d. Examination of documents, reports, procedures manuals, and other documentation.
- e. Inspecting accounting and management reports to collect operating statistics, cost, data, and performance results.
- f. Development, manipulation, and observation of a model of the business operations or systems affected by the problem or opportunity.

Identifying Organizational Systems. In the systems approach, a problem or opportunity must be viewed in a systems context. To understand a problem or opportunity, you must understand both the organizational systems and environmental systems in which a problem or opportunity arises. You must have a systemic view of the situation.

a. **A Business as a System.** A business faced with a problem or opportunity needs to be viewed as an organizational system operating within a business environment (Figure 2). This concept helps us isolate and better understand how a problem or opportunity may be related to the basic system components of a business.

b. **Environmental Systems.** A business is a subsystem of society and is surrounded by other systems in the business environment. Proper interrelationships with the economic, political, and social stakeholders within the environment should be maintained. These stakeholders that interact with a business need to be identified, to determine their effect on a problem or solution.

c. **Organizational Subsystems.** Typically a business is subdivided into subdivisions that compose the organizational subsystem.

i. These typically represent functional areas such as marketing, manufacturing, and finance, but can also represent geographic areas, product lines, distribution facilities, work groups, etc.

ii. Decomposition is the process of identifying the boundaries of subsystems within a business and determining the relationships between the subsystems. Those subsystems most affected by the problem or opportunity under consideration need to be identified.

(1). Boundaries - for responsibility.

(2). Relationships - between subsystems.

d. **Relationships Between Systems.** A black box approach aids systems professionals in analyzing the relationships and interconnections between subsystems within the firm. In other words, the processing component remains a black box while inputs and outputs of subsystems are studied.

i. **Coupling** - the process of determining how tight the function of subsystems is connected. e.g., JIT - requires a close association between inventory control and manufacturing.

ii. **Decoupling** - the process of loosening the connections between systems. e.g., E-Mail may loosen communications connections within the organization. People can be more efficient by having differing avenues of communication available to them.

- e. **Evaluating Selected Systems.** To understand a problem and solve it, you should try to determine if basic system functions are being properly performed. This should be done within a systems context by looking at inputs, processing, outputs, feedback, and control structures.
 - i. Inputs.
 - ii. Processing capabilities.
 - iii. Outputs.
 - iv. Feedback.
 - v. Control structures.
- f. **Determining Objectives, Standards, and Constraints** - a systems approach must determine firm objectives, identify standards, and recognize constraints. Figure 4 demonstrates the general systems model of the firm with its interrelated components.
 - i. **Objectives** - are accomplishments a system is supposed to achieve. These need to be stated in clear unambiguous (general) terms. e.g., a good performance for this season.
 - ii. **Standards** - are specific and quantitative measures with which the objectives achievements can be compared. Standards are used to measure the progress a firm makes as it tries to achieve objectives of the system. Standards are needed for systems control.
 - iii. **Constraints** - are restrictions on the form and content of a solution
 - (1). External - constraints required by law or industry conventions.
 - (2). Internal - constraints that arise due to the scarcity and allocation of organizational resources or contention among departments.

C. **Developing a Solution**

Once you understand a problem or opportunity, you can develop an appropriate solution.

- 3. **Designing Alternative Solutions.** Jumping immediately from problem definition to a single solution limits your options and robs you of the chance to consider the advantages and disadvantages of several alternatives. Of course, having too many alternatives can obscure the best solution. Alternative solutions may come from past experience, advice of others, simulation of business operations models, and your own intuition and ingenuity. The "doing nothing" option is also a valid alternative.
- 4. **Evaluating Alternative Solutions.** To identify the best solution, the proposed alternatives need to be evaluated. The goal of evaluation is to determine how well each alternative solution helps the firm and its selected subsystems meet their objectives.
 - a. **Evaluation criteria** - should reflect the firm's objectives and constraints. Figure 5 illustrates a simple example of the evaluation of two alternative solutions using several criteria.
 - i. Each alternative needs to be evaluated upon how well it meets the evaluation criteria.
 - ii. Criteria may be weighted on their relative importance in achieving firm goals and objectives.

b. **Cost Benefit Analysis** - Every legitimate solution will have some advantages or benefits, and some disadvantages or costs. This process identifies the benefits and costs associated with each alternative solution.

i. **Tangible costs** - quantified costs.

(1). Hardware.

(2). Software.

(3). Salaries.

ii. **Intangible Costs** - difficult to quantify.

(1). Customer goodwill.

(2). Employee morale caused by system errors.

(3). Installation/conversion problems.

iii. **Tangible Benefits** - favorable results that the firm has attained.

(1). Decrease in payroll.

(2). Decrease in inventory carry.

iv. **Intangible Benefits** - hard to estimate.

(1). Customer service.

(2). Better delivery of customer request(s).

5. **Selecting the Best Solution.** Once all alternative solutions have been evaluated, they can be compared to each other, and the "best" (most desirable) solution can be selected. Since the solutions are compared based on multiple criteria (some of which may be intangible), this selection is not always a simple process.

D. Implementing a Solution

6. Implement the selected solution. Once a solution has been selected, it must be implemented. An implementation plan may have to be developed. A project management effort may be required to supervise the implementation of large projects. Typically, an implementation plan specifies the activities, resources, and timing needed for proper implementation. This may include:

a. Types and sources of hardware and software.

b. Construction of physical facilities.

c. Hiring and training of personnel.

d. Start-up and operating procedures.

e. Conversion procedures and timetables.

7. Post implementation Review (Evaluate the success of the implemented solution). The focus of the post implementation review is to determine if the implemented solution has indeed helped the firm and selected subsystems meet their system objectives. If not, the systems approach assumes you will cycle back to a previous step and make another attempt to find a workable solution.

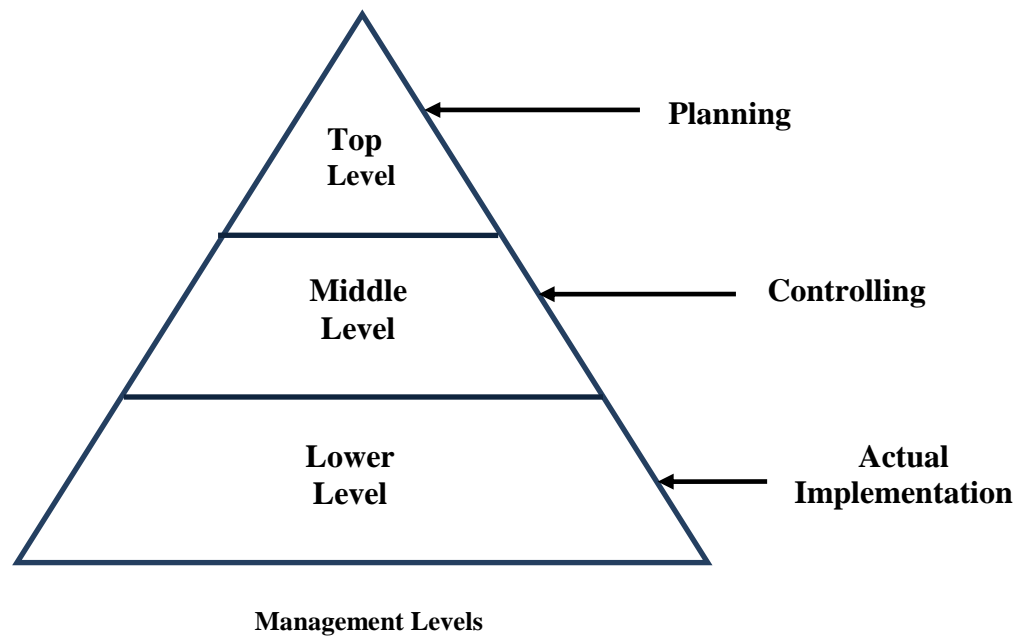
E. Applying the Systems Approach to Information Systems.

A variety of information systems development methodologies tailor the systems approach to the process of developing information systems solutions to business problems. A firm may experience difficulties in applying the systems process to IS due to:

1. Departmental/unit and/or emotional conflicts.
2. Rapidly changing environmental conditions.

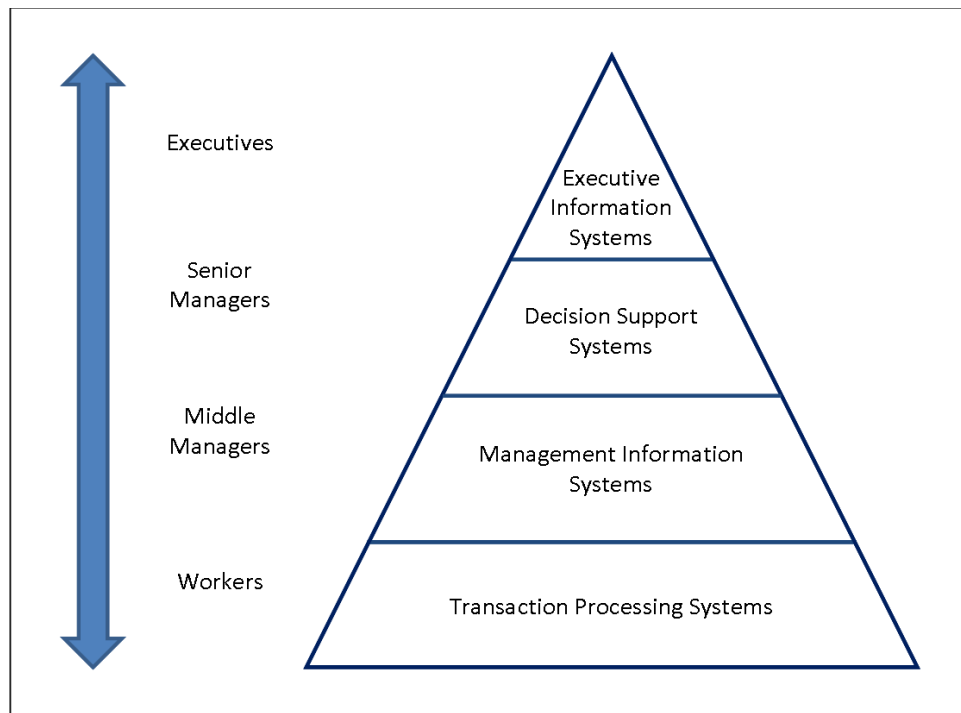
Types of information Systems

In the business environment there is a range of requirements for information. Senior managers need information to help with their corporate planning. Middle management needs more detailed information to help monitor and control business actions. Teams with operational roles need information to help carry out their duties. Thus, companies tend to have several IS operating at the same time.



The most common types of IS includes the following:

- Executive Information Systems (EIS)
- Decision Support Systems (DSS)
- Management Information Systems (MIS)
- Transaction Processing Systems (TPS)
- Office Automation Systems (OAS)



- **Transaction Processing Systems (TPS)**

Transaction Processing System is operational-level systems at the bottom of the pyramid. TPS are designed to process repetitive transactions efficiently and accurately. A business will have many (sometimes several) TPS; e.g.: **billing systems to send invoices and statements to clients**; systems which calculate weekly or **monthly payroll** and **tax payments**; **stock control systems** to route all transactions into, within and out of the business; production and purchasing systems to analyze and calculate all raw material requirements.

- **Management Information Systems (MIS)**

MIS is mostly concerned with internal sources of information. Management Information Systems are management-level systems that are used by middle managers to help ensure the smooth running of the organization in the short to medium term.

MIS is an information system that generates exact, timely and structured information so managers and other users can make decisions, resolve problems, supervise activities, and track progress. For example, compiled data of call volume in a call centre with abandon % and call service levels for every hour, every day and monthly summary.

- **Decision Support Systems (DSS)**

Decision support systems are used by senior management to make non-routine decisions. It is an information system intended to help users to reach a decision when a decision-making situation arises. These systems are often used to analyze existing structured information and allow managers to project the potential effects of their decisions into the future. DSS usually involves use of complex spreadsheet and databases to create models which will help determine difficult situations and its possible outcomes.

- **Executive Support Systems (ESS)**

Executive Support Systems (ESS) or Executive Information Systems (EIS) are strategic-level information systems that are found at the top of the Pyramid. They help executives and senior managers analyze the environment in which the organization operates, to identify long-term trends, and to plan appropriate courses of action.

For example, a CEO may require overall sales for the company, along with sales for every department separately, and general economic data for the year.

Besides all above types of IS there is one more important IS i.e. OAS which may works for all three levels.

- **Office Automation Systems (OAS)**

Office automation refers to the **application of computes and communication technology to office functions**. Office automation systems are meant to improve the productivity of managers at various levels of management of providing secretarial assistance and better communication facilities.

Office activities may be grouped under two classes, namely

- i) **Activities performed by clerical personnel (clerks, secretaries, typist, etc.,) and**
- ii) **Activities performed by the executives (managers, engineers or other professionals like economist, researches etc.)**

In the first category, the following is a list of activities.

- a) Typing
- b) Mailing
- c) Scheduling of meetings and conferences,
- d) Calendar keeping, and
- e) Retrieving documents

The following is a list of activities in the second category (managerial category)

- a) Conferencing.
- b) Production of information (messages, memos, reports, etc.) and controlling performance.