आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

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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

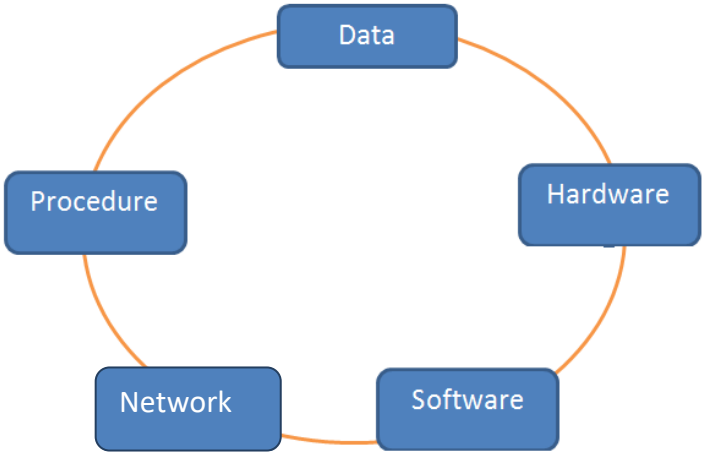
Many organizations work with large amounts of data. Data are basic values or facts and are organized in a database. Many people think of data as synonymous with information; however, information actually consists of data that has been organized to help answers questions and to solve problems.

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 want 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 too come back to them and as 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.

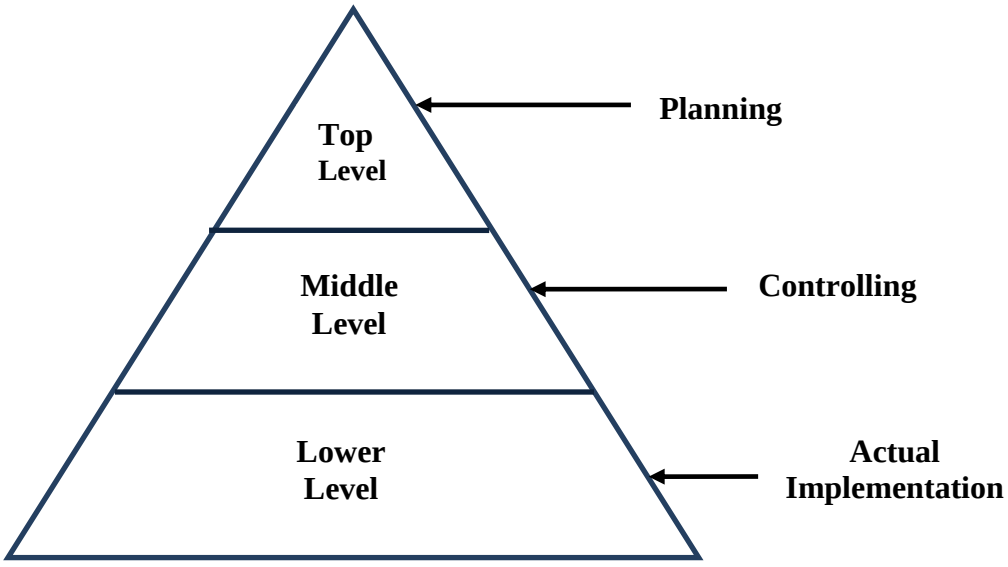
E. Applying the Systems Approach to Information Systems.

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

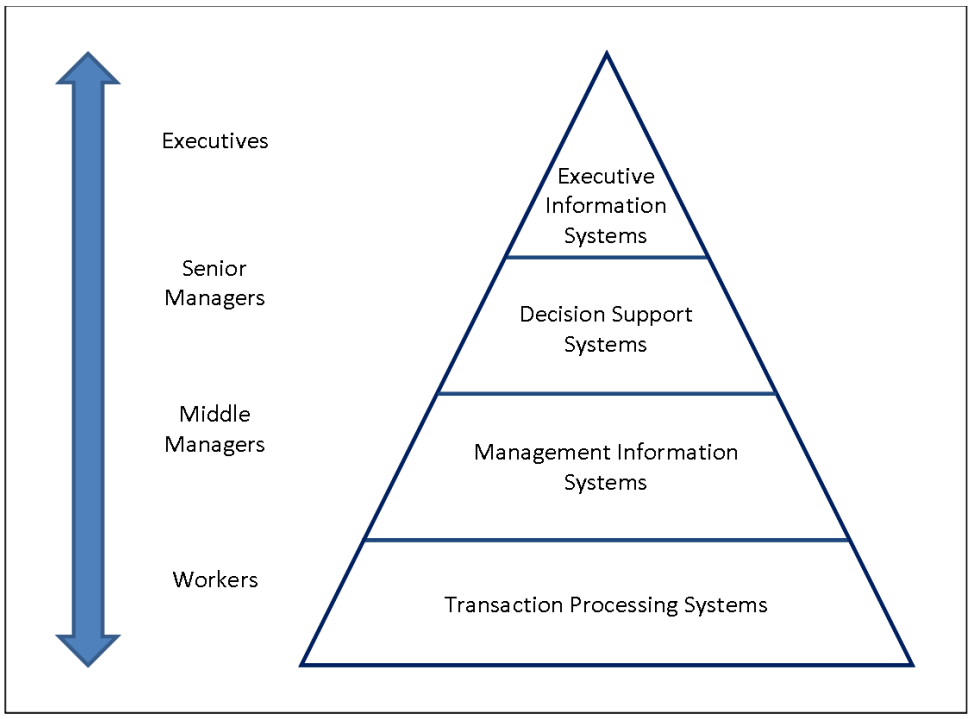
In the business environment there is a range of requirements for information. Senior managers need information to help with their corporate planning. Middle management needs more detailed information to help monitor and control business actions. Teams with operational roles need information to help carry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



Management Levels

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, complied 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.

Management Information System
Unit-2

An Overview of Management Information System

A management information system (MIS) is a computer system consisting of hardware and software that serves as the backbone of an organization's operations. An MIS gathers data from multiple online systems, analyzes the information, and reports data to aid in management decision-making. It provides information for the personnel at various levels of management for performing their respective jobs. The management information system can be compared with information technology (IT). IT can be considered as a sub-system of MIS.

"'MIS' is a planned system of collecting, storing and disseminating data in the form of information needed to carry out the functions of management."

The purpose of an MIS is improved decision-making, by providing up-to-date, accurate data on a variety of organizational assets, including:

- Financials
- Inventory
- Human Resources
- Project timelines
- Manufacturing
- Real estate
- Marketing
- Raw materials
- R&D

The MIS collects the data, stores it, and makes it accessible to managers who want to analyze the data by running reports.

A Management Information System is

- An integrated user-machine system
- For providing information
- To support the operations, management, analysis, and decision-making functions
- In an organization.

In a summarized way we can say that-

"MIS is an organized integration of hardware and software technologies, data, processes and human elements. It is a software system that focuses on the management of information technology to provide efficient and effective strategic decision making".

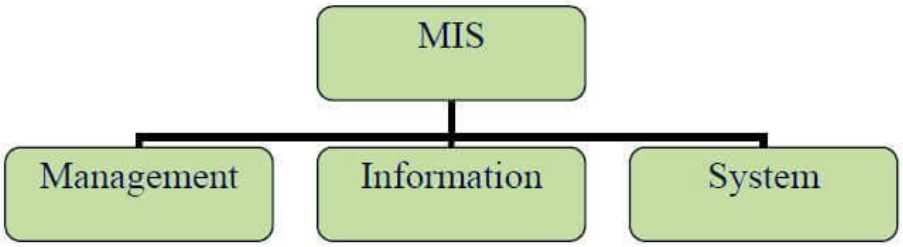
The system utilizes

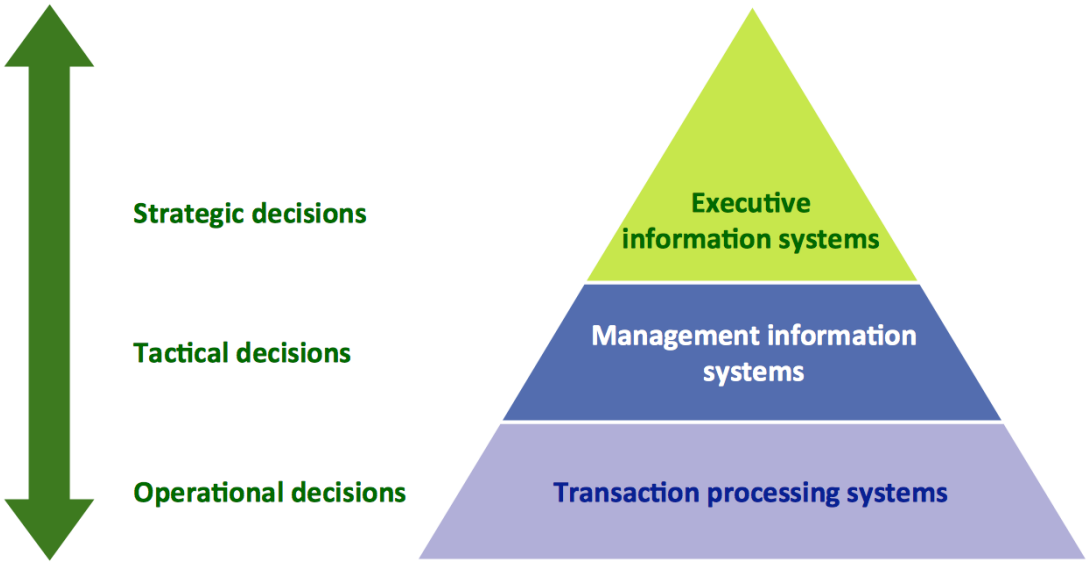
- Computer hardware & software
- Manual procedures

- Models for analysis, planning, control, and decision making, and
- A database

MIS Meaning

MIS Meaning: A management information system is an short form of three words, viz., Management, information, system. In order to fully understand the term MIS, let us try to understand these three words.





1. **Management**: Management is the art of getting things done through and with the people in formally organized groups.
2. **Information**: Information is data that is processed and is presented in a form which assists decision-making. It may contain an element of surprise, reduce uncertainty or provoke a manager to initiate an action.
3. **System**: A system is an orderly grouping of interdependent components linked together according to a plan to achieve a specific goal. The term system is the most loosely held term in management literature because of its use in different contexts.

Definition of MIS

The Management Information System (MIS) is a concept of the last decade or two. It has been understood and described in a number ways. It is also known as the Information System, the

Information and Decision System, the Computer- based information System. The MIS has more than one definition, some of which are give below.

1. The MIS is defined as a system which provides information support for decision making in the organization.
2. The MIS is defined as an integrated system of man and machine for providing the information to support the operations, the management and the decision making function in the organization.
3. The MIS is defined as a system based on the database of the organization evolved for the purpose of providing information to the people in the organization.
4. The MIS is defined as a Computer based Information System.

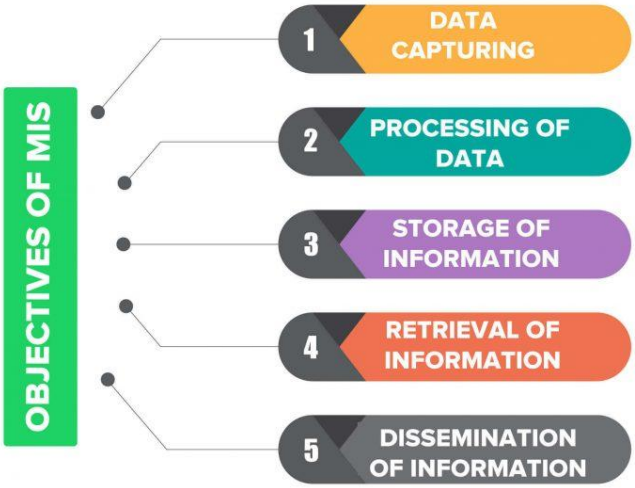
Thought there are a number of definitions, all of them converge on one single point, i.e., the MIS is a system to support the decision making function in the organization. The difference lies in defining the elements of the MIS. However, in today's world MIS a computerized .business processing system generating information for the people in the organization to meet the information needs decision making to achieve the corporate objective of the organization. In any organization, small or big, a major portion of the time goes in data collection, processing, documenting it to the people.

Hence, a major portion of the overheads goes into this kind of unproductive work in the organization. Every individual in an organization is continuously looking for some information which is needed to perform his/her task. Hence, the information is people-oriented and it varies with the nature of the people in the organization. The difficulty in handling this multiple requirement of the people is due to a couple of reasons. The information is a processed product to fulfill an imprecise need of the people. It takes time to search the data and may require a difficult processing path. It has a time value and unless processed on time and communicated, it has no value. The scope and the quantum of information is individual dependent and it is difficult to conceive the information as a well-defined product for the entire organization. Since the people are instrumental in any business transaction, a human error is possible in conducting the same. Since a human error is difficult to control, the difficulty arises in ensuring a hundred per cent quality assurance of information in terms of completeness, accuracy, validity, timeliness and meeting the decision making needs.

Objectives of MIS

MIS has five major objectives which include:

1. **Data Capturing**
2. **Processing of Data**
3. **Storage of Information**
4. **Retrieval of Information**
5. **Dissemination of Information**



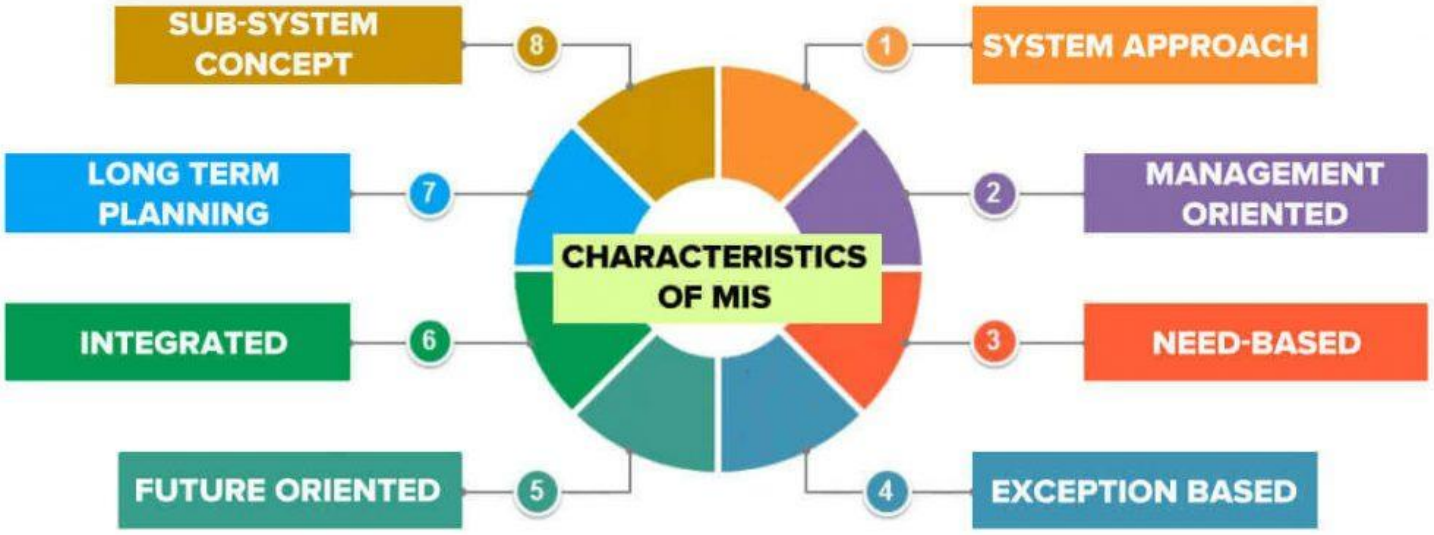
1. **Data Capturing:** MIS capture data from various internal and external sources of organization. Data capturing may be manual or through computer terminals.
2. **Processing of Data:** The captured data is processed to convert into required information. Processing of data is done by such activities as calculating, sorting, classifying, and Summarizing.
3. **Storage of Information**: MIS stores the processed or unprocessed data for future use. If any information is not immediately required, it is saved as an organization record, for later use.
4. **Retrieval of Information:** MIS retrieves information from its stores as and when required by various users.
5. **Dissemination of Information:** Information, which is a finished product of MIS, is disseminated to the users in the organization. It is periodic or online through computer terminal.

Characteristics of MIS:

1. Systems Approach: MIS follows the system approach, which implies a step by step approach to the study of system and its performance in the light of the objective for which it has been constituted. It means taking an inclusive view at sub-systems to operate within an organization.

2. Management Oriented: The management-oriented characteristic of MIS implies that top-down approach needs to be followed for designing MIS. A top-down method says the initiation of system development determines management requirements as well as business goals. MIS implies the management dynamically to the system development towards the completion of management decision.

3. Need Based: The design and development of MIS should be as per the information required by the managers. The required design and development information is at different levels, viz., strategic planning, management control and operational control. It means MIS should cater to the specific needs of managers in the hierarchy of an organization.



4. Exception Based: MIS should be developed on the exception based also, which means that in an abnormal situation, there should be immediate reporting about the exceptional situation to the decision –makers at the required level.

5. Future Oriented: The design and development of MIS should also be future purpose so that the system is not restricted to provide only the past information.

6. Integrated: A complete MIS is a combination of its multiple sub-components to provide the relevant information to take out a useful decision. An integrated system, which blends information from several operational areas, is a necessary characteristic of MIS.

7. Long Term Planning: MIS should always develop as a long term planning because it involves logical planning to get success of an organization. While developing MIS, the analyst should keep future oriented analysis and needs of the company in mind.

8. **Sub System Concept:** The MIS should be viewed as a single entity, but it must be broken down into digestible sub-systems which are more meaningful.

Besides all these characteristics of MIS, one more important characteristic that should be in every MIS is Central Database:

9. Central database: In the MIS there should be common data base for whole system. It contains data in tabular form. The data base is responsible to operations like insertion, deletion, and updation of records. This database covers information related to inventory, human resources, vendors, customers, etc. the data stored in the database.

Advantages of Management Information System:

- **Helps to achieve a higher level of efficiency:**

The managers who manage their team or the whole organization they usually have to identify organizations' strengths and weaknesses.

- **Improves the quality of decisions:**

Managers could make more rational decisions based on raw and reliable information based on the data they have.

- **Promotes better communications between departments in an organization:**

When everyone in the company shares the same information, then the scope is they have better communication between them due to which they can identify problem areas and they can sort it out.

- **Improves employee productivity:**

Employees save their productivity time as they don't have to gather the data asked by management

- **Strengthens a company's competitive advantage:**

By removing all weaknesses and non-performing areas boosts the company's competitiveness over its rivals.

- **Reveals more data about customers:**

The more the data about the requirements about the customers, management is better able to improve customer service and can think more effective marketing and promotional campaigns.

Disadvantages of Management Information System:

- Highly sensitive data or information requires constant monitoring.
- Budgeting of MIS extremely difficult.
- Quality of outputs governed by the quality of inputs.
- Lack of flexibility to update it.
- Effectiveness decreases if there are any frequent changes in top management.
- On account only qualitative factors and ignores non-qualitative factors like morale of the employee, the attitude of the employee, etc.
- Unemployment and lack of job security.

Challenges of MIS

There are three major challenges of MIS:

High Cost

Development of new computerized based information system is a problem for the organization due to the cost factor and it creates problems because with the change of time there is need of up-to-date of the information system.

Training of Employee

Employees should have the capacity of learning of the information system with the changing competitive and business environment; otherwise it will be difficult for the organization to stay in the market.

Maintenance Cost

Sometimes a problem arises due to server crash and website crash. Sometimes it leads to the loss of information. So, maintenance cost is needed to tackle the above problem.

MIS versus Data Processing

Management Information System (MIS):

MIS is an application of **computer related technology to programs**. It provides managers with information and support for effective decision-making and provides the feedback on daily operations. The outputs or reports are usually generated through accumulation of transaction processing data.

It ensures that appropriate data is collected from the valid sources, processed and passed to needy destinations. It satisfies the needs through **query systems, analysis systems**, **modeling systems.**

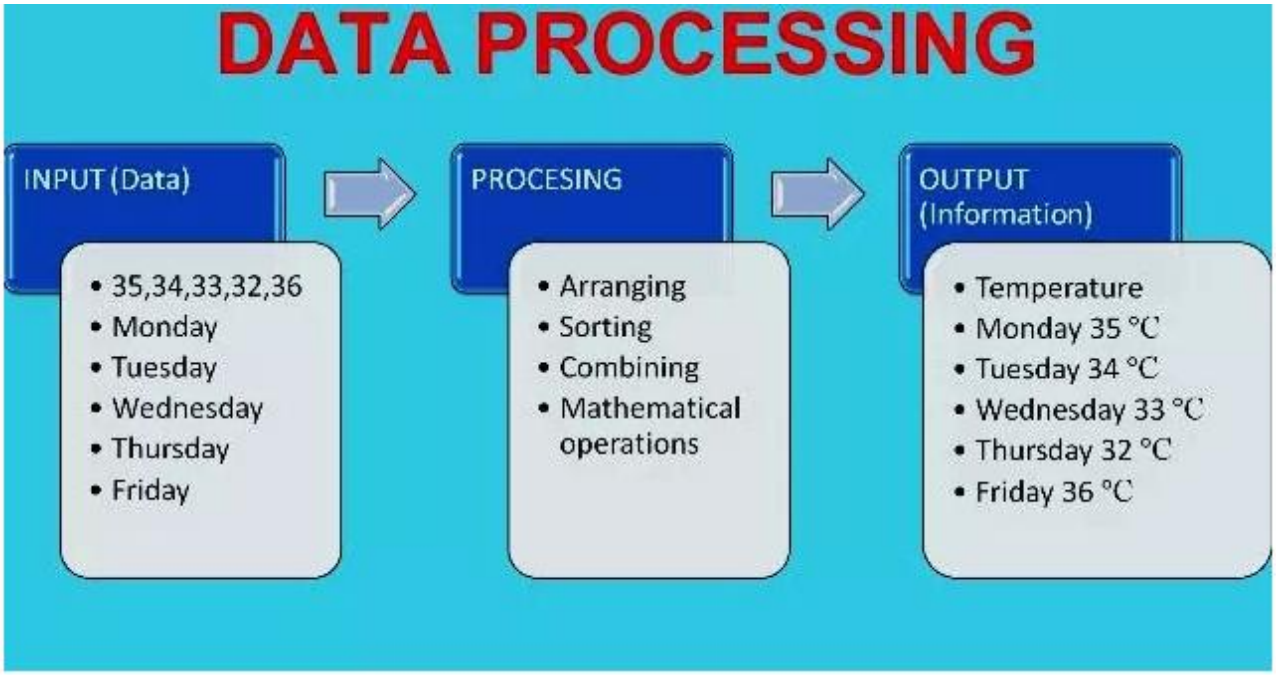
The main functioning of MIS are as:

- It supports **data processing** functions.
- It uses an **integrated database** and **supports a variety of functional areas.**
- It provides **operational** and **strategic** levels of organization.
- It is **flexible**.
- It can **adapt to the changing needs of the organization** which is a big advantage of MIS.

Data Processing System (DPS):

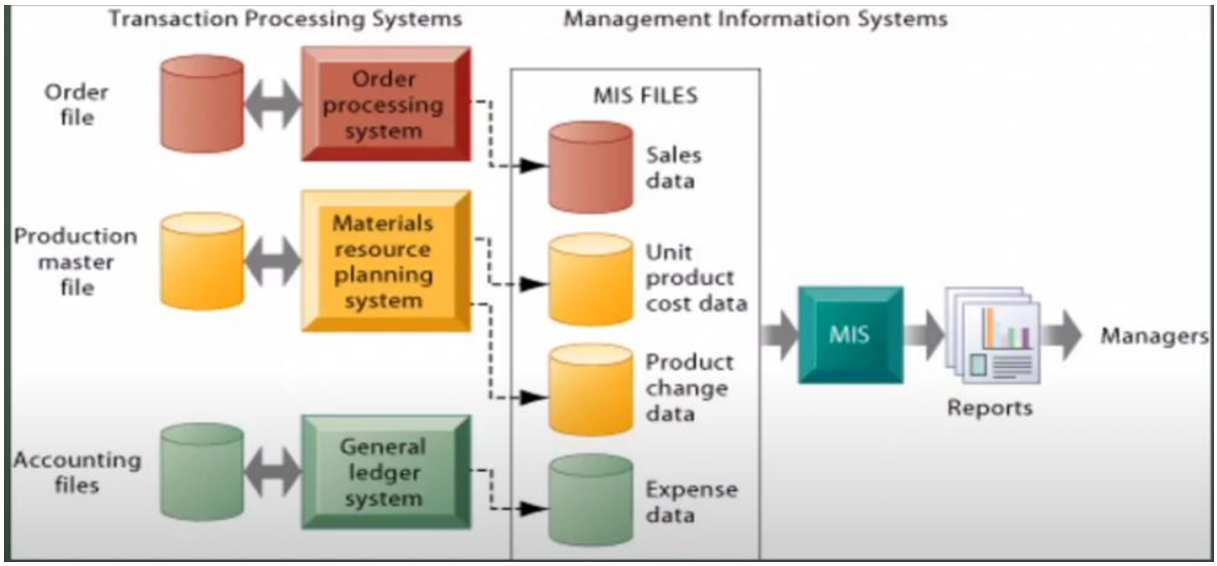
The **execution of a systematic sequence of operations performed upon data to transform it into information is known as data processing.** DPS is the **manipulation of data by computers**. It represents the automation of routines processing to support operations. Basically, it converts raw data into readable format which can be easily utilized by the people in the organization.

The data processing functions are data collection, manipulation, and storage as used to report and analyze business activities. It is oriented primarily to **processing transaction data for day-to-day transactions**.



There are six stages of data processing:

- Data Collection
- Data Preparation
- Data Input
- Processing
- Data Output
- Data Storage



Difference between MIS and DPS:

MIS	DPS
It uses an integrated database.	It does not use integrated databases.
It provides greater flexibility to the management.	It provides no such flexibility.
It integrates the information flow between functional areas.	It tends to support a single functional area.
It focuses on information needs of all level of management.	It focuses on departmental level support.
Output is in the form of graph or chart.	Output is in the form of the table.
The model is simple.	Sometimes, the model becomes complex.
Focuses on operational functionality.	It focuses on converting data to another form (readable) or language.

An example of (Format) Data Processing System Output

SALES			
purchase_number	date_of_purchase	customer_id	item_code
1	03/09/2016	1	A_1
2	02/12/2016	2	C_1
3	15/04/2017	3	D_1
4	24/05/2017	1	B_2
5	25/05/2017	4	B_2
6	06/06/2017	2	B_1
7	10/06/2017	4	A_2
8	13/06/2017	3	C_1
9	20/07/2017	1	A_1
10	11/08/2017	2	B_1

An example of (Format) MIS System Output

MIS & Decision Support Systems

MIS

MIS, Management Information System, is a computer based program to assist users to make decisions based on information present in the system. Managers at all levels require information to be provided to them to enable to carry out their functions effectively. This need is satisfied by means of a management information system.

A Management Information System (MIS) is a system that gathers comprehensive data, organizes and summarizes it in a form that is of value to functional managers, and provides them with information they need to carry out their work.

MIS is used to transform data into useful information in order to support managerial decision-making with structured decisions or programmed decisions. In simple words, a MIS is a computer-based information system which assists managers in decision-making and control and in planning more effectively.

DSS

DSS, Decision Support System, is also to help making decisions. It uses communication technologies, data, and documents to identify problems and to finalize decisions.

A decision support system (DSS) is an interactive computer system that can be easily accessed and operated by people who **are not computer specialists**. It helps them to plan and **make decisions**. In other words, DSS is a computer-based information system that supports the process of managerial decision-making in situations that are not well structured.

Such systems do not actually provide "answers" or point to optimal decisions for managers. Rather, they attempt to improve the decision--making process by providing tools that help managers analyze the situations more clearly.

Thus DSS does not replace managerial decision-making but supports it and makes the process more effective. DSS has become increasingly popular because of **advances in computer software and hardware**.

A typical DSS consists of the following elements:

i. An **MIS** that supports several methodologies for accessing and summarizing data.

ii. A **special database** that allows information to be accessed in various ways.

iii. A **user-friendly interface** that allows the user to use simple commands rather than technical computer terms when communicating with the DSS.

A DSS must provide information to managers whenever it is needed in a form they can easily understand. A typical DSS places the information under the manager's direct control.

Following are the important differences between MIS and DSS.

Sr. No.	Key	MIS	DSS
1	**Primary Task**	MIS identifies the information required.	DSS identifies the tools to be used in decision process.
2	**Focus**	Focus is on efficiency.	Focus is on effectiveness.
3	**Database**	Corporate Databases are used.	Special Database needed.
4	**Data**	Focus is on data storage.	Focus is on data manipulation.
5	**Dependency**	Dependent on computer.	Dependent on management authority.
6	**Usage**	MIS is used to in **control process**.	DSS is used in **planning, staffing and decision making**.
7	**Users**	MIS is used by middle level, low level users and senior executives in some cases.	DSS is used by **analysts**, **professionals** and **managers** so that they can take decisions.
8	**Focus**	Focus is on information processing.	Focus is on decision making, support and analysis.

MIS & Information Resources Management

Information Resources Management (IRM) is the process of **managing information resources** to **accomplish organization missions and to improve organization performance**, including the reduction of information collection burdens on the public. When standardized and controlled, these resources can be shared and re-used throughout an organization, not just by a single user or application.

There are three (3) classes of information resources:

- **Business Resources**: Enterprises, Business Functions, Positions (Jobs), Human/Machine Resources, Skills, Business Objectives, Projects, and Information Requirements.
- **System Resources:** Systems, Sub-Systems (business processes), Administrative Procedures (manual procedures and office automation related), Computer Procedures, Programs, Operational Steps, Modules, and Subroutines.
- **Data Resources:** Data Elements, Storage Records, Files (computer and manual), Views, Objects, Inputs, Outputs, Panels, Maps, Call Parameters, and Data Bases.

The concept of IRM is actually no different in intent than Materials Resource Planning (MRP) as used in manufacturing. Both are concerned with the **efficient and cost effective use of resources**. The classification and control of resources are the main objectives. Resources are classified to prove their uniqueness so that redundancy is not introduced and to promote sharing. Control is required to collect, inventory and retrieve resources as required by the business.

Whereas MRP is concerned with managing products and the parts required producing them, IRM is concerned with managing information and the resources required to produce it.

One of the important by-products of cataloging and cross-referencing information resources is a model of the enterprise, including how it is organized and how it operates. Other benefits include:

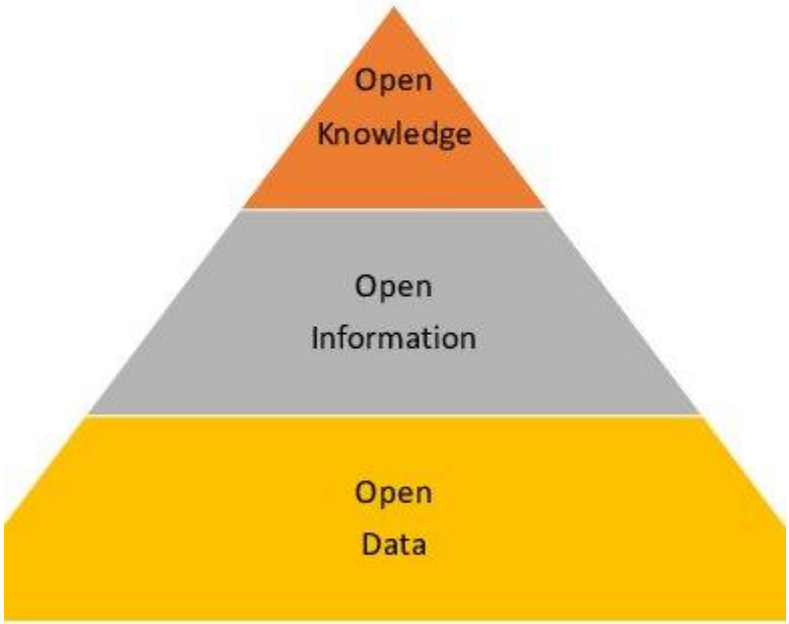
- All information resources are controllable, permitting the ability to design integrated systems and perform an “impact analysis” of a proposed resource change.
- Simplified search of information resources for reuse. Redundancy of resource definition is eliminated.
- Complete and current documentation of all information resources, in an organized and meaningful way.
- Communications within the organization is improved since developers and users would use standard and common definitions for information resources, all of which would be in standard business terminology.

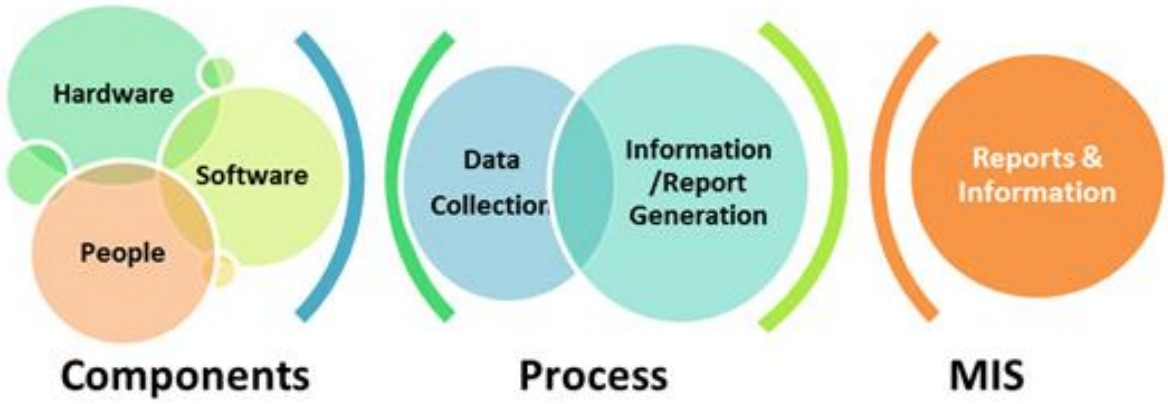
Concept of MIS

The MIS is an idea which is associated with man, machine, marketing and methods for collecting information's from the internal and external source and processing this information for the purpose of facilitating the process of decision-making of the business.

MIS is not new, only the computerization is new , before computers MIS techniques existed to supply managers with the information that would permit them to plan and control business operations. The computer has added on more dimensions such as speed, accuracy and increased volume of data that permit the consideration of more alternatives in decision-making process.

Management information system is an integrated set of component or entities that interact to achieve a particular function, objective or goal. Therefore it is a computer based system that provides information for decisions making on planning, organizing and controlling the operation of the sub-system of the firm and provides a synergistic organization in the process.





The component of an information system includes: a hardware which is used for input/output process and storage of data, software used to process data and also to instruct the hand-ware component, data bases which is the location in the system where all the organization data will be automated and procedures which is a set of documents that explain the structure of that management information system.

There are various driving factors of management information system for example:-

Technological revolutions in all sectors make modern managers to need to have access to large amount of selective information for the complex tasks and decisions.

The lifespan of most product has continued getting shorter and shorter and therefore the challenge to the manager is to design product that will take a longer shelf life and in order to do this, the manager must be able to keep abreast of the factors that influences the organization product and services thus, management information system come in handy in supporting the process.

There are huge amount of information available to today's manager and this had therefore meant that managers are increasingly relying on management information system to access the exploding information. Management information services helps manager to access relevant, accurate, up-to-date information which is the more sure way of making accurate decisions. It also helps in automation and incorporation of research and management science techniques into the overall management information system for example probability theory.

The management information services are capable of taking advantage of the computational ability of the company like processing, storage capacity among others.

Based on this relevancy, management information system should be installed and upgraded in various organizations since today's managers need them to access information for managerial decision making and also management functions.

Structure of Management information system

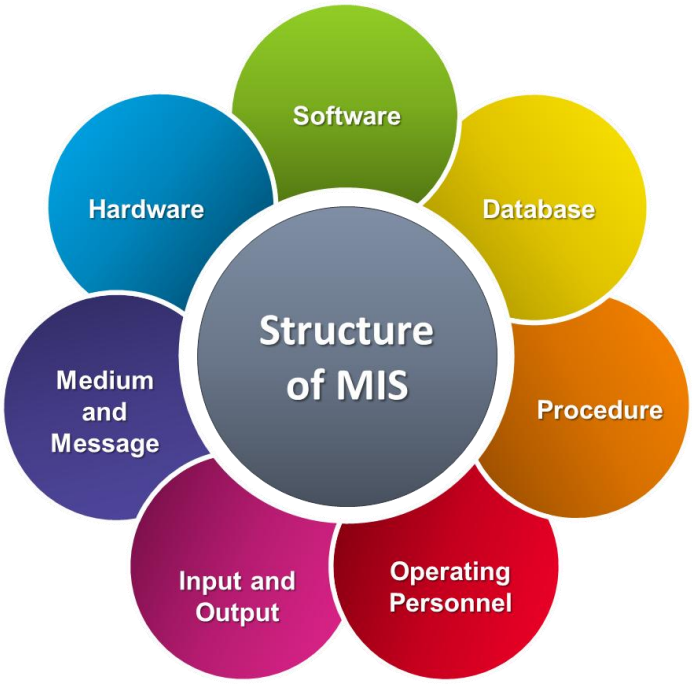
A management information system (MIS) is an organized combination of people, hardware, communication networks and data sources that collects, transforms and distributes information in an organization. An MIS helps decision making by providing timely, relevant and accurate information to managers. The physical components of an MIS include hardware, software, database, personnel and procedures.

Hardware

All physical components of a computer system compose the computer hardware. Important components include the central processing unit, input/output devices, storage units and communication devices. Communication can be over fiber-optic cables or wireless networks.

Software

Software provides the interface between users and the information system. Software can be divided into two generic types: system software and applications. The system software comprises of the operating system, utility programs and special purpose programs. Applications are developed to accomplish a specific task. For users of MIS it is much more important to understand the software than the hardware. Software maintenance can take 50 to 70 percent of all personnel activity in the MIS function. When the organization moves to implement an advanced information system the hardware and software environment becomes more complex.



Database

A database is a centrally controlled collection of organized data. Central control reduces redundancy and duplication of data. Data is stored in an organized and structured way to facilitate sharing and improve availability to those who need it. The database improves efficiency of storage by elimination of redundant files and improves efficiency of processing by providing all required data in a single file rather than separate files. This also improves efficiency of information retrieval.

Procedures

Three types of procedures are required for an MIS to operate effectively: user instructions, instructions for input preparation and operating instructions for MIS personnel who maintain the MIS.

Personnel

The personnel in the MIS function include computer operators, programmers, systems analysts and managers. Human resource requirements should be assessed by considering both the present system needs and the future system growth. The quality of MIS personnel is a key factor in its effectiveness. An MIS manager needs a combination of both managerial and technical skills.

Management Information System
Unit-3

Functions of management

"There are five fundamental functions of management, (i.e.) **Planning**, **Organizing**, **Staffing**, **Directing** and **Controlling**". Functions of management are overlapping in nature. Each function affects the performance of other.

1. Planning

It includes determination of objectives, setting rules, procedure, policies, strategies, budgeting etc., Planning may be short term or long term. Manager at all levels want to prepare plans, so it is considered as a pervasive functions. Planning looks into future without planning organization cannot achieve anything in future. Planning is deciding in advance what has to done, and how and when it has to be done. It bridges the gap between the present and the future.

2. Organising

Organising involves establishment of the formal structure of authority through which work subdivisions are arranged, defined and coordinated to accomplish the defined objective of the organization.

Designing and maintaining these systems of roles is basically the managerial function of organizing.

3. Staffing

Staffing involves the process of filling positions in the organisation structure. The staffing function relates to the recruitment, selection, training, promotion and transfer of employees at all levels of management. The staffing function is different from other functions because it deals only with people.

4. Directing

Direction is process by which the employees are guided to contribute towards organisational objectives. The term directing refers to that the managerial function which initiates organised action.

5. Controlling

Controlling is an important element in the management process. Controlling involves setting standards measuring the performance comparing the actual with the standards and find out the deviations and taking corrective actions.

Concept of organizational planning

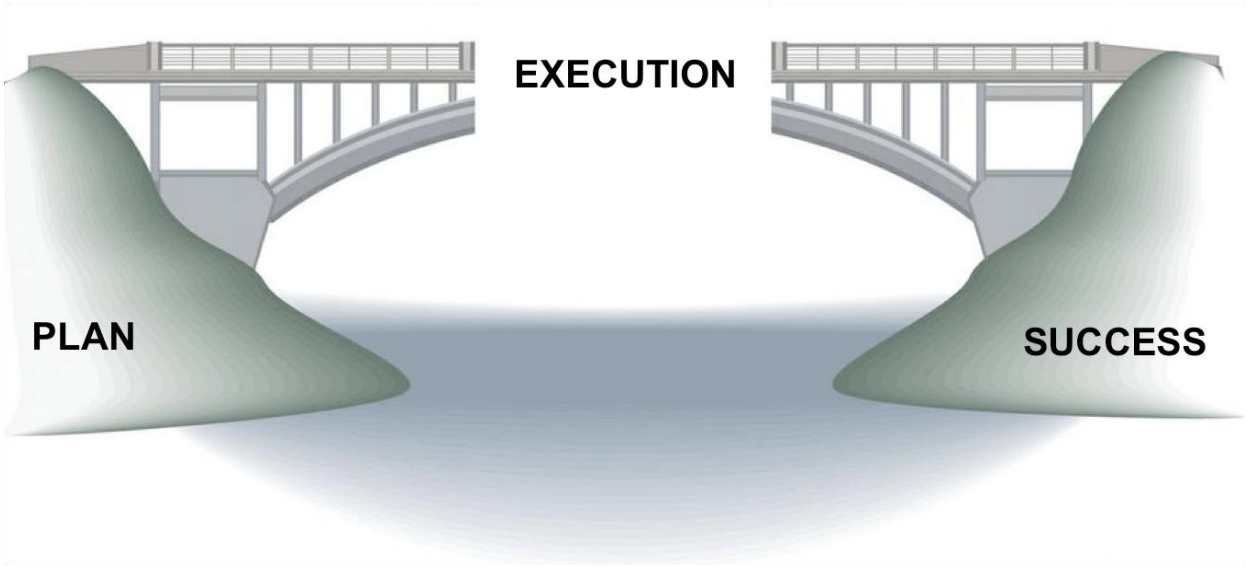
Planning is the process of thinking about the activities required to achieve a desired goal. It is the first and foremost activity to achieve desired results. It has a specific process and is necessary for multiple occupations (particularly in fields such as management, business, etc.). In each field there are different types of plans that help companies achieve efficiency and effectiveness.

"A goal without a plan is just a wish"

Planning is the basic function of management and all other functions of management are greatly influenced by the planning process. Planning is an inevitable function of management at levels of an organization.

Planning is a key management role in any organization, whether a private business, a nonprofit organization, a corporate business or a government agency. Planning is a primary management function which every organization has to undertake irrespective of its size, nature and origin.

"Planning is the fundamental management function, which involves deciding in advance, **what is to be done, when is it to be done, how it is to be done and by whom to be done."**



It is a pre-decided course of action which will be taken in future. It deals with the determination of objectives to be achieved and the activities required achieving the objectives. It **bridges** the gap between **present (where we are)** and **future (where we want to go)**. It helps to minimize the risk.

Characteristics of Planning

1. **Managerial function**: Planning is a first and foremost managerial function provides the base for other functions of the management, i.e. organizing, staffing, directing and controlling, as they are performed within the periphery of the plans made.
2. **Goal oriented**: It focuses on defining the goals of the organization, identifying alternative courses of action and deciding the appropriate action plan, which is to be undertaken for reaching the goals.

3. **Pervasive**: It is pervasive in the sense that it is present in all the segments of organization and is required at all the levels of the organization. Although the scope of planning varies at different levels and departments.
4. **Continuous Process**: Plans are made for a specific term, say for a month, quarter, and year and so on. Once that period is over, new plans are drawn, considering the organization's present and future requirements and conditions. Therefore, it is an ongoing process, as the plans are framed, executed and followed by another plan.
5. **Intellectual Process**: It is a mental exercise at it involves the application of mind, to think, forecast, imagine intelligently and innovate etc.
6. **Futuristic**: In the process of planning we take a sneak peek of the future. It encompasses looking into the future, to analyze and predict it so that the organization can face future challenges effectively.
7. **Decision making**: Decisions are made regarding the choice of alternative courses of action that can be undertaken to reach the goal. The alternative chosen should be best among all, with the least number of the negative and highest number of positive outcomes.

Importance of Planning

Planning is definitely significant as it directs us where to go, it furnishes direction and decreases the danger of risk by making predictions. The significant advantages of planning are provided below:

- **Planning provides directions**: Planning assures that the objectives are certainly asserted so that they serve as a model for determining what action should be taken and in which direction. If objects are well established, employees are informed of what the company has to do and what they need do to accomplish those purposes.

- **Planning decreases the chances of risk and uncertainty**: Planning is an activity which permits a manager to look forward and predict changes. By determining in prior the tasks to be completed, planning notes the way to deal with changes and unpredictable effects.
- **Planning decreases overlapping and wasteful activities**: Planning works as the foundation of organizing the activities and purposes of distinct branches, departments, and people. It assists in avoiding chaos and confusion. Since planning guarantees precision in understanding and action, work is conducted on easily without delays.
- **Planning encourages innovative ideas**: Since it is the primary function of management, new approaches can take the form of actual plans. It is the most challenging project for the management as it leads all planned actions pointing to growth and of the business.
- **Planning aids decision making**: It encourages the manager to look into the future and make a decision from amongst several alternative plans of action. The manager has to assess each option and pick the most viable plan.
- **Improve future performance:** It helps managers to **improve future performance**, by establishing objectives and selecting a course of action, for the benefit of the organization.

Planning is present in all types of organizations, households, sectors, economies, etc. We need to plan because the future is highly uncertain and no one can predict the future with 100% accuracy, as the conditions can change anytime. Hence, planning is the basic requirement of any organization for the survival, growth and success.

How Planning Helps Organizations

Planning and organizing skills help us manage time, tools and resources to reach a goal. They help us work out what we need to do to achieve our aims. Planning is vital at all levels in the workplace. We'll need to plan our own tasks and time. Here are some points which describes how planning helps in organization:

Increases the Efficiency of an Organization:

It focuses on the work and resources of the entire organization, create a clear and convincing vision that the team and board wish to progress, with proper coordination toward success.

Identifies the Genuine Needs of Clients:

It involves getting input from clients to guarantee that their needs are known and followed upon. Again, this helps companies expand and enhance their services.

Reveals What Not to Do:

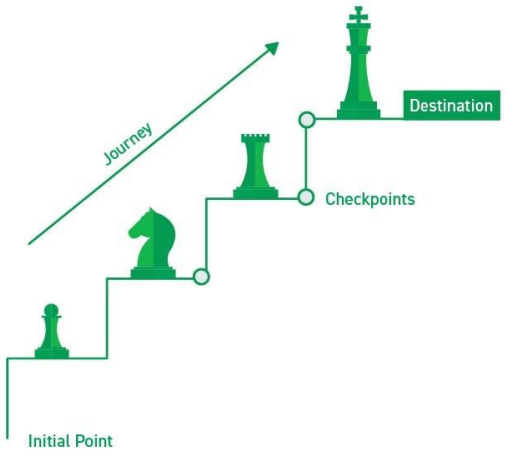
A strategic plan, on the other hand also uncovers what an organization needs to quit doing in order to be more effective and client-focused.

Help Make the Best Use of Resources:

A well-articulated plan shows to the general public, funders and key partners that the company is making the most ideal utilization of its assets to the advantages of clients it serves.

Enhances Decision Making:

A good plan tells what you want to accomplish in the given time frame, what the future holds and what the ultimate goal is.



- **The Destination-** Where do you want to take your business?
- **The Initial Point-** Where are you at the current time?
- **The Journey–** How will you get there?
- **The Checkpoints–** How will you know if you're succeeding?

Planning Process

Planning is the first primary **function of management** that precedes all other **functions.** The planning function involves the decision of what to do and how it is to be done? So managers focus a lot of their attention on planning and the **planning process**.

The **planning process** of management is one of the most essential ones. It involves setting the goals of the company and then managing the resources to achieve such goals. Planning means to decide in advance what to do and how to do. It is an activity which follows certain logical steps.

1. **Setting objectives:** Every organization works to achieve some objectives. So the first step of the planning is to define and describe the objectives of the organization. And once the objective is decided then these objectives should be communicated to all the units and employees.
   - This is the primary step in the process of planning which specifies the objective of an organisation, i.e. what an organization wants to achieve.
   - The planning process begins with the setting of objectives.
   - Objectives are end results which the management wants to achieve by its operations.
   - Objectives are specific and are measurable in terms of units.
   - Objectives are set for the organization as a whole for all departments, and then departments set their own objectives within the framework of organizational objectives.

   Example:

   A mobile phone company sets the objective to sell 2, 00,000 units next year, which is double the current sales.
2. **Developing premises:** Planning is concerned with the future, which is uncertain and every manager assumes about what might happen in future. Therefore the manager is required to make certain assumptions about the future. And these assumptions are known as premises. Premises are the base, upon which plans are drawn. They may be forecasts, existing plans or past information.

   Example:

   The mobile phone company has set the objective of 2, 00,000 units sale on the basis of forecast done on the premises of favorable Government policy towards digitization of transactions.

3. **Identifying alternative courses of action:** Once the objectives and planning premises are established, it becomes necessary to discover the various courses of action, which will be used to achieve the established objectives and the must know all the alternatives to achieve the objectives.
    - Once objectives are set, assumptions are made.
    - Then the next step is to act upon them.
    - There may be many ways to act and achieve objectives.
    - All the alternative courses of action should be identified.

    Example:

    The Mobile Company has many alternatives like reducing price, increasing advertising and promotion, after sale service etc.
4. **Evaluating alternative courses:** After that the next step is to analyze the pro and cons of each alternative. It is important to evaluate the negative and positive aspect of each alternative to achieve the objectives. It involves a number of calculations to measure the cost and benefits related to an alternative.
    - In this step, the positive and negative aspects of each alternative need to be evaluated in the light of objectives to be achieved.
    - Every alternative is evaluated in terms of lower cost, lower risks, and higher returns, within the planning premises and within the availability of capital.

    Example:

    The mobile phone company will evaluate all the alternatives and check its pros and cons.
5. **Selecting an alternative:** After evaluating the alternative course the next step is to selecting an alternative. And this is the real point of decision-making. The best plan has to be adopted and implemented. An ideal plan should be the one which is most profitable, most feasible and has least negative consequences.
    - The best plan, which is the most profitable plan and with minimum negative effects, is adopted and implemented.
    - In such cases, the manager's experience and judgment play an important role in selecting the best alternative.

    Example:

    Mobile Phone Company selects more T.V advertisements and online marketing with great after sales service.
6. **Implementing the plan:** The main role of this step is to put the plan into action and do what is required. And then the managers start to communicate the plans to the employees and initiate them to carry out the activities according to the specifications of plans.
    - This is the step where other managerial functions come into the picture.
    - This step is concerned with "DOING WHAT IS REQUIRED"
    - In this step, managers communicate the plan to the employees clearly to convert the plans into action.

- This step involves allocating the resources, organizing for labour and purchase of machinery.

Example:

Mobile Phone Company hires salesman on a large scale, creates T.V advertisement, and starts online marketing activities and set up service workshops.

7. **Follow-up action:** Since, planning is the continuous process so the managers keep on following up the plans to ensure that all the activities should be performed as per the schedule. Monitoring the plan is important to ensure achievement of objectives.
   - Monitoring the plan constantly and taking feedback at regular intervals is called follow-up.
   - Monitoring of plans is very important to ensure that the plans are being implemented according to the schedule.
   - Regular checks and comparisons of the results with set standards are done to ensure that objectives are achieved.

   Example:

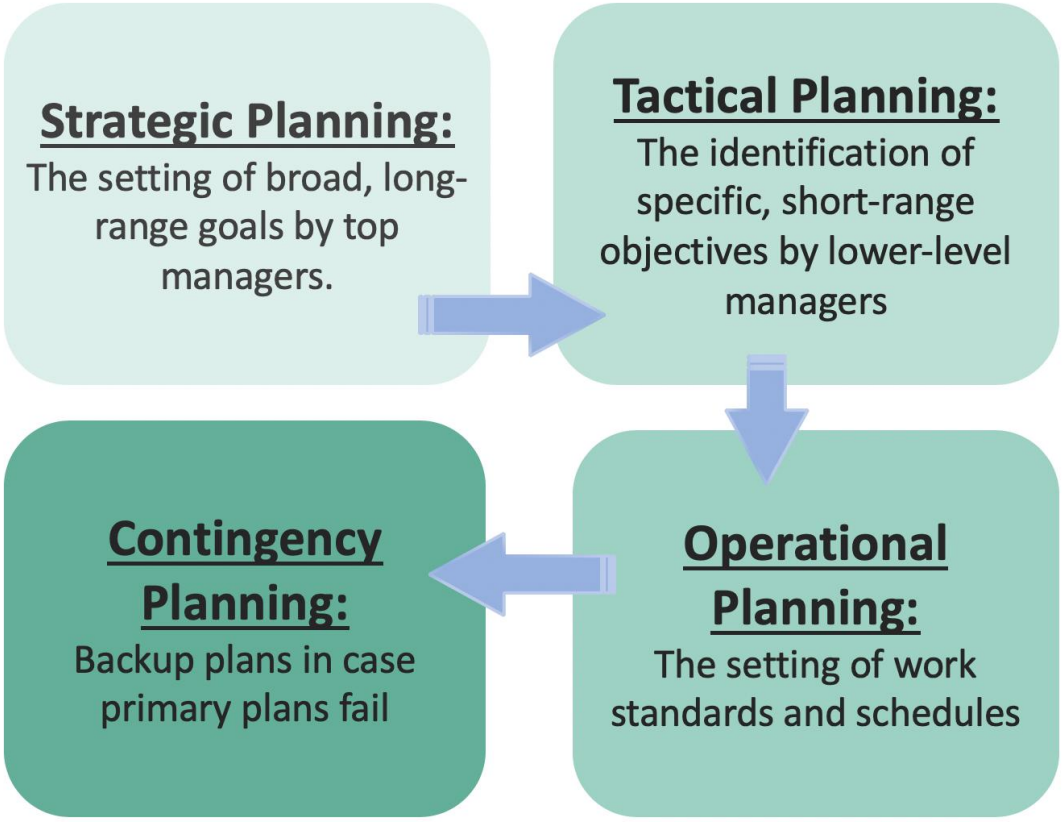
   A proper feedback mechanism was developed by the mobile phone company throughout its branches so that the actual customer response, revenue collection, employee response, etc. could be known.

Types of Organizational Planning

There are four types of planning. Each type of plan commits employees within different departments and their resources to specific actions. While there are many different types, the four major types of plans include strategic, tactical, operational, and contingency.

Strategic Planning

A strategic plan is the company's big picture. It defines the company's goals for a set period of time, whether that's one year or ten, and ensures that those goals align with the company's mission, vision, and values. Strategic planning usually **involves top managers**, although some smaller companies choose to bring all of their employees along when defining their mission, vision, and values.



Tactical Planning

The tactical strategy describes how a company will **implement its strategic plan**. A tactical plan is composed of several **short-term goals**, typically carried out within one year, that support the strategic plan. Generally, it's the responsibility of middle managers to set and oversee tactical strategies, like planning and executing a marketing campaign.

Operational Planning

Operational plans encompass what needs to happen continually, on **a day-to-day basis**, in order to execute tactical plans. Operational plans could include work schedules, policies, rules, or regulations that set standards for employees, as well as specific task assignments that relate to goals within the tactical strategy, such as a protocol for documenting and addressing work absences.

Contingency Planning

Contingency plans wait in the wings in case of a **crisis** or **unforeseen event**. Contingency plans cover a range of possible scenarios and appropriate responses for issues varying from personnel planning to advanced preparation for outside occurrences that could negatively impact the business. Companies may have contingency plans for things like how to respond to a **natural disaster**, **malfunctioning software**, or the **sudden departure** of a C-level executive.

Controlling

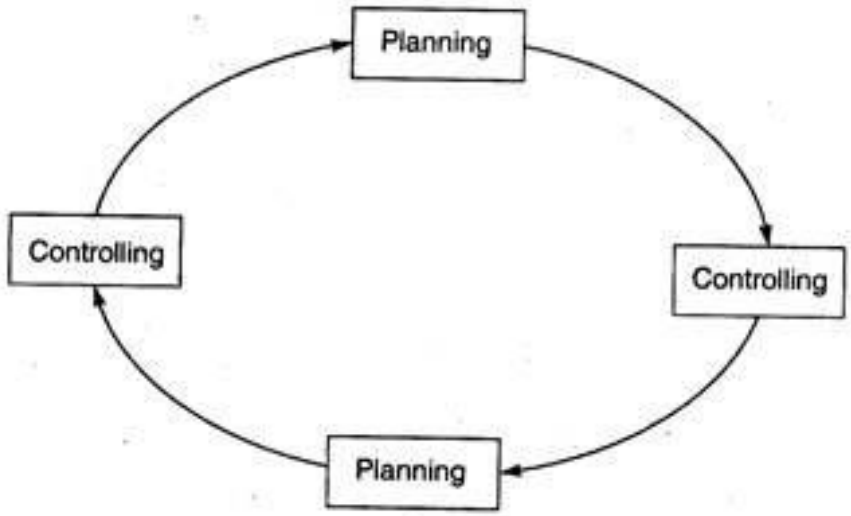
Controlling is one of the most **basic functions of management**, **like planning, organizing, staffing**, etc. Controlling is an important function, and without controlling management can't ensure the desired results.

"Controlling is the process of evaluating the actual performance in comparison with the planned targets and taking suitable corrective actions whenever necessary".

In controlling, management first prepares plans and policies and later implements them to achieve predetermined objectives. According to the time interval, the management evaluates the actual performance of each department and employee. And, compares the actual performance with that of standard performance, and if any variation is found in actual performance, it takes corrective steps in time to maintain the standard.

Through controlling the manager keeps watch on the situation, monitors it regularly make sure that the work is done in a planned way and takes suitable actions to that effect. A good controlling system is generally designed to keep things from going wrong, not jest to correct them after wards.

There is a very close link between planning and controlling. This is shown in below figure. This is usually the first part of the management process. In the next stage, the organizing and leading functions get the actual work of the organization done, and the controlling function is directly tied back into planning.



"Control is a primary goal-oriented function of management in an organization. It is a process of comparing the actual performance with the set standards of the company to ensure that activities are performed according to the plans and if not then taking corrective action".

Controlling is performed at the **lower**, **middle** and **upper levels of the management**. **Controlling complements planning**. Managers often layout careful and elaborate plans, but unless these are supported by effective control, plan accomplishment becomes just a matter of luck. Organizations that do not exercise proper control even run tremendous risks. It is even thought that planning is incomplete unless good controls are also established.

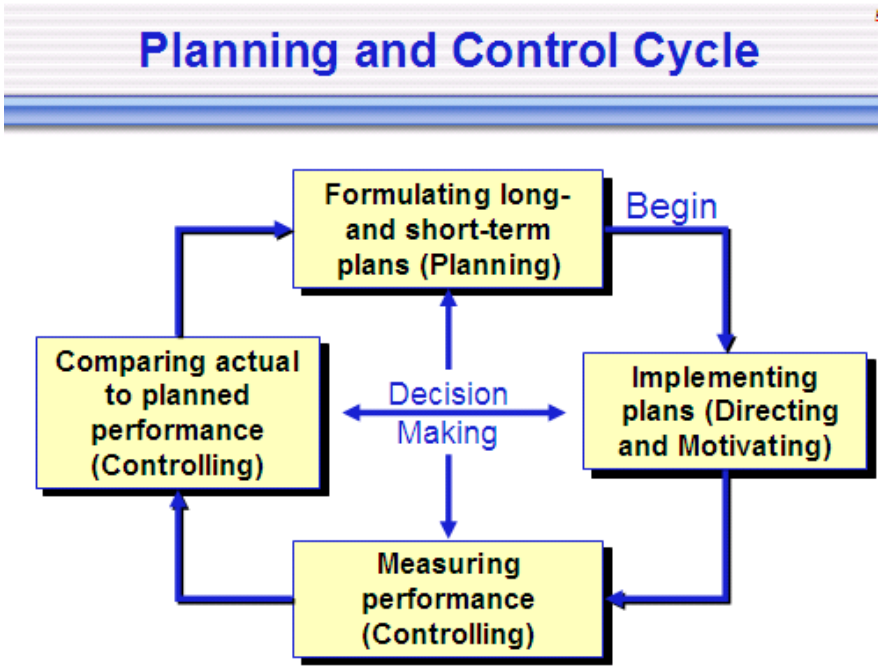
Planning and controlling are so closely linked with each other that they have been called- **"the Siamese Twins of management."**

"Planning and controlling go hand in hand".

It is not wrong to say that planning and controlling works together. A manager is required to plan so that he can control the actions of employees in order to achieve the desired outcome.

For example, if a sales manager makes a target to make the sales of 5 million in one quarter with five salespersons working in his team, then he will give the target of 1 million to every salesperson and will control their actions to achieve the desired results.

Now you understand that without planning, controlling is meaningless, and without controlling planning can't go as desired.

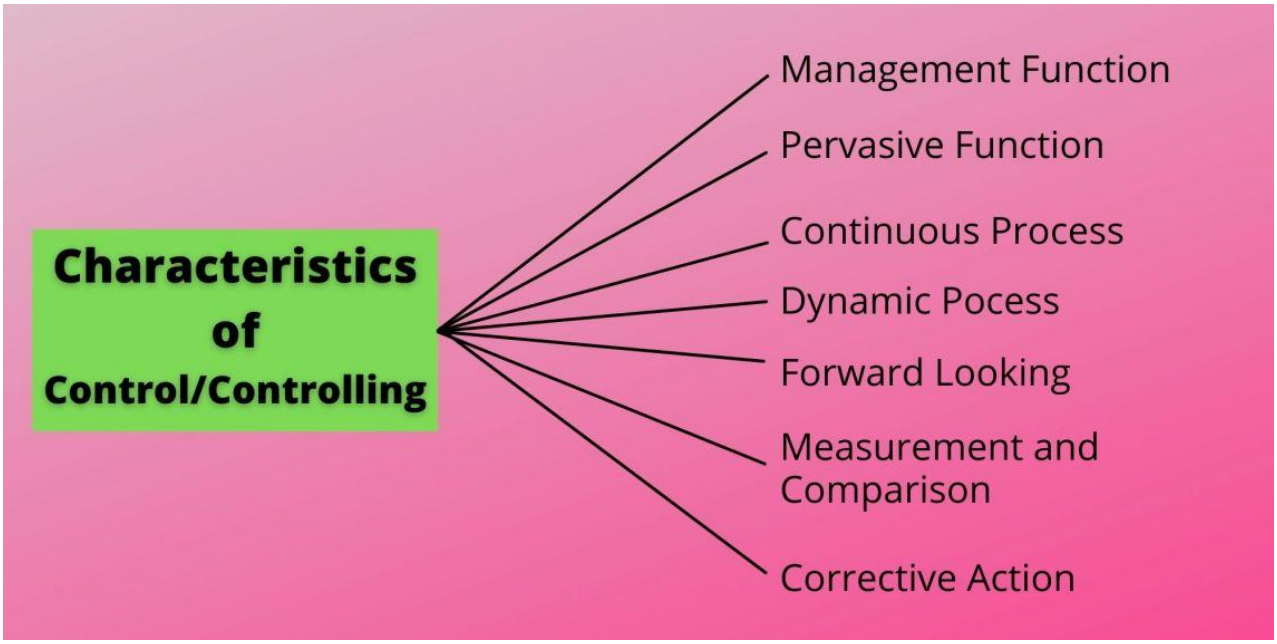


The management process will be incomplete and become useless without the control function. Control is a tool that helps an organization measures and compares its actual progress with the established plan.

Thus, control ensures what is done is what is intended. It is to be exercised by everyone in the organization, from top level to bottom level.

Characteristics of control process

Following characteristics of control can be identified:



- **Management Function**

Management process comprises of five functions, viz., planning, organizing, staffing, directing and controlling. Thus, control is part of the process of management. Controlling is a crucial function of management. It is a controlling function that brings about a balance between actual and planned performance. It is not only the function of chief executive but is the duty of every manager. A manager is responsible for whatever work is assigned to him. He will control the performance of his subordinates for ensuring the accomplishment of goals.

- **Pervasive function**

Controlling is a pervasive function because it can't be escaped at any level of the management. All management is required to control at all levels.

For example, a top-level manager will control the actions of a middle-level manager and supervise the performance of the manager and similarly, a low-level manager is answerable to a middle-level manager.

In this way, the controlling is done at all levels. However, there might be a difference in the methods of control, and different corrective actions are taken when the performance of the employee is not as desired.

- **Continuous Process**

It is a never-ending process and lasts till the existence of the organization. It involves a continuous analysis and study of the implementation of standards, policies, and procedures of the organization. Establishment of standards, measurement of actual performance, comparison of actual performance against the standards, and taking corrective action if there is any deviation are a continuous process of controlling.

- **Dynamic process**

Controlling is a dynamic process. A manager is required to take a different course of actions when an employee fails to match the standards of performance. A manager should have the skills to decide how to react to a certain situation.

For example, if an employee is absent frequently, then the manger first should talk with him and ask for the reason of his absenteeism and try to do something about the problem, and if the problem persists then, he should take some strict action.

Similarly, the course of action would be different for the employee who does not perform as per the standard frequently than the employee who has failed to meet the performance standards for the first time.

- **Forward Looking:**

Control is forward looking. Past is already gone thus, cannot be controlled. Measures can be devised to control future activities only. Past provides a base for determining controls for future. The manager will study the past performance in order to find out the reasons for low results. A corrective action will be taken to ensure that work in future is not adversely affected. Take for example, production for a particular month is low than the standard. Manager will not be able to do anything about the past performance. However, he may study the reasons for low production. He should take appropriate steps so that the same mistakes are not repeated and production will not suffer in future.

- **Measurement and Comparison**

Controlling is a managerial tool that measures and compares actual and standard performance and takes corrective measures if there is deviation. Organizational authority is concerned with this process. The effective measure between actual and planned performance helps to achieve organizational goals in the defined standards.

- **Corrective Action**

It is a management function through which a manager takes necessary steps if actual work is done is not in accordance with the standard work. It takes necessary action for the proper utilization of available resources. It is a must for the efficient completion of predetermined work. Tactful action at the right time is the essence of controlling.

Control Process

The "**Controlling Process**" is a method that can be used to make sure standards are being met within an organization. It involves the careful collection of information about a system, process, person, or group of people in order to make necessary decisions about each. **"Controlling" assures that the right things are done in the right manner at the right time.** By controlling, a Program Manager checks the progress and compares it to what was planned. If the planned events are not the same, then corrective actions can be taken.

The control process consists of the following basic elements and steps:

1. Setting Performance Standards

The task of fixing goals and standards takes place while planning but it plays a big role in controlling also. This is because the main aim of controlling is to direct a business's actions towards its goals. If the members of an organization know their goals clearly, they will invest their entire focus in achieving them.

Standards should be **clearly defined, understandable, attainable** and **realistic.**

It is very important for managers to communicate their organization's goals, standards and objectives as clearly as possible. There must never be ambiguities amongst employees in this regard. If everybody works towards common goals, it becomes easier for an organization to grow.

Standards can be set by the following two ways:

- **Quantitative/Measurable or tangible**: Those standards which can be measured and expressed are called measurable standards. These standards are expressed in numeric figure. They can be in form of cost, output, expenditure, time, profit, etc.
- **Qualitative/Non-measurable or intangible**: There are standards that cannot be measured monetarily. For example- performance of a manager, deviation of workers, their attitudes towards a concern. These are called intangible standards.

Examples of Quantitative Standards:

(a) Revenue to be earned.

(b) Units to be produced and sold.

(c) Cost to be incurred.

(d) Time to be spent in performing a task.

(e) Amount of inventories to be maintained etc.

Examples of Qualitative Standards:

(a) Improving motivation level of employees.

(b) Improving labor relations.

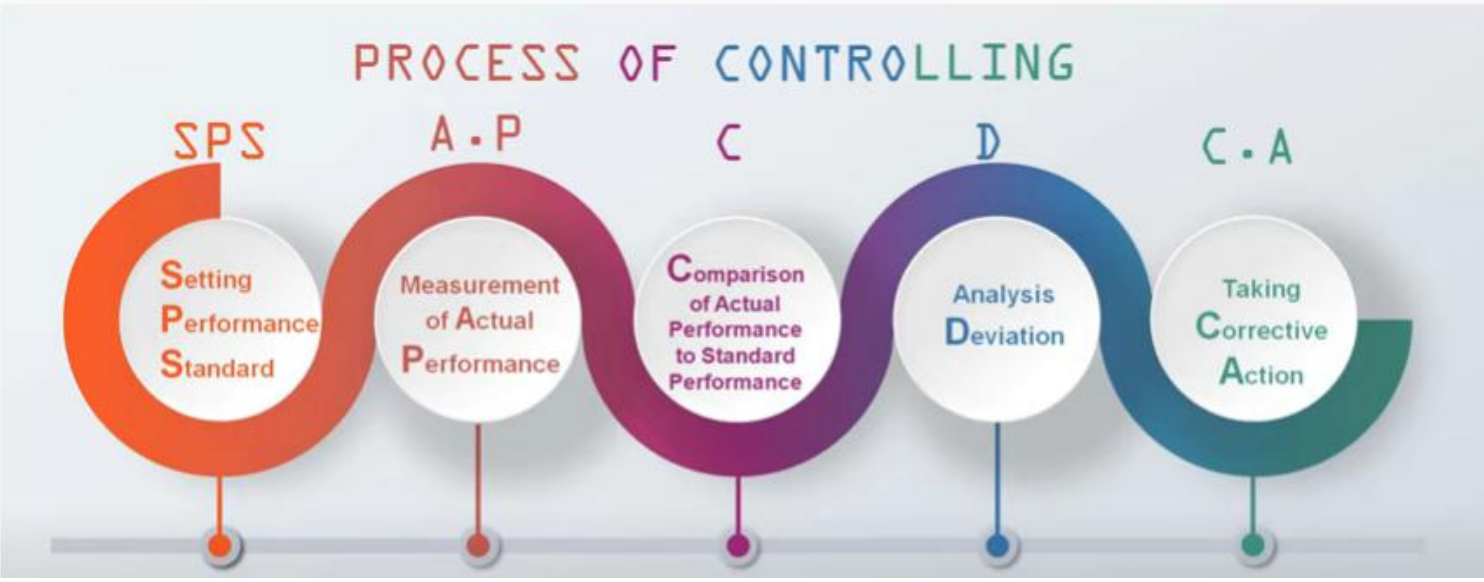
(c) Improving quality of products.

(d) Improving goodwill etc.

In order to facilitate easy comparison of actual performance with the standards, a manager should try to set these standards in quantitative terms as far as possible. However, in case of qualitative standards, effort should be made to define these standards in such a way that comparison becomes easily understandable.

For example, for improving customer satisfaction in a restaurant having self service, standard can be set in terms of time taken to get a table, place the order and collect the order. Moreover, the standards set should be flexible enough so that necessary changes can be made according to varying situations.

Controlling becomes easy through the establishment of these standards because controlling is exercised on the basis of these standards.



2. Measurement of Actual Performance

Once managers know what their goals are, they should next measure their actual performance .This step basically helps them in knowing whether their plans are working as intended.

Most organizations prepare **formal reports** of performance measurements both quantitative and qualitative (where quantification is not possible) that the managers review regularly. These measurements should be related to the standards set in the first step of the control process.

Apart from taking corrective action, this step of process control also helps managers in predicting future problems. This way they can take measures immediately and save their business from losses.

For example, if sales growth is a target, the organization should have a means of gathering and reporting sales data. Data can be collected through personal observation (through management by walking around the place where things are happening), statistical reports (made possible by computers), oral reporting (through conferencing, one-to-one meeting, or telephone calls), written reporting (comprehensive and concise, accounting information – normally a combination of all. To be of use, the information flow should be regular and timely.

3. Comparison of Actual Performance to Standard Performance

This step compares actual activities to performance standards. When managers read computer reports or walk through their plants, they identify whether actual performance meets, exceeds, or falls short of standards.

Typically, performance reports simplify such comparison by placing the performance standards for the reporting period alongside the actual performance for the same period and by computing the variance—that is, the difference between each actual amount and the associated standard.

The manager must know of the standard permitted variation (both positive and negative). Management by exception is most appropriate and practical to keep insignificant deviations away. Timetable for the comparison depends upon many factors including importance and complexity attached with importance and complexity.

4. Analysis Deviation

Deviation refers to difference between actual performance and plan performance. For example if plan is producing 100 units and actually only 80 units are produced, then deviation =100−80=20.

Deviations can be of two types

(i) Negative Deviation and

(ii) Positive Deviation.

Positive deviation means that the actual performance is more than the standard work whereas negative deviation means that the actual performance is less than the standard work. If the actual performance is more than the standard, the corrective action can help in improving the efficiency in future.

In the controlling process, it is important to know the causes of negative deviation but it is not less important to know about the causes of positive deviations.

All deviations need not be brought to the notice of top management. When the deviation is beyond the prescribed limit, an analysis of deviations is made to identify the causes of deviations. The causes of deviation are reported to the managers. The managers take necessary corrective actions.

5. Taking Corrective Action

In case there are discrepancies between actual performances and goals, managers need to take corrective actions immediately. Timely corrective actions can reduce losses as well as prevent them from arising in the future again.

Sometimes, business organizations formulate default corrective actions in the form of policies. This, however, can be difficult to do when it comes to complicated problems.

There are two alternatives here:

- Taking corrective measures for deviations that have occurred; and
- After taking the corrective measures, if the actual performance is not in conformity with plans, the manager can revise the standards. It is here the controlling process comes to an end. Follow-up is an important step because it is only through taking corrective measures, a manager can exercise control.

6. Following up on corrective action

Just taking corrective measures is not enough; managers must also take them to their logical conclusion. Even this step requires thorough evaluations and comparisons.

Managers should stick to the problem until they solve it. If they refer it to a subordinate, they must stay around and see to it that he completes the task. They may even mentor him personally so that he may be able to solve such problems by himself later.

The nature of control in an organization

All organizations (businesses, universities, governments, hospitals) are concerned with channeling human efforts toward attainment of organizational objectives. Regardless of their formal purposes, organizations are composed of people with their own personal interests. Even if these individuals and groups wish to help attain organizational goals, the organization of which they are a part must coordinate their efforts and direct them toward specific goals. Thus organizations must influence or control the behavior of people, if they are to fulfill their plans and achieve their goals.

On the basis of designing Control Systems:

Three approaches may be followed while designing control systems, viz., Market Control, Bureaucratic Control, and Clan Control. However, most organizations do not depend only on just one of them.

1. Market Control:

Control is based upon market mechanisms of competitive activities in terms of price and market share. Different divisions are converted into profit centers and their performance is evaluated by segmental top line (turnover), bottom line (profit) and the market share.

Using market control will mean that the managers in future will allocate resources or create departments or other activities in line with the market forces.

2. Bureaucratic Control:

Bureaucratic control focuses on authority, rule and regulations, procedures and policies. Most of the public sector units in India go in for bureaucratic control.

If they do not go by the rulebook, the legislative committees and the ministries under whom they work will reprimand them. In a hospital no medicine can be used unless the prescription is there and it is recorded in the issue register, even if the patient may die in between.

3. Clan Control:

The control systems are designed in a way that give way to shared vision, shared values, norms, traditions and beliefs, etc., part of the organizational culture.

It is not based upon hierarchical mechanisms, but work-related and performance measures. This kind of control is most suitable for the organizations which use team style of work groups and where technology changes very fast.

On the basis of Levels:

People at different level have different planning responsibilities, so do they undertake controlling. On the basis of levels controls, can be categorized as Operational, Structural, Tactical, and Strategic.

1. Operational Control:

Its focus remains upon the processes used by the organization for transforming the inputs (resources) into outputs (products/services). Operational controls are used at the lower management. It is exercised almost every day. Quality control, financial controls are part of operational controls.

2. Structural Control:

Are the different elements of organization structure serving their intended aims? Is there overstaffing? Is the ratio of staff to line increasing? Necessary action is to be undertaken.

Two important forms of structural control can be bureaucratic control and clan control, about which we have already talked. Structural control is exercised by top and middle management.

3. Tactical Control:

Since tactical control deals with the departmental objectives, the controls are largely exercised by middle management levels.

4. Strategic Control:

Strategic controls are early warning systems. Strategic control is the process to determine whether the effectiveness of a corporate, business and functional strategies are successful in helping organizations to meet its goals. Strategic controls are exercised by top level management.

Management Information System
Unit-4

Business Applications of Information Technology

INTRODUCTION

Today's businesses rely more heavily on technology than ever before. Information technology is an essential partner in management of our business, regardless of the kind of enterprise we operate. From small businesses run by a single person to huge multi-national corporations, the importance of information technology in any business setting is evident. Computer technology is used across the business world in every department and has become vital to business operations in the modern world.

Without information technology and system support, businesses simply stop! If the internet or phone service goes down in an office, nothing can get done — HR, finance, operations, communications, sales, and all other departments depend on functional computer and information systems to complete their work. Plus, IT and Information Services (or IS) protect the integrity of data and keep it safe from a world of technological threats.

In short, workplaces cannot function without IT and IS professionals. They're a valuable part of every office and business environment.

Undoubtedly, technology is very necessary for Business. It has caused an explosion in commerce and trade; many traditional business models and concepts were revolutionized. Technology has just about changed every aspect of business in a big way and this has never happened this fast before in history. To be more specific, here are a few ways in which information technology has affected business:

1- Communication

In the business world, communication plays an important role in maintaining the relationship between employees, suppliers, and customers. Therefore, the use of IT we can simplify the way to communicate through e-mail, video chat rooms or social networking site.

2- Time saving

IT applications can save time in the retrieval of information from a database or website. Rapid searches can be carried out by simply cueing in a keyword such as the name of a customer or a component.

Another way that time can be saved is in the rapid duplication of information. For example, an e-mail can be sent to all of the relevant members of an organization simply by creating a pre-prepared mailing list for all communications of a certain type.

3- Customer Relationship improvement

Companies are using IT to improving the way of design and manage customer relationship. Customer Relationship Management (CRM) systems capture every relationship a company has with a customer so that a more experience gain is possible.

If a customer makes a call to centre and report an issue, the customer relation officer will be able to see what the customer has purchased, view shipping information, call up the training manual for that item and effectively respond to the issue.

4- Management Information Systems

Information data is very important for an organization and a valuable resource requirement for the safe and effective care, that enable the company to track sales data, expenditure and productivity as well as information to track profits from time to time, maximizing return on investment and recognize areas of improvement.

5- Security

Most businesses of the modern era are subject to security threats and vandalism. Technology can be used to protect financial data, confidential executive decisions and other proprietary information that leads to competitive advantages. Simply put, technology helps businesses keep their ideas away from their competition. By having computers with passwords, a business can ensure none of its forthcoming projects will be copied by the competition.

6- Efficiency of operations

Technology also helps a business understand its cash flow needs and preserve precious resources such as time and physical space. Warehouse inventory technologies let business owners understand how best to manage the storage costs of holding a product. With proper technology in place, executives can save time and money by holding meetings over the Internet instead of at corporate headquarters.

7- Storage

You are required a computer for data storage for your business. Inventory, sales, receivables and payables stored in Excel, Open Office or a similar program keeps these figures at your fingertips. Accounting software stores your payroll information, tax records and specialized data for your business. Once you are acquainted with a program, you won’t know how you functioned without it. You can eliminate much of the physical storage at the office by using information technology to scan and store old personnel and payroll files, tax files or client files. You may need less square footage with information technology.

8- Marketing

Large and small businesses are on a level playing field on the Internet. You can have a Web presence, take orders, buy merchandise, sell excess or even operate some businesses entirely online. A marketing tool that uses information technology is the Quick Response or QR Code that looks like a bar code but is square. A scan advertises your website address and includes any text you choose. You can use your business management skills to direct employees or contractors to do your Internet marketing, or you can choose to learn a new set of skills in information technology.

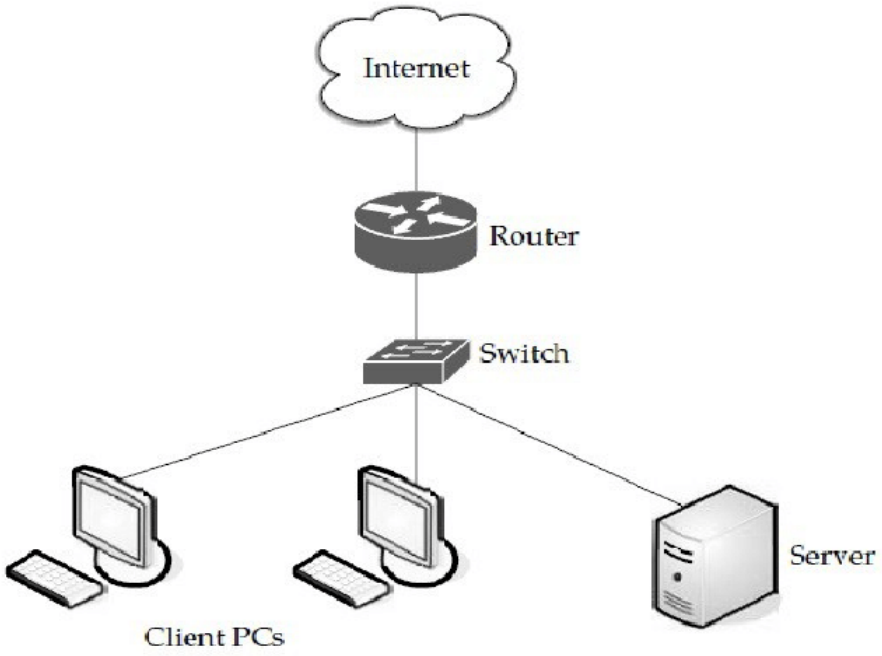
Internet

The **Internet** is an increasingly important part of everyday life for people around the world. The Internet is a **global network** of billions of computers and other electronic devices. With the Internet, it's possible to access almost any information, communicate with anyone else in the world, and do much more.

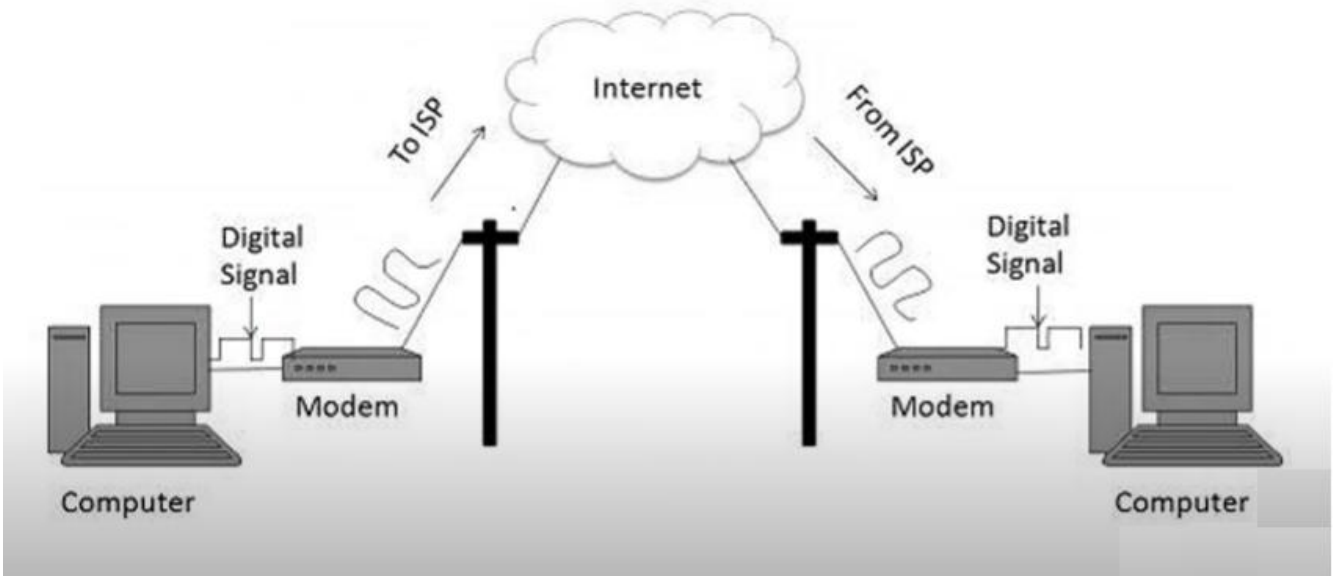
We can do all of this by connecting a computer to the Internet, which is also called **going online.** When someone says a computer is online, it's just another way of saying it's connected to the Internet.

The internet is a globally connected network system that uses **TCP/IP** to transmit data via various types of media. So we can say that the internet is a network of global exchanges – including private, public, business, academic and government networks – connected by guided, wireless and fiber-optic technologies.

The terms internet and World Wide Web are often used interchangeably, but they are not exactly the same thing; the internet refers to the global communication system, including hardware and infrastructure, while the web is one of the services communicated over the internet.



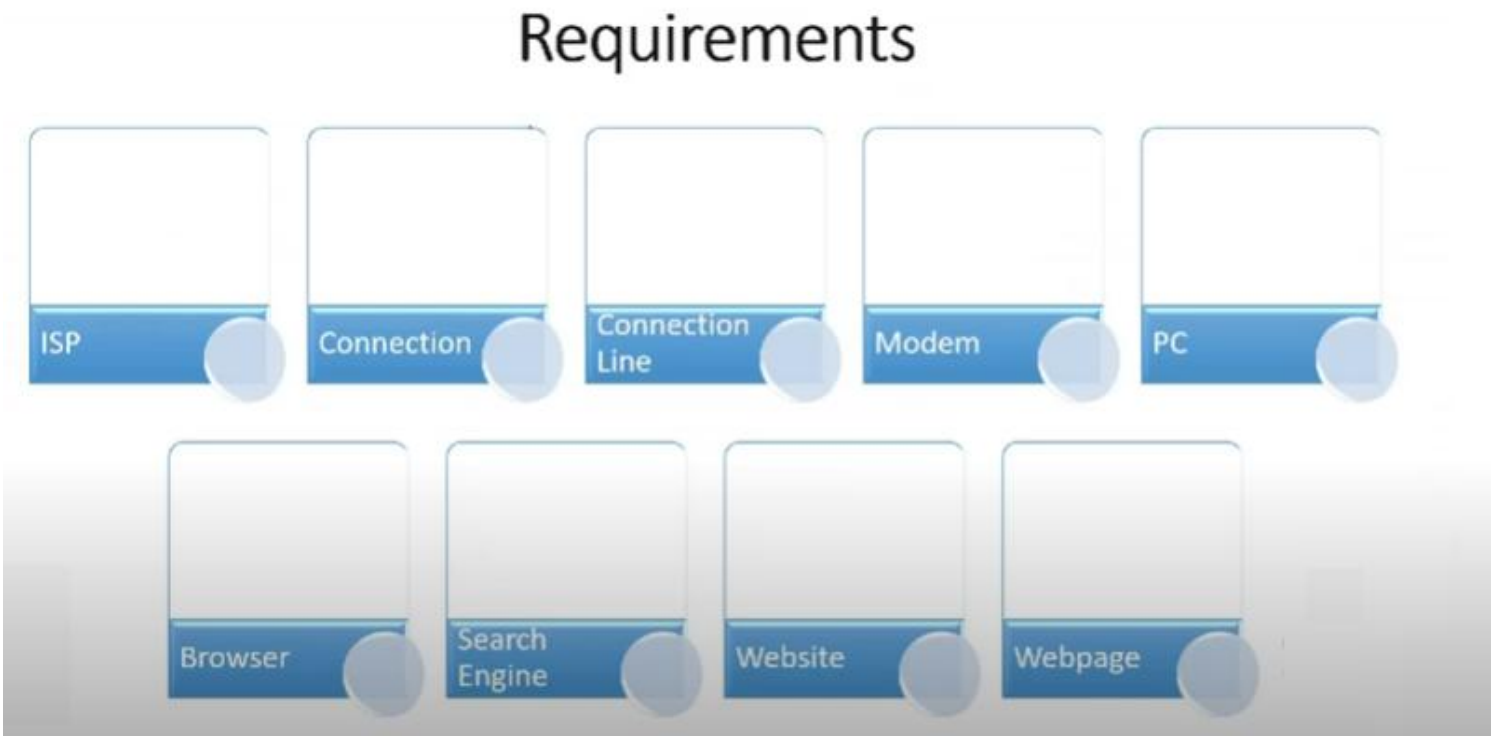
The **World Wide Web**—usually called the **Web** for short—is a collection of different **websites** we can access through the Internet. A **website** is made up of related text, images, and other resources. Websites can resemble other forms of media—like newspaper articles or television programs—or they can be interactive in a way that's unique to computers.



The purpose of a website can be almost anything: a news platform, an advertisement, an online library, a forum for sharing images, or an educational site like us!

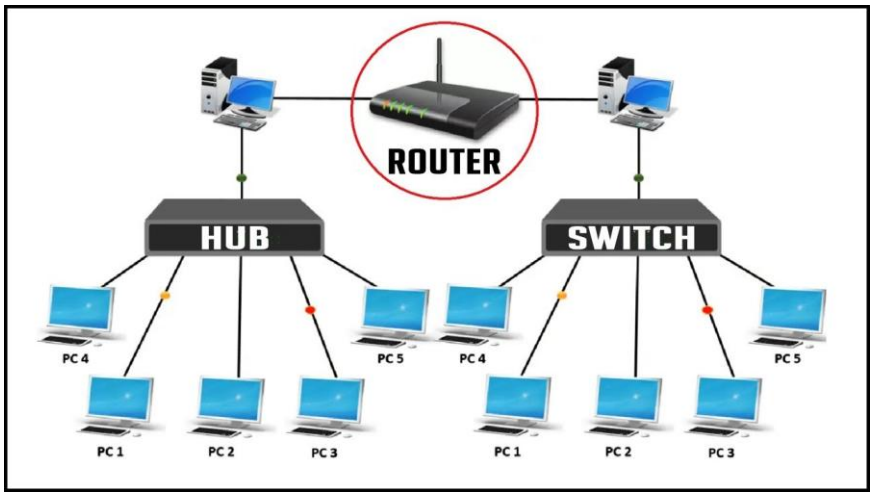
Once you are connected to the Internet, you can access and view websites using a type of application called a **web browser**. Just keep in mind that the web browser itself is not the Internet; it only displays websites that are stored on the Internet.

When you visit a website, your computer sends a request over these wires to a **server**. A server is where websites are stored, and it works a lot like your computer's hard drive. Once the request arrives, the server retrieves the website and sends the correct data back to your computer.



To connect to the Internet we need the following four things:

1. A **computer**
2. A **modem** and **telephone line** (if you are using dial up access)
   A data line of some sort (if you are not using dial up access)
3. An **Internet browser** (software) and software to connect us to the ISP
4. An **account** with an Internet Service Provider (ISP) Souvenirs



These things work together in the following way:

- The **Computer** is essential.
- The **Modem** is necessary if we are using a telephone line to access the Internet. It translates the language that computers talk into a language that can travel across the phone lines, and vice versa.
- The **ISP** is our gateway to the Internet. We access the ISP over the phone line, and the ISP will connect us to the Internet. The ISP provides us with e-mail and access to the Internet. It does this through thousands of dollars worth of hardware and software, which the average user can not afford. You will have an account with the ISP - we will pay month charges in return for accessing the Internet through the ISP. This account will come with a user name and a password that we use to log on to the Internet.

We need two lots of software to connect to the Internet. The first is the software that connects us to our ISP. This is different for each ISP. Some ISP's will give us a disk with the connection software on it. Other ISP's will use the connecting software that comes with the operating systems Windows 95, OS7 and OS8. They will give us the settings to put into this software.

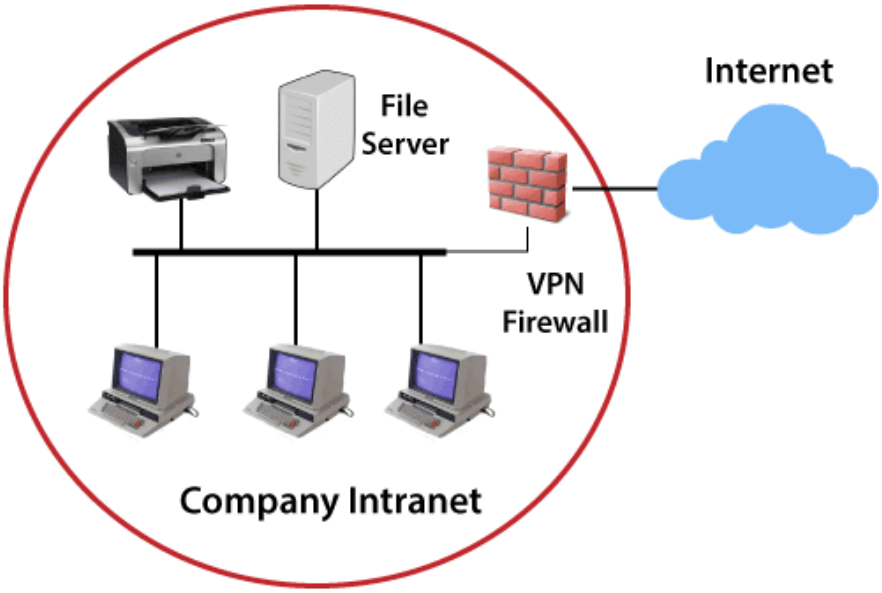
The second lot of software you need is a **Browser**. Browsers go and get web pages and display them on your computer.

Intranet

An intranet is a computer network for sharing information, collaboration tools, operational systems, and other computing services within an organization, usually to the exclusion of access by outsiders.

Its primary purpose is to help employees securely communicate with each other, to store information, and to help collaborate.

For example, a business may create an intranet to allow employees to securely share messages and files with each other.

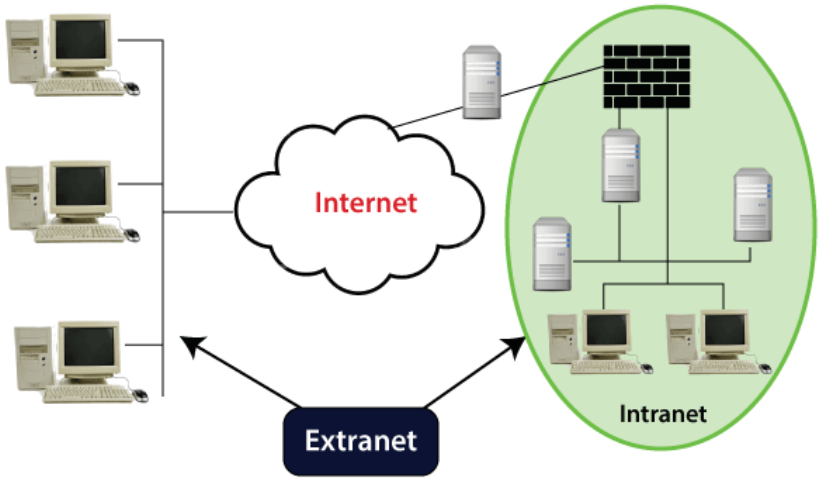


Extranet

An extranet is an intranet that can be partially accessed by authorized outside users, enabling businesses to exchange information over the internet in a secure way. It is accessible to some people from outside the company, or possibly shared by more than one organization.

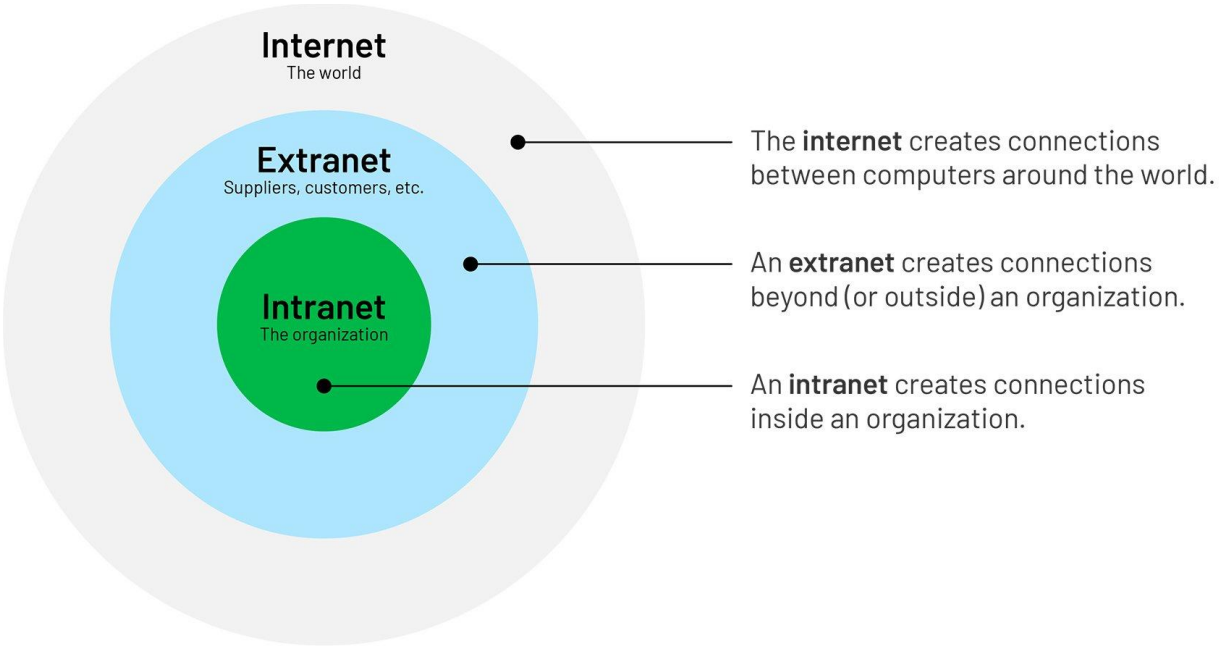
This network system is basically used for business to business (B2B) purposes. This system basically allows the outside users of an organization, like partners, suppliers, vendors and other stakeholders to remain in touch with the activities of organization.

Information and data access performed through a proper account or link system. This is a best network system to keep in touch with market position and share a large amount of data to partners in a timely manner.



Difference between Internet, Intranet and Extranet

Point of difference	Internet	Intranet	Extranet
Accessibility of network	Public	Private	Private
Availability	Global system.	Specific to an organization.	To share information with suppliers and vendors it male the use of public network.
Coverage	All over the world.	Restricted area up to an organization.	Restricted area up to an organization and some of its stakeholders or so.
Accessibility of content	It is accessible to everyone connected.	It is accessible only to the members of organization.	Accessible only to the members of organization and external members with logins.
No. of computers connected	It is largest in number of connected devices.	The minimal numbers of devices are connected.	The connected devices are comparable with Intranet.
Owner	No one.	Single organization.	Single/ Multiple organizations.
Purpose of the network	Its purpose is to share information throughout the world.	Its purpose is to share information throughout the organization.	Its purpose is to share information between members and external, members.
Security	It is dependent on the user of the device connected to network.	It is enforced via firewall.	It is enforced via firewall that separates internet and extranet.
Users	General public.	Employees of the organization.	Employees of the organization which are connected.
Policies behind setup	There is no hard and fast rule for policies.	Policies of the organization are imposed.	Policies of the organization are imposed.
Maintenance	It is maintained by ISP.	It is maintained by CIO. HR or communication department of an organization.	It is maintained by CIO. HR or communication department of an organization.
Relation	It is the network of networks.	It is derived from Internet.	It is derived from Intranet.



E-Commerce

E-commerce is the buying and selling of goods or services via the internet, and the transfer of money and data to complete the sales. It's also known as electronic commerce or internet commerce.

E-commerce has helped businesses establish a wider market presence by providing cheaper and more efficient distribution channels for their products or services.

These business transactions occur either as business-to-business (**B2B**), business-to-consumer (**B2C**), consumer-to-consumer (**C2C**), or consumer-to-business (**C2B**).

Features

- **Non-Cash Payment** − E-Commerce enables the use of credit cards, debit cards, smart cards, electronic fund transfer via bank's website, and other modes of electronics payment.
- **24x7 Service availability** − E-commerce automates the business of enterprises and the way they provide services to their customers. It is available anytime, anywhere.
- **Advertising / Marketing** − E-commerce increases the reach of advertising of products and services of businesses. It helps in better marketing management of products/services.
- **Improved Sales** − Using e-commerce, orders for the products can be generated anytime, anywhere without any human intervention. It gives a big boost to existing sales volumes.
- **Support** − E-commerce provides various ways to provide pre-sales and post-sales assistance to provide better services to customers.
- **Inventory Management** − E-commerce automates inventory management. Reports get generated instantly when required. Product inventory management becomes very efficient and easy to maintain.
- **Communication improvement** − E-commerce provides ways for faster, efficient, reliable communication with customers and partners

ADVANTAGES

1. A Larger Market

Ecommerce allows you to reach customers all over the country and around the world. Your customers can make a purchase anywhere and anytime, especially more people are getting used to shopping on their mobile devices.

2. Lower Cost

With the advance in ecommerce platform technologies, it has become very easy and affordable to set up and maintain an ecommerce store with a low overhead. Merchants no longer have to spend a large budget on TV ads or billboard, nor worry about the expense for personnel and real estate.

3. More Opportunities to "Sell"

Merchants can only provide a limited amount of information on a product in a physical store. On the other hand, ecommerce websites allow the space to include more information such as demo videos, reviews, and customer testimonials to help increase conversion.

4. Time Saving

It literally speeds up the buying process because when someone thinks of buying one specific product from the physical store which is very far and not easily available. Here how the ecommerce helps the customer to avail the specific product easily and speedily.

Easily retarget your customers.

5. Easier to encourage an impulse buy

Impulse buying is one of the techniques where it works as a common behavior of customer's perception towards a particular product. It is related to the control of human psychological behavior which is like some people possess personality traits that can be said as impulse buying tendencies.

6. Reviews Available

It has so many positive recommendations which can give more values to your **ecommerce website** and help customers to build more trust over a particular product. It can help you to be clear and more visible about the product that helps you with more product selection too. All of the reviews are valuable to customers, which can really help a lot to built trust over the products and services.

7. Provide flexibility to the customer to buy product 24/7.

It has more flexibility over the regular store because the services are available 24/7 and though helps to serve you the services at anytime and anyplace.

8. No Geographical limitation

Tap the global market form the day one. It is like the customer will have access to the online store from anywhere in the world, which can globally be accessed. This is what every customer is looking forward to having as their service because sometimes customers are not able to find a particular product which not available at the store location but though online store works like a magic to provide them with multiple options. So, that they can be avail the services easily.

Enterprise Solutions

Enterprise applications are specifically designed for the sole purpose of promoting the needs and objectives of the organizations.

Enterprise applications provide business-oriented tools supporting electronic commerce, enterprise communication and collaboration, and web-enabled business processes both within a networked enterprise and with its customers and business partners.

Services Provided by Enterprise Applications

Some of the services provided by an enterprise application include –

- Online shopping, billing and payment processing
- Interactive product catalogue
- Content management
- Customer Relationship Management
- Manufacturing and other business processes integration
- IT services management
- Enterprise Resource Management
- Human Resource Management
- Business Intelligence Management
- Business Collaboration and Security
- Form Automation

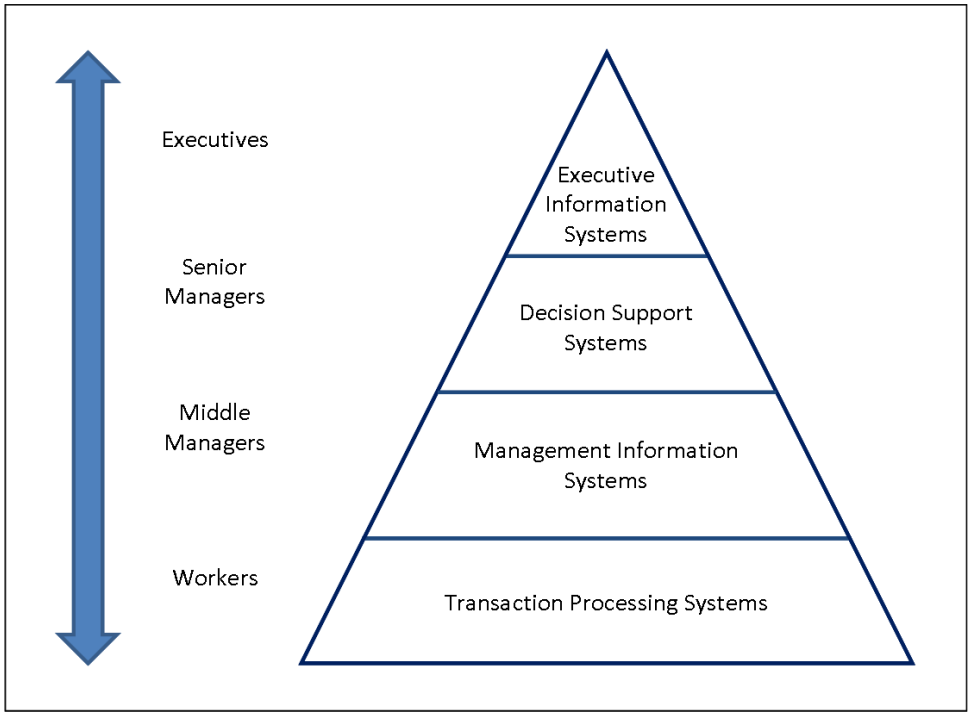
Most Commonly Used Enterprise Applications

Multitude of applications comes under the definition of Enterprise Applications. In this section, let us briefly cover the following applications −

- Management information system (MIS)
- Enterprise Resource Planning (ERP)
- Customer Relationship Management (CRM)
- Decision Support System (DSS)
- Knowledge Management Systems (KMS)
- Content Management System (CMS)
- Executive Support System (ESS)
- Business Intelligence System (BIS)
- Enterprise Application Integration (EAI)
- Business Continuity Planning (BCP)
- Supply Chain Management (SCM)

Information system for managerial decision support

Many Organizations are also tapping versatility and power of Computers by designing and developing systems tailored to meet the specific needs. An increasing number of Managers rely on computers and information system to make decision. Managers and different level in an organization make different kind of decision making (operational, tactical and strategic) so that the kind of information necessary to support their decision are also different. Accordingly different types of information systems are designed to meet the various information needs of managers.



There are four types of Information System: **Transaction Processing System (TPS**), **Management Information System (MIS)**, **Decision Support System (DSS)** and **Executive Information System (EIS)**. The type of information system used by an organization depends on its information needs.

Managing Information Technology

Information technology management (IT management) is the process whereby **all resources related to information technology** are managed **according to an organization's priorities and needs.** This includes **tangible resources** like **networking hardware, computers** and **people**, as well as **intangible resources** like **software** and **data**.

The central **aim** of IT management is to **generate value through the use of technology**. To achieve this, business strategies and technology must be aligned.

Information technology management includes many of the basic functions of management, such as **staffing**, **organizing**, **budgeting** and **control**, but it also has functions that are unique to IT, such as **software development**, **change management**, **network planning** and **tech support.**

Generally, IT is used by organizations to support and compliment their business operations. The advantages brought about by having a dedicated IT department are too great for most organizations to pass up. Some organizations actually use IT as the center of their business.

Security & Ethical challenges

Security is important for a number of reasons, specifically when it comes to protecting the privacy and sensitive data of customers, safeguarding the finances of an online business, preventing fraud and financial scams and defending the reputation of an online store as a safe place to conduct transactions.

Security is the prevention that ensures safe transaction through the internet. It consists of protocols that safeguard people who engage in business. We need to gain our customers' trust by putting in place security basics. Such basics include:

- Privacy
- Integrity
- Authentication
- Non-repudiation

1. Privacy

Privacy includes preventing any activity that will lead to the sharing of customers' data with unauthorized third parties. Apart from the organization that a customer has chosen, no one else should access their personal information and account details.

A breach of privacy occurs when organization let others have access to such information. An organization should put in place at least a necessary minimum of **anti-virus**, **firewall**, **encryption**, and other **data protection**.

2. Integrity

Integrity is another crucial concept of Security. It means ensuring that any information that customers have shared online remains unaltered. The principle states that the organization is utilizing the customers' information as given, without changing anything. Altering any part of the data causes the customers to lose confidence in the security and integrity of the organization.

3. Authentication

The principle of authentication in security requires that both the organization and the customer should be real. They should be who they say they are. The business should prove that it is real, deals with genuine items or services, and delivers what it promises. The customer should also give their proof of identity to make the organization feel secure about the online transactions. It is possible to ensure **authentication** and **identification**.

4. Non-repudiation

Repudiation means denial. Therefore, Non-repudiation is a legal principle that instructs company and customers not to deny their actions in a transaction. The business and the customer should follow through on the transaction part that they initiated. Organizations can feel less safe since it occurs in cyberspace with no live video. It confirms that the communication that occurred between the two players indeed reached the recipients. Therefore, a party in that particular transaction cannot deny a signature, email, or a purchase.

Information systems have made many businesses successful today. Some companies such as Google, Facebook, EBay, etc. would not exist without information technology. However, improper use of information technology can create problems for the organization and employees.

Cyber-crime

Cyber-crime refers to the use of information technology to commit crimes. Cyber-crimes can range from simply annoying computer users to huge financial losses. The growth of smart phones and other high-end Mobile devices that have access to the internet have also contributed to the growth of cyber-crime.

Types of cyber-crime

1. ***Financial Frauds*** – It happens when a cybercriminal uses stolen credit card data. Another form of credit card fraud is when the fraudster steals our personal details and identity to enable them to get a credit card.
2. ***Phishing Attacks*** - It is one of the common security threats where hackers masquerade as genuine businesses and send emails to clients to trick them into revealing their sensitive information by simply presenting them with a fake copy of our legitimate website or anything that allows the customer to believe the request is coming from the business.

Common phishing techniques include emailing our customers or our team with fake "you must take this action" messages. This technique only works our customers follow through with the action and provide them access to their login information or other personal data which the hacker can exploit as per his benefit.

3. ***Spamming*****-** Where emails are known as a strong medium for higher sales, it also remains one of the highly used mediums for spamming. Nonetheless, comments on our blog or contact forms are also an open invitation for online spammers where they leave infected links in order to harm us. They often send them via social media inbox and wait for us to click on such messages.
4. ***DOS Attacks-***A Denial-of-Service (DoS) attack is an attack meant to shut down a machine or network, making it inaccessible to its intended users. DoS attacks accomplish this by flooding the target with traffic, or sending it information that triggers a crash.
5. ***Brute Force Attacks***- These attacks target our online store's admin panel in an attempt to figure out our password by brute-force A brute force attack uses trial-and-error to guess login info, encryption keys, or find a hidden web page. Hackers work through all possible combinations hoping to guess correctly.
6. ***Malware***- A malware attack is a common cyberattack where malware (normally malicious software) executes unauthorized actions on the victim's system. Hackers may design a malicious software and install on our IT and computer systems without our knowledge. These malicious programs include spyware, viruses, Trojan horses, and ransomware.

   The systems of our customers, admins, and other users might have Trojan Horses downloaded on them. These programs can easily swipe any sensitive data that might be present on the infected systems and may also infect our website.
7. ***e-Skimming*****-** E-skimming involves infecting a website's checkout pages with malicious software. The intention is to steal the clients' personal and payment details. Skimming is an illegal practice used by identity thieves to capture credit card information from a cardholder surreptitiously. Fraudsters often use a device called a skimmer that can be installed at ATM machines to collect card data.
8. ***SQL Injections*****-** SQL injections are cyber-attacks intended to access our database by targeting our query submission forms. Attacker can inject SQL of their choosing into the database and delete, copy, or modify the contents of the database. An attacker can also modify cookies to poison a web application's database query.

By using above mentioned attacks cyber-attack can perform following crimes as

Identity theft

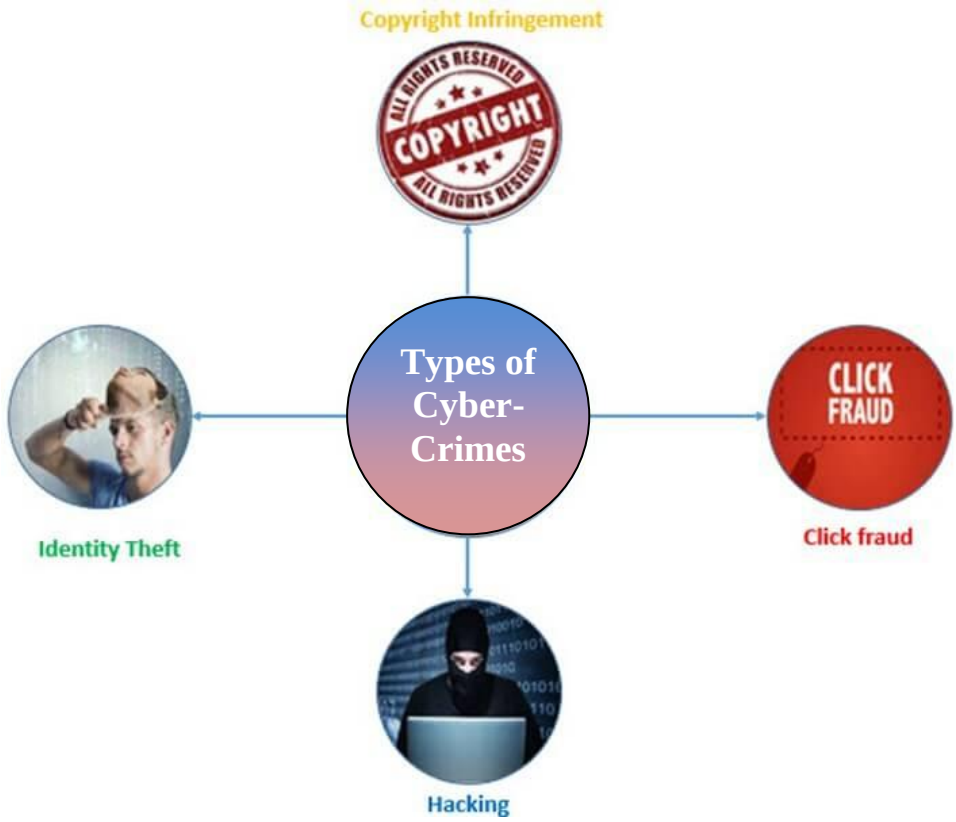
Identity theft occurs when a cyber-criminal impersonates someone else identity to practice malfunction. This is usually done by accessing personal details of someone else. The details used in such crimes include social security numbers, date of birth, credit and debit card numbers, passport numbers, etc.

Once the information has been acquired by the cyber-criminal, it can be used to make purchases online while impersonating him-self to be someone else. One of the ways that cyber-criminals use to obtain such personal details is phishing. **Phishing involves creating fake websites that look like legitimate business websites or emails**.

For example, an email that appears to come from YAHOO may ask the user to confirm their personal details including contact numbers and email password. If the user falls for the trick and updates the details and provides the password, the attacker will have access to personal details and the email of the victim.

If the victim uses services such as PayPal, then the attacker can use the account to make purchases online or transfer funds.

Other phishing techniques involve the use of fake Wi-Fi hotspots that look like legitimate ones. This is common in public places such as restaurants and airports. If an unsuspecting user logons into the network, then cyber-crimes may try to gain access to sensitive information such as usernames, passwords, credit card numbers, etc.



Copyright infringement

Piracy is one of the biggest problems with digital products. Websites such as the pirate bay are used to distribute copyrighted materials such as audio, video, software, etc. Copyright infringement refers to the unauthorized use of copyrighted materials.

Fast internet access and reducing costs of storage have also contributed to the growth of copyright infringement crimes.

Click fraud

Advertising companies such as Google AdSense offer pay per click advertising services. Click fraud occurs when a person clicks such a link with no intention of knowing more about the click but to make more money. This can also be accomplished by using automated software that makes the clicks.

Hacking

Hacking is used to by-pass security controls to gain unauthorized access to a system. Once the attacker has gained access to the system, they can do whatever they want. Some of the common activities done when system is hacked are;

- Install programs that allow the attackers to spy on the user or control their system remotely
- Deface websites
- Steal sensitive information. This can be done using techniques such as SQL Injection, exploiting vulnerabilities in the database software to gain access, social engineering techniques that trick users into submitting id's and passwords, etc.

Information system Security

MIS security refers to measures put in place to protect information system resources from unauthorized access or being compromised. Security vulnerabilities are weaknesses in a computer system, software, or hardware that can be exploited by the attacker to gain unauthorized access or compromise a system.

People as part of the information system components can also be exploited using social engineering techniques. The goal of social engineering is to gain the trust of the users of the system.

Guaranteeing effective information security has the following key aspects −

- Preventing the unauthorized individuals or systems from accessing the information. To achieve this we can use **firewalls**.
- Maintaining and assuring the accuracy and consistency of data over its entire life-cycle.

- Ensuring that the computing systems, the security controls used to protect it and the communication channels used to access it, functioning correctly all the time, thus making information available in all situations.
- Ensuring that the data, transactions, communications or documents are genuine. It can be achieved by using **authentication techniques** like **OTP** (One Time Password).
- Ensuring the integrity of a transaction by validating that both parties involved are genuine, by incorporating authentication features such as "**digital signatures**".
- Ensuring that once a transaction takes place, none of the parties can deny it, either having received a transaction, or having sent a transaction. By this we can achieve '**non-repudiation**' principle.
- Safeguarding data and communications stored and shared in network systems.

Information system Ethics

Ethics refers to rules of right and wrong that people use to make choices to guide their behaviors. Ethics in MIS seek to protect and safeguard individuals and society by using information systems responsibly. Most professions usually have defined a code of ethics or code of conduct guidelines that all professionals affiliated with the profession must adhere to.

In a nutshell, a code of ethics makes individuals acting on their free will responsible and accountable for their actions. An example of a Code of Ethics for MIS professionals can be found on the British Computer Society (BCS) website.

Information Communication Technology (ICT) policy

An ICT policy is a set of guidelines that defines how an organization should use information technology and information systems responsibly. ICT policies usually include guidelines on;

- Purchase and usage of hardware equipment and how to safely dispose them
- Use of licensed software only and ensuring that all software is up to date with latest patches for security reasons
- Rules on how to create passwords (complexity enforcement), changing passwords, etc.
- Acceptable use of information technology and information systems
- Training of all users involved in using ICT and MIS

With great power comes great responsibility. Information systems bring new opportunities and advantages to how we do business but they also introduce issues that can negatively affect society (cybercrime). An organization needs to address these issues and come up with a framework (MIS security, ICT policy, etc.) that addresses them.

Advanced Concepts in Information Systems

Enterprise Resource Planning

ERP is an abbreviation for Enterprise Resource planning. Enterprise resource planning (ERP) is a system used by companies to manage and integrate the important parts of their businesses. Many ERP software applications are important to companies because they help them implement resource planning by integrating all of the processes needed to run their companies with a single system.

Benefits of the ERP are:

1. Optimization of business processes.
2. Accurate and timely access to reliable information.
3. The ability to share information between all components of the organization.
4. Elimination of unnecessary operations and data.
5. Reduction of time and costs of proceedings
6. Then, as each module of the ERP system enters the same real-time database, another advantage is that no duplicate records or playback operations, i.e., redundancy is avoided.
7. The performance of all work units that make up their business because better use time is increased. If you previously had to make reports and take them from one place to another, now the time is spent on other activities.
8. To improve performance and save time, optimize the control and analysis of management decisions there in the long term, reduced costs for the company.
9. Another obvious advantage is in terms of customer service, because the response time is reduced attention to them.
10. When a company has an ERP system is more competitive in the environment in which it operates.

All the below-mentioned modules can be found in an ERP system:

- Human Resource
- Inventory
- Sales & Marketing
- Purchase
- Finance & Accounting
- Customer Relationship Management(CRM)
- Engineering/ Production
- Supply Chain Management (SCM)

Each component mentioned above is specialized to handle the defined business processes of the organization. Let us go through the introduction of the various modules.

Human Resource Module(HR):

Human Resource module helps to HR team for efficient management of human resources. HR module helps to manage employee information, track employee records like performance reviews, designations, job descriptions, skill matrix, time & attendance tracking. One of the important submodules in the HR module is Payroll System which helps to manage salaries, payment reports etc. It can also include Travel Expenses & Reimbursement tracking. Employee Training tracking can also be managed by ERP.

Inventory Module:

Inventory module can be used to track the stock of items. Items can be identified by unique serial numbers. Using that unique numbers inventory system can keep track of item and trace its current location in the organization.

e.g. you have purchased 100 hard disks, so using inventory system you can track how many hard disks are installed, where they are installed, how many hard disks are remaining etc.

Inventory module includes functionalities like inventory control, master units, stock utilization reporting etc.

There may be an integration of the inventory module with the purchase module of ERP.

Sales Module :

Typical sales process includes processes like Sales queries & inquiry analysis & handling, quotation drafting, accepting sales orders, drafting sales invoices with proper taxation, dispatch/Shipment of material or service, tracking pending sales order. All these sales transactions are managed by the sales module of ERP. CRM module can take the help of the Sales module for future opportunity creation & lead generation.

Purchase Module:

As the name indicates, purchase modules take care of all the processes that are part of the procurement of items or raw materials that are required for the organization. Purchase module consists of functionalities like supplier/vendor listing, supplier & item linking, sending quotation request to vendors, receiving & recording quotations, analysis of quotations, preparing purchase orders, tracking the purchase items, preparing

GRNs(Good Receipt Notes) & updating stocks & various reports. Purchase module is integrated with Inventory module & Engineering/production module for updating of stocks.

Finance & Accounting module:

Whole inflow & outflow of money/capital is managed by the finance module. This module keeps track of all account-related transactions like expenditures, Balance sheet, account ledgers, budgeting, bank statements, payment receipts, tax management etc. Financial reporting is an easy task for this module of ERP. Any Financial data that is required for running the business is available on one click in Finance module.

Customer Relationship Management (CRM) module:

CRM department is helping to boost the sales performance through better customer service & establishing a healthy relationship with customers. All the stored details of the customer are available in the CRM module.

CRM module helps to manage & track detailed information of the customer like communication history, calls, meetings, details of purchases made by the customer, contract duration etc. CRM module can be integrated with the Sales module to enhance sales opportunities.

Engineering / Production module:

Production module is a great help for the manufacturing industry for delivering the product.

This module consists of functionalities like production planning, machine scheduling, raw material usage,(Bill of material)preparation, track daily production progress production forecasting & actual production reporting.

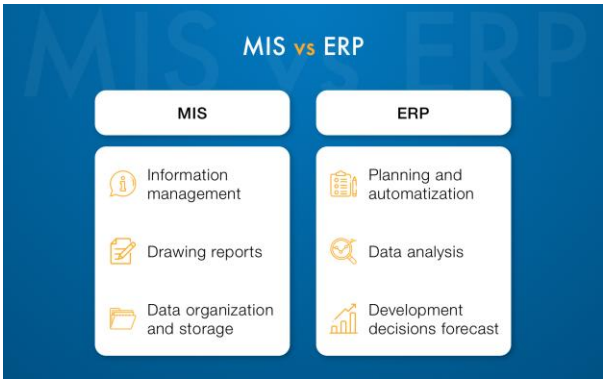
Supply Chain Management (SCM):

SCM module manages the flow of product items from manufacturer to consumer & consumer to manufacturer. Common roles involved are a manufacturer, Super Stockiest, Stockiest, distributors, retailers etc. SCM involves demand & supply management, sales returns & replacing process, shipping & transportation tracking etc.

Today many SMBs face challenges in their process automation. ERP is a great help for such organizations. ERP can efficiently streamline the business operations of the organization. Above introduction of modules can help you to choose & customize the ERP modules depending on your organization's requirements.

MIS vs ERP

MIS is used for the general management and use of information. It helps organize and store data collected from various sources in a single database and makes related reports. **ERP** is used to plan and automate business processes.



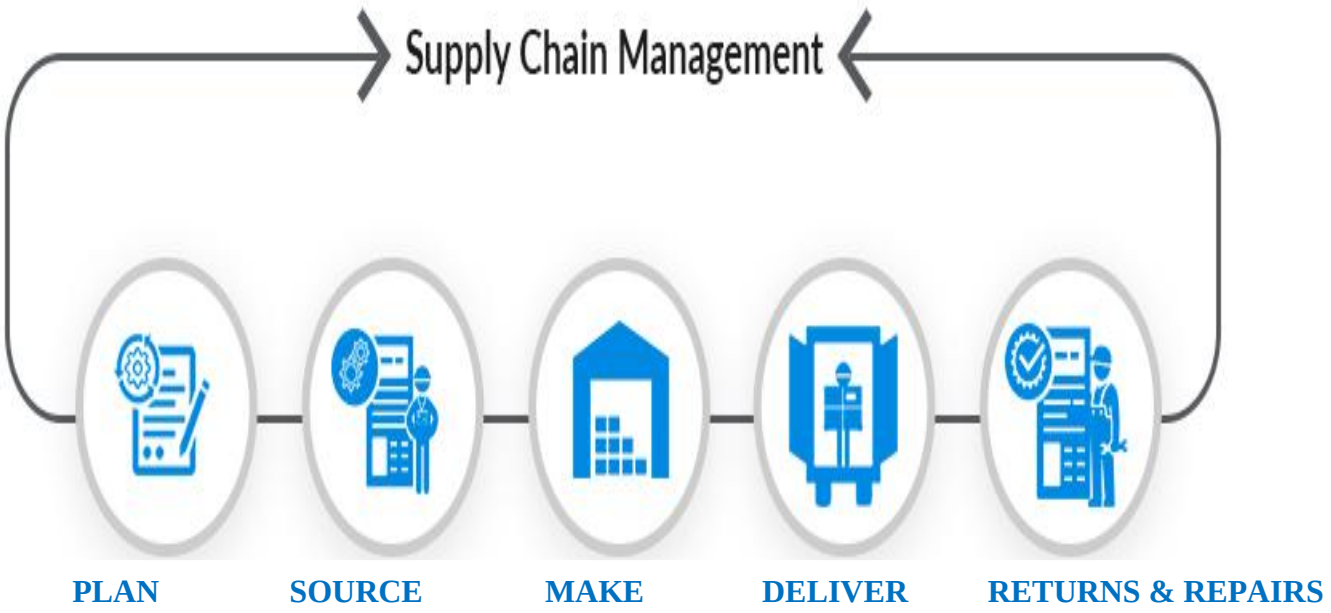
Supply Chain Management

- SCM- Supply Chain Management is the management of the **flow of goods** and **services** and includes all processes that transform **raw materials into final products**. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace.
- It is the handling of the entire production flow of a good or service — starting from the raw components all the way to delivering the final product to the consumer.

SCM Involves Following Steps

Stage 1: Planning

Planning involves a wide range of activities. Companies must first decide on their operations strategy. Whether to manufacture a product or component or buy it from a supplier is a major decision.



Stage 2: Source

- This aspect of supply chain management involves organizing the procurement of raw materials and components.
- Procurement is the acquisition of goods and services at the best possible price, in the right quantity and at the right time.
- When sources have been selected and vetted, companies must negotiate contracts and schedule deliveries.

Stage 3: Making

This stage is concerned with assembling, making of products, storing of product, scheduling of production activities, testing of products, packing and release. Companies must also manage rules for performance, data that must be stored, facilities and regulatory compliance.

Stage 4: Deliver / Distribution

Another most important component of supply chain management is contributing to direct/indirect integration with the consumers. It has a significant contribution to surge the brand image of the firm. Finished goods and services, as demanded by consumers, have to meet expectations through the company's delivery channels and logistics services. To have a seamless delivery, the firm utilizes various freights – road, air and rail.

The delivery stage includes any trial period or warranty period, customers or retail sites must be invoiced and payments received, and companies must manage import and export requirements for the finished product.

Stage 5: Returns & Repairs

Return is associated with managing all returns of defective products, including identifying the product condition, authorizing returns, scheduling product shipments, replacing defective products and providing refunds. Returns also include "end-of-life" products (those that are in the end of their product lifetime and a vendor will no longer be marketing, selling, or promoting a particular product and may also be limiting or ending support for the product).

Customer Relationship Management

CRM- Customer Relationship Management is the technology used to manage relations with customers and potential customers. A CRM system helps organizations build customer relationships and streamline processes so they can increase sales, improve customer service, and increase profitability.

CRM is to manage interactions with customers and potential customers. A CRM system helps organizations build customer relationships and streamline processes so they can increase sales, improve customer service, and increase profitability.

Goals of CRM

- Provide better customer services.
- Cross sell product, Cross-selling is a strategy of providing existing customers the opportunity to purchase additional items offered by the seller.
- Cross-selling involves offering the customer items that complement the original purchase in some manner more effectively.
- The telecommunications industry is a prime example of this type of sales activity. When establishing local telephone service, the new subscriber is often invited to enjoy other telecommunications options offered by the service provider. These may include long distance packages, cell phone services, or high-speed Internet services.

- Up selling involves promoting upgrades or add-ons to customers that are extra purchases and increase sales. When you up sell, you offer the customer another product for purchase.
- Incentives are crucial features of up selling. Incentives such as a discount and/or free shipping give the customer good reasons to purchase something extra right away.
- Helps sales staff close deals faster
- Increase customer revenue
- Personally recognizing customers;
- Offering appropriate value and great service to encourage repeat business;
- Ensuring that employee and customer satisfaction continues to improve.
- Beating the competition by offering a better product, competing on the service experience rather than price alone.

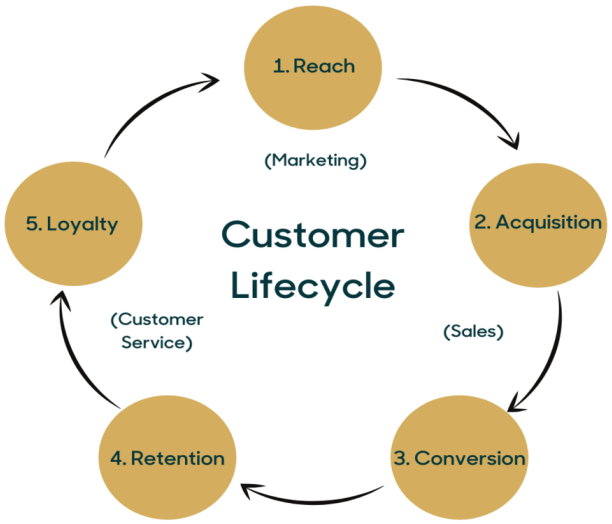
Steps of CRM Process

The CRM process is a strategy for keeping every customer interaction personalized and meaningful that consists of five main steps. A customer relationship management system (CRM system) provides the data and functionalities your team needs to execute this strategy—and ultimately turn leads into customers.

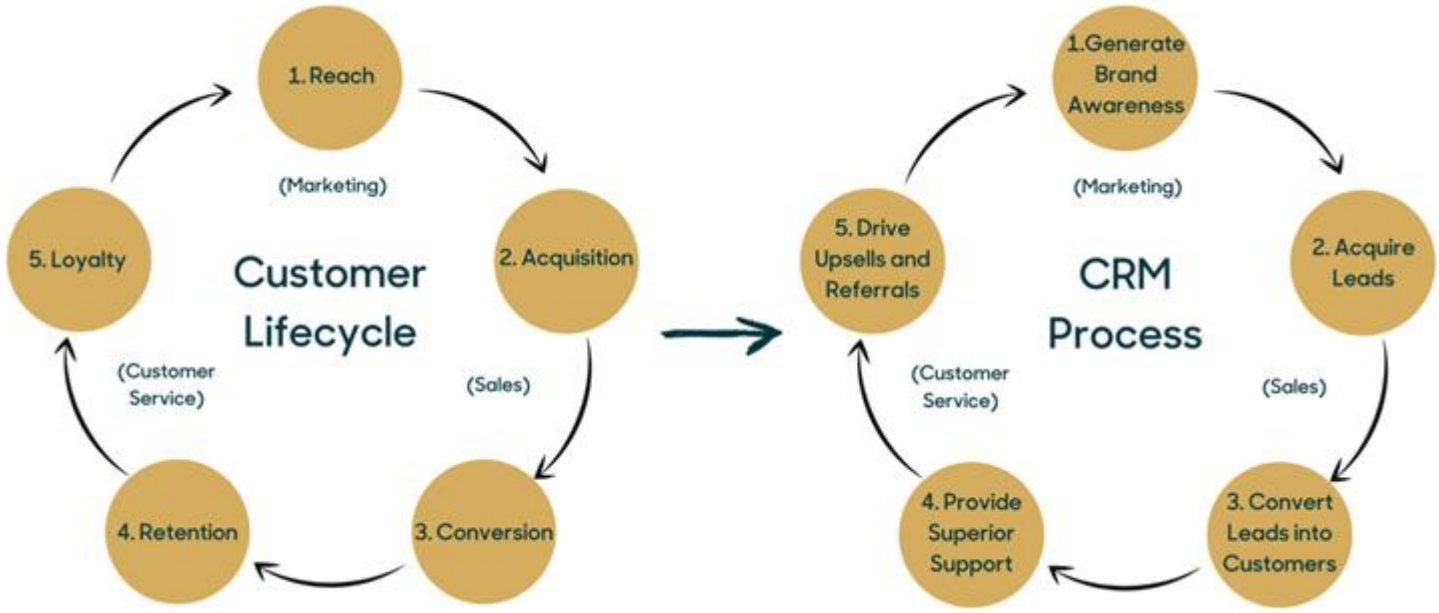
To understand the steps of the CRM process, we have to understand the customer lifecycle.

There are five key stages in the CRM cycle:

1. Reaching a potential customer
2. Customer acquisition
3. Conversion
4. Customer retention
5. Customer loyalty



Every stage in the customer lifecycle corresponds with an actionable step in the CRM process. The key knows what those steps are and how to execute them.



Five steps in the CRM process

1. Generate brand awareness

The first step to acquiring new customers is to introduce them to our business. The marketing team typically takes on this task through a number of measures

- Learning about your target audience.
- Segmenting your target audience.
- Creating marketing campaigns that speak to those target demographics.

2. Acquire leads

Introducing our brand to a potential customer is just the beginning of the CRM process. From there, we have to encourage them to learn more about our business and engage with it.

Depending on how our company is structured, this lead acquisition step could be a marketing or sales team responsibility — or both.

3. Convert leads into customers

We've successfully engaged with our leads, and they're interested. Now it's time to turn those leads into customers.

To do so, sales reps must first be skilled at identifying how interested leads are and, specifically, whether they're interested enough to make a purchase. A CRM system is very helpful here. The historical data from past successful sales can be used to identify lead-qualification criteria.

4. Provide superior customer service

We've successfully converted our lead into a customer. Great! But the CRM process doesn't end when a customer converts. In order to grow as a company, we need to retain customers. How do we keep that customer coming back? Excellent service from support is the answer.

Customer service is the biggest factor that determines a consumer's loyalty to a brand. Conversely, poor customer service can cost our customers and negatively impact our reputation. Support teams must be able to deliver superior support whenever, wherever, and however their customers expect it.

Most of customers say being able to resolve their issue quickly is the most important aspect of a good customer service experience. With CRM software, support agents can easily access the historical customer information they need to resolve a ticket quickly.

5. Drive Upsells and Referrals

When we think of a returning customer, we imagine a customer continually coming back to the same business to buy the products they know and love. But there is another key way existing customers provide value — by upgrading to other products.

- **Upsell-** Invite customers to buy the same product they've selected but give them the option to access more features at a higher price. For example, if you sell fitness trackers online, let customers know they can also buy models with a pedometer and calorie tracker vs. the basic model that only tracks heart rate.
- **Referrals- Customer referrals** are one of the most powerful selling and marketing tools available. In fact, the best source of new business is a **referral** from a satisfied **customer**.

  Referral marketing is a word-of-mouth initiative designed by a company to incentivize existing customers to introduce their family, friends and contacts to become new customers.

Procurement Management

Procurement management is the systematic approach used for buying all the goods and services needed for a company to stay sustainable. Manage your procurement well, and it will add value to all your business practices and save your both time and money.

Procurement Management Information System (PMIS) is a smart system which collects stores and synthesizes the procurement related information all over the country. It is an online based central and integrated data management system concerning to the procurement activities.

Today, different organizations employ various management techniques to carry out the efficient functioning of their departments. Procurement management is one such form of management, where goods and services are acquired from a different organization or firm.

All organizations deal with this form of management at some point in the life of their businesses. It is in the way the procurement is carried out and the planning of the process that will ensure the things run smoothly.

But with many other management techniques in use, is there any special reason to use this particular form of management to acquire goods and services? Yes, this is one of the frequent questions asked regarding procurement management.

Procurement management is known to help an organization to save much of the money spent when purchasing goods and services from outside. It also has several other advantages.

How Does Procurement Management Works?

Following are the four main working areas of concerns when it comes to procurement management. The following points should be considered whenever procurement process is involved:

- Not all goods and services that a business requires need to be purchased from outside. It is for this reason that it is very essential to weigh the pros and cons of purchasing or renting these goods and services from outside.
- You would need to have a good idea of what you exactly require and then go on to consider various options and alternatives. Although there may be several suppliers, who provide the same goods and services, careful research would show you who of these suppliers will give you the best deal for your organization.
- The next step typically would be to call for bids. During this stage, the different suppliers will provide you with quotes.

This stage is similar to that of choosing projects, as you would need to consider different criteria, apart from just the cost, to finally decide on which supplier you would want to go with.

- After the evaluation process, you would be able to select the best supplier. You would then need to move on to the step of discussing what should go into the contract. Remember to mention all financing terms how you wish to make the payments, and so on, so as to prevent any confusion arising later on, as this contract will be binding.

Procurement Management Process

This Procurement Management process will help you to purchase goods and services from external suppliers.

It gives you a complete procurement process and procurement procedures, which explain step-by-step, how to purchase from suppliers.

This procurement process will also help you to:

- Identify the goods and services to procure
- Complete Purchase Orders and issue to suppliers
- Agree on delivery timeframes and methods
- Receive goods and services from suppliers
- Review and accept the items procured
- Approve supplier payments

This Procurement Management Process will enable you to:

- Identify supplier contract milestones
- Review supplier performance against contract
- Identify and resolve supplier performance issues
- Communicate the status to management

Procuring goods and services from external suppliers can be a critical path for many projects. Often, the performance of the supplier will reflect on the performance of the overall project team. It's therefore crucial that you manage your supplier’s performance carefully, to ensure that they produce deliverables which meet your expectations.

This Procurement Management Process will help you do this to get the most out of your external supplier relationships.