

## M.COM –MANAGEMENT INFORMATION SYSTEMS (MIS)

### UNIT-I

#### FUNDAMENTAL INFORMATION SYSTEM CONCEPTS

##### **Concept of information**

Information is an increment in knowledge: it contributes to the general framework of concepts and facts that we know. Information relies on the context and the recipient's general knowledge for its significance.

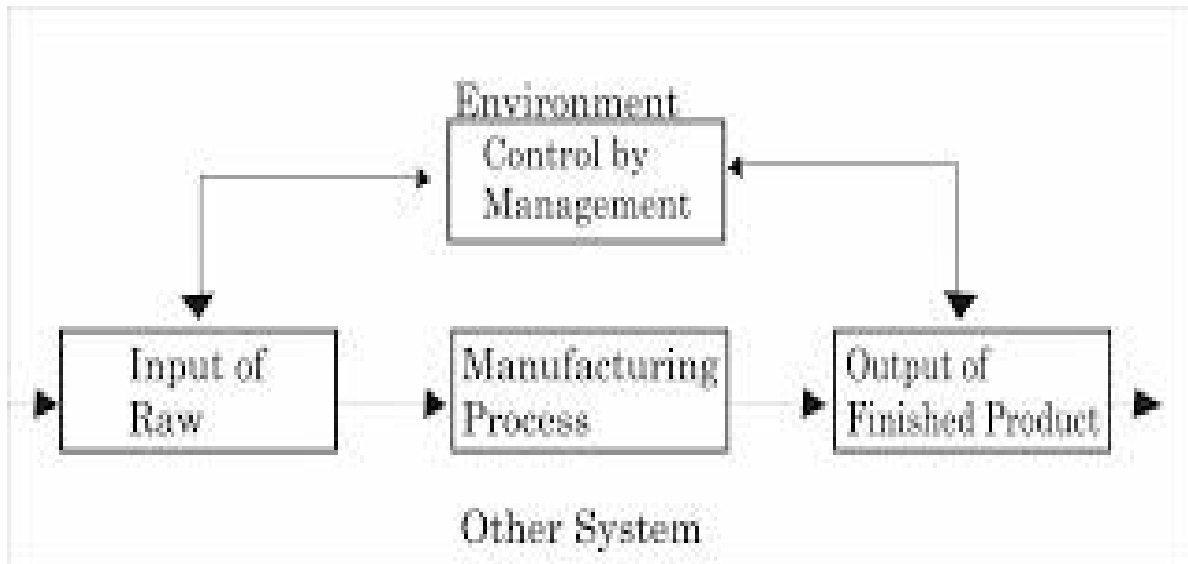
Data are only the raw facts, the material for obtaining information. Information systems use data stored in computer databases to provide needed information. A database is an organized collection of interrelated data reflecting a major aspect of a firm's activities.

##### SYSTEM CONCEPT:

A System as a group of interrelated or interacting element forming a unit which, working towards a common goal. e.g. The System of sun and planets, the system of human body, the system of a college, the system of business organisation.

For the field of Information Technology "A System is a group of interrelated component working together toward a common goal by accepting inputs and producing output in an organised transformation process. Such as a system (called dynamic system has three basic interacting components or element.

- Input: Input involves capturing and assembling element that enter the system to be processed. For example: raw material, energy, data and human effort must be secured (protected) and organize for process
- Processing:  
It is method or series of steps by which data changes into information (output).  
Examples are a manufacturing process, the human breathing process, or mathematical calculations etc.
- Output: Result of process data and instruction that is obtained from the system. For example, finished products, result etc.



The System Concept can be made more useful by including two additional components: feedback and control.

#### **Feedback & Control:**

- **Feedback:**

Feedback is data about the performance of a system. It is necessary to know whether the results of data processing are helpful for the business or not. In this step, we take the comments of different users about the data processing system and its output. This step is helpful for future planning. For example, data about sales performance is feedback to a sales manager.

- **Control:**

Control involves monitoring and evaluating feedback to determine whether a system is moving toward the achievement of its goal. The control function then makes necessary adjustments to the system's input and processing components to ensure that it produces proper output. For example, a sales manager exercises control when he or she reassigns salespersons to new sales territories after evaluating feedback about their sales performance.

#### **CHARACTERISTICS OF SYSTEM**

The characteristics of a common system are as under:

- A system does not exist in a vacuum rather than it exists and functions in an environment containing other systems.

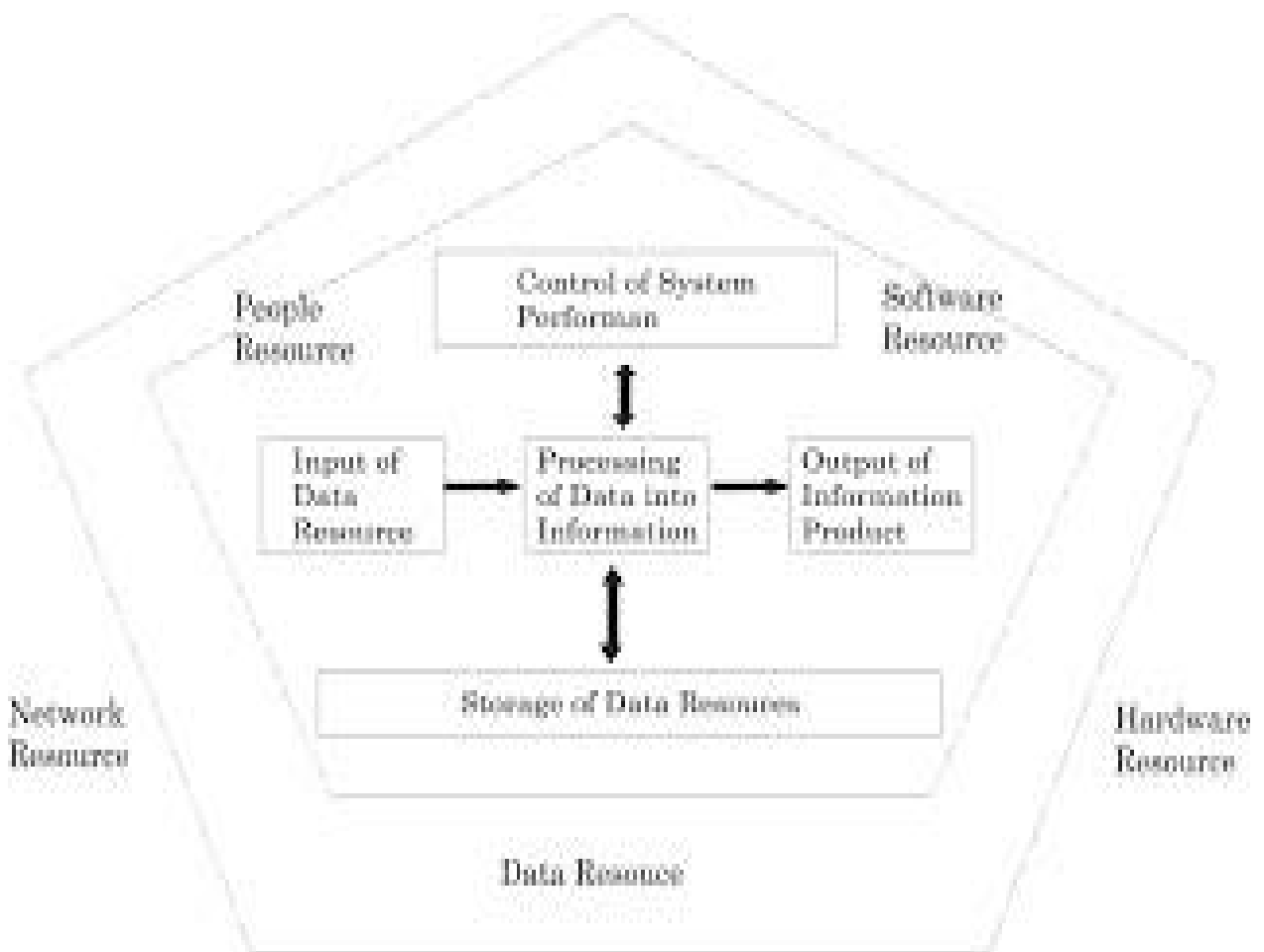
- A large system may have more than one small system called sub system and the large system is its environment.
- Several system may share the same environment. Some of these system may be connected to one another by mean of share boundary or interface.
- A system may be open system that is a system that interact with other system in its environment.
- A system has the ability to change itself or the environment in order to survive as an adaptive system.

**Example:**

Organisation such as business and government agencies are good examples of the system in society, which is their environment, society contains a multitude of such systems, including individuals and their social, political and economic institutions. Organisations themselves consist of many subsystems, such as department, division, and other work groups. Organisations are open system, because they interface and interact with other systems in the environment..

**NAME & DIAGRAM OF COMPONENT OF AN INFORMATION SYSTEM**

Information System is a system that accepts data resources as input and processes them into information products as output.



1. **Resources:**

People, hardware, software, data and networks are five basic resources consist of Information System.

2. **Activities:**

Input, Processing, Output, Storage & Controls. All information system uses these components to transform raw material into information product.

## **INFORMATION SYSTEM RESOURCE WITH HELP OF DIAGRAM**

Information System consists of five major resources people, hardware, software, data and network, which you can see above diagram.

- **People Resource:**

People are required for the operation of all Information System. People resources include programmer and all other person who use computer. The basic purpose of any Information System is to provide information to the people.

- **Specialists:**

Are people who develop[ and operate Information System. They include System Analysts, Programmers, Computer Operators, and other Managerial Technical and Clerical IS Personal (Workers),

- **End Users:**

End user also called users or client) anyone else who uses Information System.

- **Hardware Resources:**

The hardware component consists of all the physical devices used within the Information System. The equipment includes hardware like computer, terminals and printers and non-computer equipment like typewriter, other machine, paper, printing ribbon etc.,

- **Machine:**

Computers, video monitors, magnetic disk devices, printers, optical disk,

- **Media:**

Media (tangible object on which data recorded): Floppy disk, magnetic tape, optical disks, plastic cards, paper forms, CD's Rom.

- **Software Resources:**

The computer programmed used for processing information and control hardware such as MS-Office, payroll program, peach-tree and Windows etc.

- **Data Resources:**

Data is raw material of Information System. Data is necessary for any Information System. Any deficiency in data causes it seriously. Data can take many forms, including Alphabetic, numeric, alphanumeric data, other character that describes business transaction. The data resources are organised , stored, and accessed by a variety of sources management technologies.

For Example: Name, Address, Product descriptions, Customer records, employee files, inventory databases.

- **Network Resources:**

Networks used for data communication and internet to exchange information.

## **INFORMATION SYSTEM ACTIVITIES**

The Information System activities (functions) are input, processing, output, storage and control.

1. **Input of Data Resource:**

Data about business transactions and other events must be captured and prepared for processing by the input or data entry activity such as recording and editing. End-user enter data directly into a computer system or record data on some type of physical medium such as paper form. Once entered, data may be transfer on to a machine-readable medium such as magnetic disk, optical disk etc until needed for processing.

For example sale data could be captured by sale person using computer keyboard are optical scanning device to enter data into the computer.

2. **Processing of Data in to Information:**

Data are usually process through calculating: computing, sorting, organise, analyze manipulate data, thus converting data into information for end user.

For example calculating employee's pay, taxes and other payroll deduction.

3. **Output of Information Product:**

Information in various forms in transmitted to end users and make available to them in the output activity. Productions of appropriate information products for end user as the goal of information system. Common information product include massages, reports, forms, and graphics image which may be provided by video displays, audio response, paper report, and multimedia e.g. producing and displays about sales performance.

4. **Storage of Data Resources** Storage is a basic system component of an Information System in which data and information are retained in an organised manner for later use. Stored data are commonly organised into fields, records, files and databases e.g. Storing records of customers, employees and products.

5. **Control of System Performance:**

It involves measuring performance and taking corrective decisions if required. An Information System should produce feedback about its input, processing, output and be evaluated to determine if the system is not meeting standards. Then appropriate system activities must be adjusted so that proper information products are produced for end users. These activities are known as control.

For example, a manager may discover that the subtotal of sales amounts in a sales report does not add up to total sales. This might mean that data entries or processing procedures need to be corrected. Then changes would have to be made to ensure that all sales transactions would be properly captured and processed by a sales information system e.g. Generating audible signals to indicate proper entry of sales data.

### **RECOGNISING INFORMATION SYSTEM (Different Types of Information System)**

There are many kinds of Information System in the real world. All of them use hardware, software, people and other resources to transform data into information products. There are different types of Information System, which are as under.

- **Manual Information System:**

In a manual Information System everything is done by hand. All types of calculations, processing and operations required to convert data into information, are performed by human beings. In a Manual Information System people use simple tools such as pencils and paper etc.

- **Mechanical Information System:**

In this data processing different calculation processing is performed with mechanical machines.

- **Electronic Data Processing System or Computer Based Information System:**

The Computer based Information System where people use computer system to transform data in to information products. The input of data is given to the computer, which converts this data into information by applying the required processing. In computer different software packages are used for data processing.

As a business professional, you should be able to recognise the fundamental of Information System.

- The people, hardware, software, data and network resources they use.
- The types of Information Product they produce.
- The way they perform input, processing, output, storage and control activities.

### **EXPANDING ROLE OF INFORMATION SYSTEM**

Until the 1960s, the role of most Information System was simple transaction processing, record keeping, accounting and other electronic data processing applications. Then another role was added as the concept of management information systems (MIS). By the 1970s, respecified information products produced by such MIS were not adequately meeting many of the decision making needs of management. So the concept of decision support system (DSS) was born. In the 1980s, several new roles of Information System appeared. First the rapid development of microcomputer processing power, application software package and telecommunication networks gave birth to the phenomenon of end user computing. Now end users could use their own computing resources to support their job requirement instead of waiting for the indirect support of corporate information services department.

Second Executing Information Systems attempted to give top executive an easy way to get the critical information they want, when they want it, tailored to the formats they prefer.

Third, the use of Artificial Intelligence (AI) technique to business information systems, expert system (ES) and other knowledge based systems forged a new role for Information System.

An important new role the concept of strategic role for information system, sometimes called strategic information system (SIS) (1980 - 90). In this concept information technology becomes an integral component of business process, products and service that help a company gain a competitive advantage in the global marketplace.

Finally, the rapid growth of the internet, intranet, extra-net and other interconnected global networks of the 1990s has dramatically changed the capabilities of Information System in the business. Inter a networked enterprise that is e-commerce and e-business.

## **TYPES OF INFORMATION SYSTEM**

There are two types of Information System of Information System can be classified in to two types.

1. Operation Support System.
2. Management Support System.

### **Operation Support System:**

An Information System that collects, process and stores data generated by the operations systems of an organisation and produces data and information for input in to management information system or the control of an operations system. These system produce a variety of information products for internal and external use. The role of Operation Support System in the business firms is to efficiently process business transactions, control industrial process, support enterprise communication and collaboration and update corporate database.

There are three types of Operation Support Systems.

- **Transaction Processing System:**

This system is used to store and process day-to-day business activities. Automated Teller Machine (ATM) is an example of Transaction Processing System (TPS). This system processes data faster reduce clerical costs and improves customer service. Transaction processing system process transaction in two ways.

- **Batch Processing:**

In this data of transactions is accumulated over a period of time and process periodically.

- **Real Time Processing:**

In this data are processed immediately after a transaction occurs.

- **Process Control System:**

Process control system monitors and control physical process. e.g. a petroleum refinery uses electronic sensors linked to computers to continually monitor chemical process and make instant (real time) adjustments that control refinery process.

- **Office Automation System:**

Office Automation Systems collect, process, store and transmit information in the form electronic office communications. Office Automation System provides the facilities to create and distribute graphics and documents, send messages, schedule appointment, browse the web and publish web pages. The Office Automation System enhances office communication and productivity. Most important Office Automation Software is Word Processing, Spread Sheet, and Database. Presentation, E-Mail, Web Browser and Personal Information Management.



For Example a business may Word-Processing for office correspondence, electronic mail to send and receive electronic messages, desktop publishing to produce a company newsletter and teleconferencing to hold electronic meetings.

## **Subsystems of MIS**

Systems may consist of numerous sub-systems, each of which has elements, interactions, and objectives. Subsystems perform specialized tasks related to the overall objectives of the total system.

A system exists on more than one level and can be composed of subsystems or element parts.

Following are the subsystems of Management Information System:

1. Transaction Processing System
2. Management Reporting System
3. Decision Support System
4. Office Information System
5. Business Expert System

**Transaction Processing System** - A transaction is defined as an exchange between two or more business entities. Overall transaction processing, also known as data processing, reflects the principal business activities of a firm like - sales, production, inventory, shipping, receiving, billing, accounts payable, accounts receivables, payroll, general ledger, etc. Transactions are important events for an organization, and collecting data about them is called transaction processing. Transaction Processing System's primary purpose is to record, process, validate, and store transactions that take place in the various functional areas of a business for future retrieval and use. Transaction processing systems are cross-functional information systems that process data resulting from the occurrence of business transactions.

- A TPS records internal and external transactions for a company.
- A TPS performs routine and repetitive tasks. It is mostly used by lower level managers to make operational decisions.
- Transactions can be recorded in batch mode or online. In batch mode files are updated periodically; and in online mode, each transaction is recorded as it occurs.

- TPS is a six step process - Data entry, Data capture, Data validation, Processing and re-validation, Storage, Output generation, and Query support.

**Management Reporting System** - Management Reporting Systems are the most elaborate of management oriented MIS components. Its main objective is to provide lower and middle management with printed reports and inquiry capabilities to help maintain operational and management control of enterprise.

- MRSs are usually developed by information system professionals, rather than by end users.
- MRSs are oriented towards reporting on the past and the present, rather than projecting the future.
- MRSs largely report on internal company operations.
- MRSs generally have limited analytical capabilities.
- MRSs do not directly support the decision-making process
- MRSs provide Scheduled or Periodic Reports, Exception Reports, and Demand or Ad-hoc Report.

**Decision Support System** - Decision Support Systems are a class of computerized information systems that support decision-making activities. DSS are interactive computer-based systems and subsystems intended to help decision makers. A DSS may present information graphically and may include an expert system or artificial intelligence. DSS tend to be designed primarily to serve management control level and strategic planning level managers.

- DSSs support for decision-makers in semi-structured and unstructured problems.
- DSSs are more focused on specific decision rather than routine flows of information.
- DSS present information graphically and may include an expert system or artificial intelligence.
- DSSs are adaptive over time.

**Office Information System** - Office Information System is an information system that uses hardware, software, and networks to enhance work flow and better communication between employees. Office automation refers to the application of computer and communication technology to office functions. Office automation systems are meant to improve the productivity of managers at various level of management by providing secretarial assistance and better communication facilities. Office automation systems are the combination of hardware, software and people in information systems, that process office transactions and

support office activities at all levels of the organization. These systems include a wide range of support facilities, which include word processing, electronic filing, electronic mail, message switching, data storage, data and voice communication etc.

**Business Expert System** - Business expert system is a knowledge based information system that uses its knowledge about a specific, complex application area to act as an expert. This system is one of the knowledge based information system. Expert system provides decision support to managers in the form of advice from an expert in a specific problem area. Expert systems find application in diverse areas, ranging from medical, engineering and business.

### **CLASSIFICATION OF INFORMATION SYSTEM**

There are five types others categories of Information System.

#### **1. Expert System:**

An Expert System is a knowledge based Information System that uses its knowledge about a specific area to act as an expert consultant to users medicine, engineering, physical science and business. For example: Expert System now helps diagnose illness, search for minerals, analyse compound, recommend repair and do financial planning. OR

An Expert System is an intelligent computer program, which contains knowledge about some particular field to assist human expert or provide information to those people who do not have any access to an expert in that particular field.

#### **2. End Users Computing System (Knowledge Management System):**

End Users Computing Systems are computer-based information system that directly support both the operational and managerial applications of end users. End Users Computing are the direct use of computers by end users. In End User Computing System end users use microcomputer workstations, software packages and databases for personal productivity, information retrieval, decision support and application development. For example, users may use word-processing, spreadsheet, send e-mail and retrieve information from data base. End Users Computing is the involvement of end users (including employees, managers and executive) in the development use if information system.

#### **3. Strategic Information System:**

The Strategic Information System using information technology to develop products, services and capabilities that gives company strategic advantages over the competitive forces it faces in the global marketplace. This creates Strategic Information System, information system that support or shape the competitive position and strategic of an enterprise. So a Strategic Information System can be any kind of Information System (TPS, MIS, DSS etc) that helps an organisation gain a competitive advantages, reduce competitive disadvantages, or meet other strategic enterprise objective. e.g. online stock trading, shipment tracking and e-commerce WEB systems.

#### 4. **Business Information System:**

Information System that support basic business functions such as accounting or marketing are known as Business Information System. Business Information Systems provide managers with a variety of information products to support their decision-making responsibilities in each of the functional area of business. for example Information System that support application in accounting finance, marketing, operation management and human resources management. Financial Managers need information concerning financing cost and investment returns provided by financial information system. Marketing managers need information about sales performance and trends provided by marketing information system.

#### 5. **Integrated Information System:**

Many software applications use a mixture of different types of Information Systems to create information for different types of users. Most Information System designed to produce information and support decision making for various levels of management and business function as well as do record keeping and transaction processing.

## **SYSTEMS APPROACH**

The system approach to a business organization implies a wholistic approach to the study of— inter-relationships of sub-systems of an organization in view of the objectives set by the organisation. Thus, this requires an integrated approach which could reduce the conflict among different— sub-systems and modify the objectives of these sub-systems in order to arrive at an

optimum solution to the problems which may arise in the achievement of the main objectives or in the working of the whole system.

### **Characteristics of system**

- Every system has a purpose.
- Every system is made up of components like input process output, feedback and control etc.
- System is made up of subsystem, whose goals are referred to as sub goals.
- Goal of a system is more important than subsystem goal.
- Systems whether open or closed have an element of control associated with them.

### **Types of System**

There is several way of classifying systems that emphasizes the differences. Classification of system is as follows

**1) Open & Closed Systems** –An open system interfaces and interacts with other system. An open system needs to receive feedback to change and continue to exist in its environment. Example – A marketing system is an open system.

A closed system does not exchange the information with its environment. It does not have any connection to the other system. Example – Research & development of organization, ICU dept. of hospital, etc.

**2) Physical & Abstract System** – Physical system are tangible entities that may be static or dynamic in operations. For example the physical parts of the computer center are the computers, desk, chair, etc. that facilitate operation of the computer.

**3) Abstract systems** are conceptual and non physical entities. They may be formulas of relationship among set of variables or models, software / program.

**4) Deterministic & Probabilistic System** – A deterministic system works with certainty in predictable manner. The interaction among its subsystem is known in advance. One state of the system determines the next state of the system. Example – A computer system which works on the principal GIGO.

**5) A probabilistic system** operates with uncertainty as certain degree of error is always attached with prediction of what the system will do. Example – A student admission system in a college is probable in nature. Systems approach is an organized way of dealing with a problem.

### **System approach in planning, organizing & Controlling MIS**

System Approach in Planning – The important function of management is planning. Planning means deciding in advance, what has to be done, who has to do it, when is to be done and how it is to be done. The planning process consist of two steps –

- 1) Developing the strategic
- 2) Formulating the steps, timing and cost, required to achieve the strategy.

**System Approach in Organizing** – Organizing is important to manager because it helps in effective group action. It also helps in maintaining the people to work together. It consist of following points –

1. The formal organization system as described in chart policies and procedure.
2. The informal organizing.
3. The individual as a system
4. The organizational communication system.
5. The power system.
6. The functional system.
7. The management process system.
8. The material logistic system.

The different phases of organizing are:

### **Develop a technical organization**

- Start with total company objectives and develop a hierarchy of systems required.
- Involve specialists in developing a team, matrix or a system.

- System Approach in Controlling – Controlling is important because it is needed to achieve the desired result. The most common process consists of three steps.

### **Information system**

Information systems are a set of people, procedures and resources that collect, transform and disseminate information in an organization.

There are six building blocks of an information system, which are input, output, technology, models, database and control.

**Types of Information System-** there are two types of information system.

**1 Operation Information system** – it processes the data generated by and used in business operations. It is of two types:-

I) Transaction processing system

II) Office Automation system

**2. Management information System** – MIS provides information to support management decision making.

I) Decision Support System

II) Executive information System

## **MEANING, DEFINITION AND OBJECTIVES OF MIS**

### **Meaning**

MIS is an integrated man-machine system which collects, maintains, correlates and selectively displays information in the proper time frame consistently, to meet the specific needs of various levels of management in order that decisions could be made and action taken for fulfilling the objectives of an organization.

In other words it is a system which:

- Provides information to support managerial functions. (Planning, control, organizing, operating)
- Collects information systematically and routinely in accordance with a well-defined set of rules.

iii. Includes files, hardware, software and operations research models of processing, storing, retrieving and transmitting information to the users.

### **Definition of MIS**

A system that collects, process, stores the data and distributes information to help in decision making for managerial function. It is also defined as the integrated user machine system for providing information to supports the decision making operations & achieving organizational goal.

According to Jerome “A system that aids management in making, carrying out and controlling decisions”.

According to Kelley, “A combination of human and computer based resources which results in collection, storage, retrieval, communication and use of efficient management of operations and for business planning”.

### **Objectives**

1. **Facilitate:** The decision making process by furnishing information in the proper time frame.
2. **Provide:** It requisite information at each level of management to carry out their functions.
3. **Help:** In highlighting the critical factors to the closely monitored for success
4. **Support:** Support decision making in both structured and unstructured problem environments.
5. **Provide:** Provide a system of people, computers, and procedures, interactive query facilities documents for collecting, storing, retrieving and transmitting information to the users.

### **Role of MIS**

1. MIS ensure that appropriate and relevant data is collected from various sources, processed and is sent further to the needy destination.
2. It fulfils the need of individual, workgroup and management.
3. MIS satisfies the diverse need of various systems like query, Analysis, Modelling, DSS.
4. MIS helps in strategic planning, management control, operational control and transaction processing level.
5. MIS play important role in information generation, communication, problem identification and decision making administration.
6. With good MIS support marketing, finance, production, and personal functions increases efficiently.
7. MIS helps in streamlining of the operations.



8. MIS creates structured database and therefore saves the time.
9. MIS bring clarity in communication and understanding this help in bringing high degree of professionalism.
10. MIS helps in systemization of business operation through tools and techniques of the computer, which makes task simpler, accurate and faster.

### **Strategies for determining MIS design**

MIS design should be specific to an organization, respecting its age, structure, and operations.

Six strategies for determining MIS design have been suggested by Blumenthal (1969):

- 1) Organization-chart approach using this approach, the MIS is designed based on the traditional functional areas, such as finance, administration, production, R&D and extension. These functional areas define current organizational boundaries and structure.
- 2) Integrate-later approach largely a laissez faire approach, it does not conform to any specified formats as part of an overall design. There is no notion of how the MIS will evolve in the organization. Such an MIS becomes difficult to integrate. In today's environment - where managers demand quick and repeated access to information from across sub-systems - the integrate-later approach is becoming less and less popular.
- 3) Data-collection approach This approach involves collection of all data which might be relevant to MIS design. The collected data are then classified. This classification influences the way the data can be exploited usefully at a later stage. The classification therefore needs to be done extremely carefully.
- 4) Database approach A large and detailed database is amassed, stored and maintained. The database approach is more and more accepted for two main reasons: first, because of data independence it allows for easier system development, even without attempting a complete MIS; and, second, it provides management with immediate access to information required.
- 5) Top-down approach The top-down approach involves defining the information needs for successive layers of management. If information required at the top remains relatively stable in terms of level of detail, content and frequency, the system could fulfil MIS requirements (Zani, 1970). The usefulness of this approach depends on the nature of the organization. It can be suitable for those organizations where there is a difference in the type of information required at the various levels.

·6) Total-system approach In this approach the interrelationships of the basic information are defined prior to implementation. Data collection, storage and processing are designed and done within the framework of the total system. This approach can be successfully implemented in organizations which are developing.

### **Planning for MIS**

MIS design and development process has to address the following issues successfully –

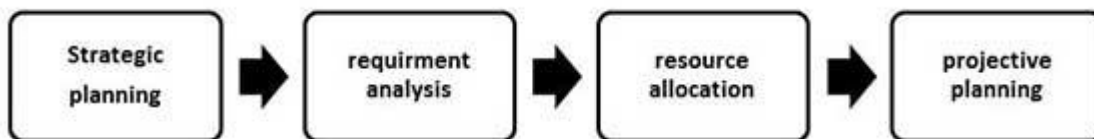
- There should be effective communication between the developers and users of the system.
- There should be synchronization in understanding of management, processes and IT among the users as well as the developers.
- Understanding of the information needs of managers from different functional areas and combining these needs into a single integrated system.
- Creating a unified MIS covering the entire organization will lead to a more economical, faster and more integrated system, however it will increase in design complexity manifold.
- The MIS has to be interacting with the complex environment comprising all other sub-systems in the overall information system of the organization. So, it is extremely necessary to understand and define the requirements of MIS in the context of the organization.
- It should keep pace with changes in environment, changing demands of the customers and growing competition.
- It should utilize fast developing in IT capabilities in the best possible ways.
- Cost and time of installing such advanced IT-based systems is high, so there should not be a need for frequent and major modifications.
- It should take care of not only the users i.e., the managers but also other stakeholders like employees, customers and suppliers.

Once the organizational planning stage is over, the designer of the system should take the following strategic decisions for the achievement of MIS goals and objectives –

- Development Strategy – Example - an online, real-time batch.
- System Development Strategy – Designer selects an approach to system development like operational verses functional, accounting verses analysis.
- Resources for the Development – Designer has to select resources. Resources can be in-house verses external, customized or use of package.
- Manpower Composition – The staffs should have analysts, and programmers.

Information system planning essentially involves –

- Identification of the stage of information system in the organization.
- Identification of the application of organizational IS.
- Evolution of each of this application based on the established evolution criteria.
- Establishing a priority ranking for these applications.
- Determining the optimum architecture of IS for serving the top priority applications.



### **Implementation of MIS**

There are four basic methods for implementing the MIS once the design has been completed.

This are–

1. Cut off the old system and install the new. This produces a time gap during which no system. Small is n operation. It is practical only for small companies or small systems where installation required one or two dates. An exception to this would be the installation of a larger system during a plant’s vacation shut down or some other period of inactivity.
2. Cut over by segments. This method is also referred to as “phasing in” the new system. Small parts or subsystems are substituted for the old. If this method is possible, some careful questions should be asked about the design of the new system. Is it really just an automation of isolated groups of clerical activities? Generally, new systems are not substitutable piece by piece for previous non systems. However, in the case of upgrading old system, this may be a very desirable method.

3. Operate in parallel and cut over. The new system is installed and operated in parallel with the current system until it has been checked out; then the current system is cut out. This method is expensive because of personnel and related costs. However, it is required in certain essential systems, such as payroll or customer billing. Its big advantage is that the system is fairly well debugged when it becomes the essential information system of the company.

**Identity the Implementation Tasks The major implementation tasks, or milestones, usually consist of**

1. Planning the implementation activities.
2. Acquiring and laying out facilities and offices
3. Organizing the personnel for implementation
4. Developing procedures for installation and testing
5. Developing the training program for operating personnel
6. Completing the system's software
7. Acquiring required hardware
8. Generating files
9. Designing forms
10. Testing of the entire system
11. completing cutover to the new system
12. Documenting the system
13. Evaluating the MIS
14. Providing system maintenance (debugging and improving)

Planning the implementation activities

- Establish Relationships among Tasks
- Establish a schedule
- Prepare a Cost schedule Tied to tasks and time

- Establish a reporting and control system

## UNIT-II

### **Information technology**

Information technology (IT) is the use of computers to store, retrieve, transmit, and manipulate data or information. IT is typically used within the context of business operations as opposed to personal or entertainment technologies. IT is considered to be a subset of information and communications technology (ICT).

### **Concept of Information Technology**

Information is a resource which has no value until it is extracted, processed and utilized. Information technology deals with information system, data storage, access, retrieval, analysis and intelligent decision making. Information technology refers to the creation, gathering, processing, storage, presentation and dissemination of information and also the processes and devices that enable all this to be done.

Information technology is affecting us as individual and as a society. Information technology stands firmly on hardware and software of a computer and tele-communication infrastructure.

**Definition:** A term that encompasses all forms of technology used to create, store, exchange and utilize information in its various forms including business data, conversations, still images, motion pictures and multimedia presentations.

### **Information technology architecture**

Information technology architecture is a detailed description of the various information processing assets needed to meet business objectives, the rules that govern them, and the information associated with them. It affects three levels within an organization, including the server, middleware, and client.

Information **technology architecture** is a detailed description of the various information-processing assets needed to meet business objectives, the rules that govern them, and the

information associated with them. It focuses on three basic tiers within the organization. We'll look at them as they relate to our newspaper business example:

- Server - generally hardware, this level provides the basic computing power for the entire organization and is typically centrally located. This is the equipment in the computer room of the newspaper business mentioned above.
- Middleware - generally software, this level sits on top of the server level and provides the infrastructure necessary to keep the hardware running and the information flowing. These are the tools and utilities used by the information technology people in the newspaper business.
- Client - A combination of hardware and software, this level provides the capabilities accessible by a user and allows them to access the information a business has available. These are the things the reporters use in newspaper business (personal computers, printers, applications, etc.).

In addition, several documents of interest are created that provide details for how the levels are organized and administered. They are as follows:

- Products - a list of hardware and software used by the architecture.
- Standards & Guidelines - the set of rules for implementation and use of the various assets and the level at which each is provided within the architecture.
- Services - a list of functions and features the architecture will provide.
- Principles - a set of guiding ideas that form the basis of the architecture.
- Policies - a set of rules that enforce the principles of the architecture.

## **Computer Hardware**

Hardware refers to the physical elements of a computer. This is also sometime called the machinery or the equipment of the computer.

Hardware represents the physical and tangible components of a computer, i.e. the components that can be seen and touched.

Examples of Hardware are the following –

- **Input devices** – keyboard, mouse, etc.
- **Output devices** – printer, monitor, etc.
- **Secondary storage devices** – Hard disk, CD, DVD, etc.
- **Internal components** – CPU, motherboard, RAM, etc.

## **Discuss the current trends in computer hardware platforms**

### **The Mobile Digital Platform**

Based on new handheld hardware like cell phones and tablet computers

### **Nanotechnology**

Creating computer chips and other devices, thousands of times smaller through manipulating individual atoms, molecules

### **Grid Computing**

Connects geographically remote computers into a single network to combine processing power and create virtual supercomputer

Provides cost savings, speed, agility

### **Virtualization**

Allows single physical resource to act as multiple resources (i.e. run multiple instances of OS)

- Reduces hardware and power expenditures
- Facilitates hardware centralization

Type of software that allows a single computer (or clusters of connected computers) to function as if it were several different computers, each running its own operating system and software.

Virtualization software underpins most cloud computing efforts and can make computing more efficient, cost-effective, and scalable.

### **Cloud Computing**

A model of computing in which firms and individuals obtain computing resources over the internet

Cloud infrastructure as a service

Cloud software as a service

The fastest growing (estimated revenue of close \$150 billion by 2014)

**Replacing computer resources** – either an organization's or an individuals' hardware or software – with services provided by the internet

Most valuable to smaller companies Autonomic Computing

Development of system that can configure themselves, heal themselves, ex: self-updating antivirus software

## **Software**

Software is a set of programs, which is designed to perform a well-defined function. A program is a sequence of instructions written to solve a particular problem.

There are two types of software –

- System Software
- Application Software

### **System Software**

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users.

Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.

Here is a list of some of the most prominent features of a system software –

- Close to the system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate
- Generally written in low-level language

### **Application Software**



Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Application software may consist of a single program, such as Microsoft's notepad for writing and editing a simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Examples of Application software are the following –

- Payroll Software
- Student Record Software
- Inventory Management Software
- Income Tax Software
- Railways Reservation Software
- Microsoft Office Suite Software
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint

Features of application software are as follows –

- Close to the user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

## **Relationship between Hardware and Software**

- Hardware and software are mutually dependent on each other. Both of them must work together to make a computer produce a useful output.
- Software cannot be utilized without supporting hardware.
- Hardware without a set of programs to operate upon cannot be utilized and is useless.
- To get a particular job done on the computer, relevant software should be loaded into the hardware.
- Hardware is a one-time expense.
- Software development is very expensive and is a continuing expense.
- Different software applications can be loaded on a hardware to run different jobs.
- Software acts as an interface between the user and the hardware.
- If the hardware is the 'heart' of a computer system, then the software is its 'soul'. Both are complementary to each other.

### **Computer peripheral**

A computer peripheral is any external device that provides input and output for the computer. For example, a keyboard and mouse are input peripherals, while a monitor and printer are output peripherals. Computer peripherals, or peripheral devices, are sometimes called "I/O devices" because they provide input and output for the computer. Some peripherals, such as external hard drives, provide both input and output for the computer.

### **Types of Peripheral Devices**

There are many different peripheral devices, but they fall into three general categories:

1. **Input devices**, such as a mouse and a keyboard
2. **Output devices**, such as a monitor and a printer
3. **Storage devices**, such as a hard drive or flash drive

**Database:** Database is a collection of inter-related data which helps in efficient retrieval, insertion and deletion of data from database and organizes the data in the form of tables, views, schemas, reports etc. For Example, university database organizes the data about students, faculty, and admin staff etc. which helps in efficient retrieval, insertion and deletion of data from it.

**DDL** is short name of Data Definition Language, which deals with database schemas and descriptions, of how the data should reside in the database.

**CREATE:** to create a database and its objects like (table, index, views, store procedure, function, and triggers)

**ALTER:** alters the structure of the existing database

**DROP:** delete objects from the database

**TRUNCATE:** remove all records from a table, including all spaces allocated for the records are removed

**COMMENT:** add comments to the data dictionary

**RENAME:** rename an object

**DML** is short name of Data Manipulation Language which deals with data manipulation and includes most common SQL statements such SELECT, INSERT, UPDATE, DELETE, etc., and it is used to store, modify, retrieve, delete and update data in a database.

**SELECT:** retrieve data from a database

**INSERT:** insert data into a table

**UPDATE:** updates existing data within a table

**DELETE:** Delete all records from a database table

**MERGE:** UPSERT operation (insert or update)

**CALL:** call a PL/SQL or Java subprogram

**EXPLAIN PLAN:** interpretation of the data access path

**LOCK TABLE:** concurrency Control

**Database Management System:** The software which is used to manage database is called Database Management System (DBMS). For Example, MySQL, Oracle etc. are popular commercial DBMS used in different applications.

### **File management**

File management describes the fundamental methods for naming, storing and handling files. By using appropriate file and folder naming, strategies, along with good metadata practice and catalog software.

A file management system is used for file maintenance (or management) operations. It is a type of software that manages data files in a computer system. A file management system has limited capabilities and is designed to manage individual or group files, such as special office documents and records. It may display report details, like owner, creation date, state of completion and similar features useful in an office environment.

A file management system is also known as a file manager.

**1.File Management:** The process and act of creating an organized structure in which you store information for easy retrieval.

**2.Drive:** A drive is a computer storage device that holds information. It is the top-level location (or "Root" directory) for file storage. Drives are usually designated with a letter such as C:\ (which is typically the hard drive of the computer you are working on). Other examples of drives would be the network drive on campus (which is the Z:\ drive) and external USB drives that you may use such as a Flash or Thumb Drive. The letters of these drives vary depending on the computer that you are using.

**3.Folder:** A folder is a storage location within a drive. Another term for a folder is a "directory" however the term "folder" has become the term of choice for most. A folder can consist of files or additional folders (called " **Subfolders**"). Users can create folders that accommodate their method of organization. For example, you may want to store all of your work for your English course in a particular area of your computer to make it easier for you to find.To do this you might create a folder on your C:\ drive named "English" and then within the "English" folder create two additional subfolders -- One for Papers and one for Journals. The folder structure would look like the example to the right.

**4.File:** A file can be a document, spreadsheet, image, or other type of item that is stored on a computer. Files are typically associated with a program or software application that is needed in order to open the item.

**5.File Extension:** The file extension appears after the period in the filename and is used to indicate the type of format the file is in. For example the file extension ".docx" indicates that the file is a Microsoft Word document. A complete filename using this extension may look like this: "Letter to Mom.docx"

**6.Path:** The path refers to the exact location of the file and indicates to the computer user the entire sequence that must be followed to find the file. The path begins with the drive and then includes any folders or subfolders that house the file. In the screenshot above, a Microsoft Word document named "paper1.docx" that is stored in the "Papers" folder would have the path: C:\English\Papers\paper1.docx.

**7.File Management Utility:** A *File Management Utility* is a computer program that provides a user with a graphical interface in which he/she can organize files and folders on a computer's storage device.

**8. Zipping (Compressing):** Zipping is the process of packaging a folder that contains multiple files into a single file (called a "Compressed" or "Zipped" folder). In addition to combining

multiple files into one, the resulting zipped folder typically takes up less storage space.

Knowing how to zip files is especially useful when you need to send multiple files to someone either (example: through email or an online course). A Zip folder has a ".zip" file extension and the icon for the zip folder typically looks like a folder with a zipper. In order for the recipient to view the files, they would first need to unzip (or Extract) the zipped folder to be able to access the individual items inside.

## **Database model**

A Database model defines the logical design and structure of a database and defines how data will be stored, accessed and updated in a database management system. While the Relational Model is the most widely used database model, there are other models too:

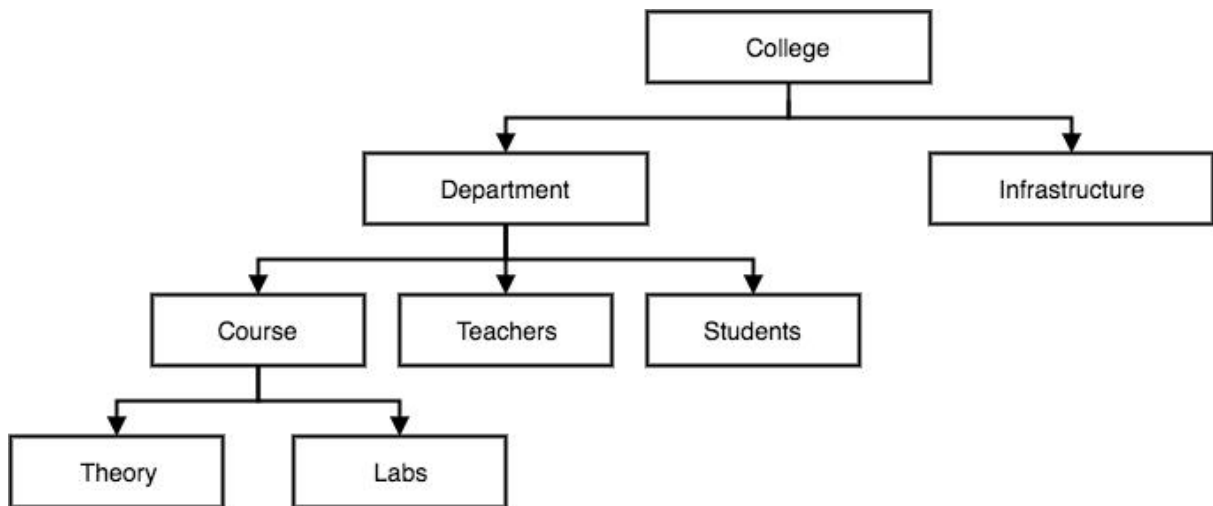
- Hierarchical Model
- Network Model
- Entity-relationship Model
- Relational Model

## **Hierarchical Model**

This database model organises data into a tree-like-structure, with a single root, to which all the other data is linked. The hierarchy starts from the **Root** data, and expands like a tree, adding child nodes to the parent nodes. In this model, a child node will only have a single parent node.

This model efficiently describes many real-world relationships like index of a book, recipes etc.

In hierarchical model, data is organised into tree-like structure with one one-to-many relationship between two different types of data, for example, one department can have many courses, many professors and of-course many students.

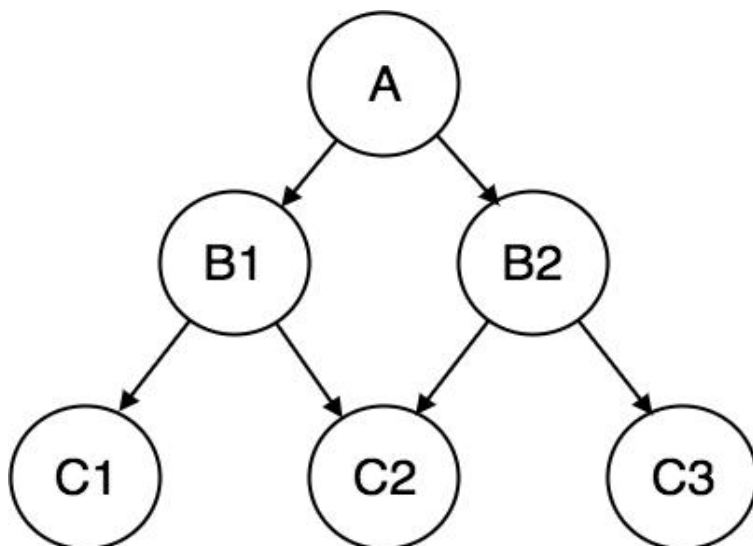


### Network Model

This is an extension of the Hierarchical model. In this model data is organised more like a graph, and are allowed to have more than one parent node.

In this database model data is more related as more relationships are established in this database model. Also, as the data is more related, hence accessing the data is also easier and fast. This database model was used to map many-to-many data relationships.

This was the most widely used database model, before Relational Model was introduced.

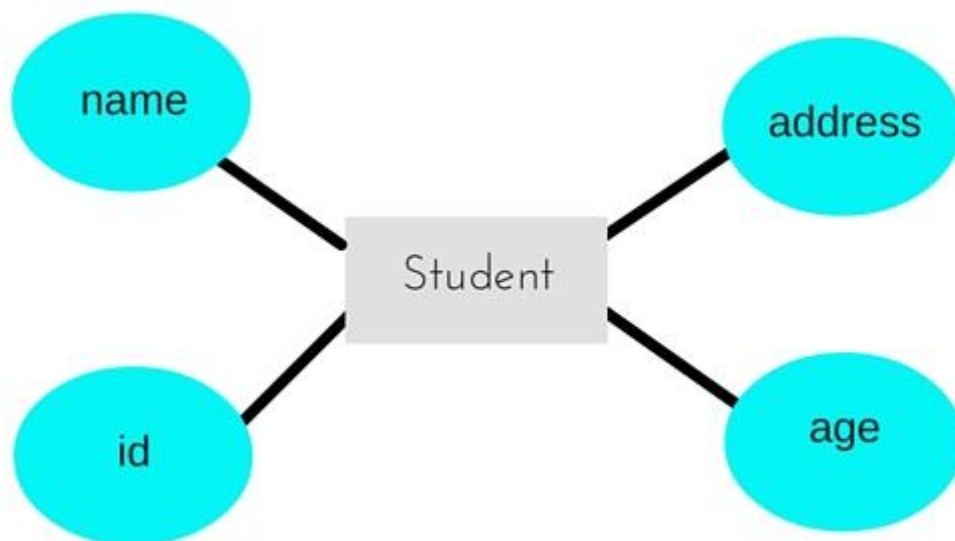


## Entity-relationship Model

In this database model, relationships are created by dividing object of interest into entity and its characteristics into attributes. Different entities are related using relationships. E-R Models are defined to represent the relationships into pictorial form to make it easier for different stakeholders to understand.

This model is good to design a database, which can then be turned into tables in relational model(explained below).

Let's take an example, If we have to design a School Database, then Student will be an entity with attributes name, age, address etc. As Address is generally complex, it can be another entity with attributes street name, pincode, city etc, and there will be a relationship between them.

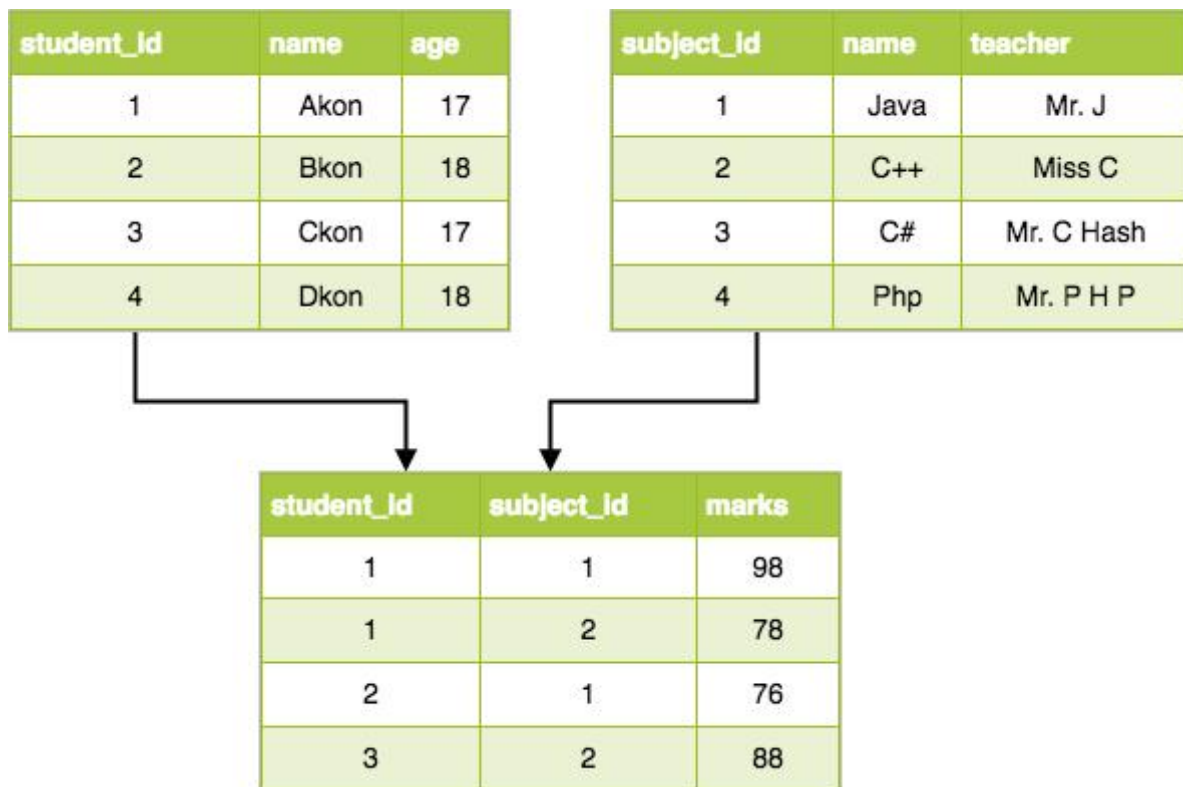


## Relational Model

In this model, data is organised in two-dimensional tables and the relationship is maintained by storing a common field. This model was introduced by E.F Codd in 1970, and since then it has been the most widely used database model, infact, we can say the only database model used around the world. The basic structure of data in the relational model is tables. All the information related to a particular type is stored in rows of that table.

Hence, tables are also known as relations in relational model.

In the coming tutorials we will learn how to design tables, normalize them to reduce data redundancy and how to use Structured Query language to access data from tables.



## Database Management System

Database Management System or DBMS in short refers to the technology of storing and retrieving users data with utmost efficiency along with appropriate security measures. This tutorial explains the basics of DBMS such as its architecture, data models, data schemas, data independence, E-R model, relation model, relational database design, and storage and file structure and much more.

### Why to Learn DBMS?

Traditionally, data was organized in file formats. DBMS was a new concept then, and all the research was done to make it overcome the deficiencies in traditional style of data management. A modern DBMS has the following characteristics –

- **Real-world entity** – A modern DBMS is more realistic and uses real-world entities to design its architecture. It uses the behavior and attributes too. For example, a school database may use students as an entity and their age as an attribute.



- **Relation-based tables** – DBMS allows entities and relations among them to form tables. A user can understand the architecture of a database just by looking at the table names.
- **Isolation of data and application**– A database system is entirely different than its data. A database is an active entity, whereas data is said to be passive, on which the database works and organizes. DBMS also stores metadata, which is data about data, to ease its own process.
- **Less redundancy** – DBMS follows the rules of normalization, which splits a relation when any of its attributes is having redundancy in values. Normalization is a mathematically rich and scientific process that reduces data redundancy.
- **Consistency** – Consistency is a state where every relation in a database remains consistent. There exist methods and techniques, which can detect attempt of leaving database in inconsistent state. A DBMS can provide greater consistency as compared to earlier forms of data storing applications like file-processing systems.
- **Query Language** – DBMS is equipped with query language, which makes it more efficient to retrieve and manipulate data. A user can apply as many and as different filtering options as required to retrieve a set of data. Traditionally it was not possible where file-processing system was used.

### **Applications of DBMS**

**Database** is a collection of related data and data is a collection of facts and figures that can be processed to produce information.

Mostly data represents recordable facts. Data aids in producing information, which is based on facts. For example, if we have data about marks obtained by all students, we can then conclude about toppers and average marks.

A **database management system** stores data in such a way that it becomes easier to retrieve, manipulate, and produce information. Following are the important characteristics and applications of DBMS.

- **ACID Properties** – DBMS follows the concepts of Atomicity, Consistency, Isolation, and Durability (normally shortened as ACID). These concepts are applied on transactions, which manipulate data in a database. ACID properties help the database stay healthy in multi-transactional environments and in case of failure.

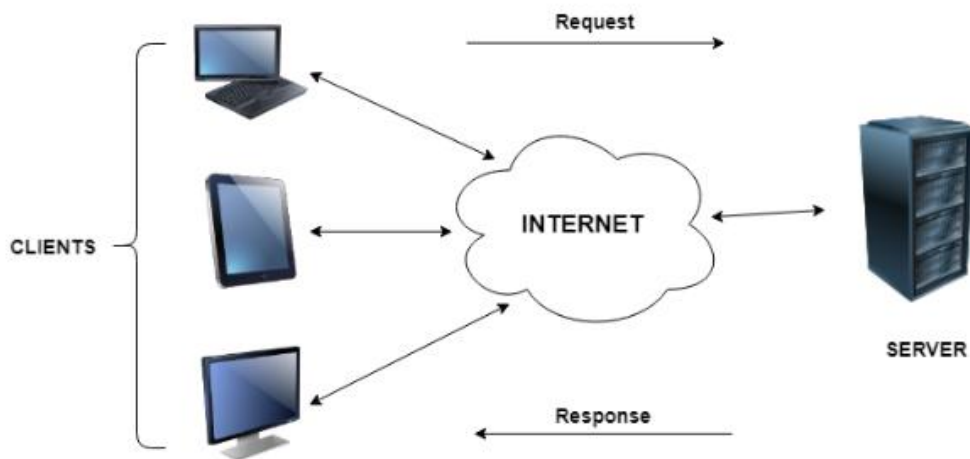
- **Multiuser and Concurrent Access**– DBMS supports multi-user environment and allows them to access and manipulate data in parallel. Though there are restrictions on transactions when users attempt to handle the same data item, but users are always unaware of them.
- **Multiple views** – DBMS offers multiple views for different users. A user who is in the Sales department will have a different view of database than a person working in the Production department. This feature enables the users to have a concentrate view of the database according to their requirements.
- **Security** – Features like multiple views offer security to some extent where users are unable to access data of other users and departments. DBMS offers methods to impose constraints while entering data into the database and retrieving the same at a later stage. DBMS offers many different levels of security features, which enables multiple users to have different views with different features. For example, a user in the Sales department cannot see the data that belongs to the Purchase department. Additionally, it can also be managed how much data of the Sales department should be displayed to the user. Since a DBMS is not saved on the disk as traditional file systems, it is very hard for miscreants to break the code.

### **Characteristics of Database Management System**

- Provides security and removes redundancy
- Self-describing nature of a database system
- Insulation between programs and data abstraction
- Support of multiple views of the data
- Sharing of data and multiuser transaction processing
- DBMS allows entities and relations among them to form tables.
- It follows the ACID concept ( Atomicity, Consistency, Isolation, and Durability).
- DBMS supports multi-user environment that allows users to access and manipulate data in parallel.

### **Client server computing**

In client server computing, the clients requests a resource and the server provides that resource. A server may serve multiple clients at the same time while a client is in contact with only one server. Both the client and server usually communicate via a computer network but sometimes they may reside in the same system.



### **Characteristics of Client Server Computing**

The salient points for client server computing are as follows:

- The client server computing works with a system of request and response. The client sends a request to the server and the server responds with the desired information.
- The client and server should follow a common communication protocol so they can easily interact with each other. All the communication protocols are available at the application layer.
- A server can only accommodate a limited number of client requests at a time. So it uses a system based to priority to respond to the requests.
- Denial of Service attacks hinders servers ability to respond to authentic client requests by inundating it with false requests.
- An example of a client server computing system is a web server. It returns the web pages to the clients that requested them.

### **Advantages of Client Server Computing**

The different advantages of client server computing are –

- All the required data is concentrated in a single place i.e. the server. So it is easy to protect the data and provide authorisation and authentication.

- The server need not be located physically close to the clients. Yet the data can be accessed efficiently.
- It is easy to replace, upgrade or relocate the nodes in the client server model because all the nodes are independent and request data only from the server.
- All the nodes i.e clients and server may not be build on similar platforms yet they can easily facilitate the transfer of data.

### **Disadvantages of Client Server Computing**

The different disadvantages of client server computing are –

- If all the clients simultaneously request data from the server, it may get overloaded. This may lead to congestion in the network.
- If the server fails for any reason, then none of the requests of the clients can be fulfilled. This leads of failure of the client server network.
- The cost of setting and maintaining a client server model are quite high

## **UNIT -III**

### **Role of communication in management**

Communication and management are closely linked with each other. Communication is directly related to the basic management functions of planning, organizing, leading and controlling. Evaluating business environment, preparing plans and making decisions requires communication. Delegation, coordination, supervision and organizational development-all are done by means of communication. Developing reward system and interacting with subordinates as a part of leading function would be impossible without communication. Establishing standards, monitoring performance and taking corrective actions as a part of control also requires communications. Therefore, communication is termed as the life-blood of an organization.

Managers perform a variety of roles such as interpersonal roles, decisional roles and informational roles for smooth running of their organization. It would be impossible to perform these roles without communication. Importance of communication in performing these managerial roles is discussed below:

1. **Interpersonal role** : Interpersonal role implies interacting with superiors, subordinates, peers and other outside parties of the organization. Performing an interpersonal role requires continuous communication with these parties.
2. **Decisional role**: It requires manager to seek out information to use in decision making and then communicate those decisions to others.
3. **Informational role**: Informational role focuses on acquiring and disseminating information.

In fine, it can be concluded that performing managerial roles and functions requires information from various internal and external sources. Therefore, managers must engage in communication. For this, it is said that none can perform management functions without communication.

## **Trends in Communications**

### **1. Mobile apps for frontline employees**

Like social tools, mobile apps for employees are maturing, but there are many opportunities which are still to be explored, particularly for communicating with frontline staff. For example, have we found a way which integrates communications into a must-have mobile app which frontline staffs need to carry out their role?

### **2. Digital signage**

Digital signage has been around for years, but its only recently that some IC functions are really exploiting its possibilities. This is an area where there are huge opportunities to be imaginative and impactful, by making signage more interactive, targeted for different groups and uses, and harmonising it with its physical surroundings.

### **3. Events**

Digital channels are changing both simple and complex physical events. Webcasting, apps, social tools and even digital walls are transforming everything from a town hall to an internal conference into a thoroughly digital experience. I'd love to know how IC professionals are using digital communications to transform traditional events.

### **4. Chatbots**

There has been a lot of recent coverage about the use of chatbots, and the various experiments being carried out by companies like Microsoft. A chatbot which can respond to natural language queries and can respond accordingly, for example by pointing people to important resources, has obvious potential. Are any internal communications pros actively experimenting with a chatbot?

#### **5. Wearables**

The development of wearables in the consumer space has been a bit back and forth, with the growth of the Apple Watch and the failure of Google Glass. However, wearables have obvious value for employees out in the field or on the factory floor. It seems likely that targeted communications will extend to wearables at some point.

#### **6. Virtual reality**

It feels like virtual reality has been waiting in the wings for ages to be a viable workplace technology. There's some overlap here with the immersive worlds of Second Life which failed to take off some years ago. Exciting opportunities are now being provided by popular VR (Virtual Reality) headsets by Oculus Rift and even the potentially disruptive combination of mobile and Google Cardboard. VR is here at last and I'm intrigued to see how it's going to be used in the workplace.

#### **7. Artificial intelligence**

You'll find different names applied to solutions which process vast amounts of organisational data and produce output and results targeted and personalised for the individual, and then continue to learn and improve. I've yet to see comms pros use the ability to surface and deliver content with tools like Microsoft Delve, and it will be exciting to see if anybody is grasping the challenge.

#### **8. Messaging**

Messaging apps are everywhere. How can these be used by central IC teams in the workplace in a way which is relevant and has value?

#### **9. The physical workplace**

The increasing digitisation of the physical workplace is apparent. The use of sensors, the growth of the Internet of Things, easier video conferencing and advances in mobile technology

and digital signage means the physical office and digital workplace environment need to be harmonised. The opportunities for internal communications are still not 100% clear, so any examples of emerging practice will be illuminating.

### 10. **An integrated experience**

With so many digital channels in play, how do you provide an integrated and consistent experience?

As well as some of these more cutting edge channels, our Awards also focus on excellent intranets, portals, ESNs and other more traditional digital communications.

1. **Intranet essentials** (new intranets or rework, core intranet elements such as search or people directory)
2. **Social, collaboration and communication** (initiatives which showcase social networking, collaboration and internal communications)
3. **Business, mobile and frontline solutions** (initiatives which deliver a specific business solution or solve a problem, serve the needs of frontline or customer-facing staff or showcase enterprise mobility)
4. **Digital workplace** (initiatives which take a holistic view of the experience of work, agile working, or an element from the wider digital workplace)

### **Telecommunications Concepts**

The term telecommunications generally refers to all types of long-distance communication that use common carriers, including telephone, television, and radio. Data communications is a subset of telecommunications and is achieved through the use of telecommunication technologies.

In modern organizations, communications technologies are integrated. Businesses are finding electronic communications essential for minimizing time and distance limitations.

Telecommunications plays a special role when customers, suppliers, vendors, and regulators are part of a multinational organization in a world that is continuously awake and doing business somewhere 24 hours a day, 7 days a week (“24/7”).

### **Telecommunications system**

A telecommunications system is a collection of compatible hardware and software arranged to communicate information from one location to another. These systems can transmit text, data, graphics, voice, documents, or video information.

The major components are:

1. **Hardware**—all types of computers and communications processors (such as a modems or small computers dedicated solely to communications).
2. **Communications media** —the physical media through which **electronic signals** are transferred; includes both wireline and wireless media.
3. **Communications networks**—the linkages among computers and communications devices.
4. **Communications processors** —devices that perform specialized data communication functions; includes front-end processors, controllers, multiplexors, and modems.
5. **Communications software**—software that controls the telecommunications system and the entire transmission process.
6. **Data communications providers** —regulated utilities or private firms that provide data communications services.
7. **Communications protocols**—the rules for transferring information across the system.
8. **Communications applications** —electronic data interchange (EDI), teleconferencing, videoconferencing, e-mail, facsimile, electronic funds transfer, and others. To transmit and receive information, a telecommunications system must perform the following separate functions that are transparent to the user:

- Transmit information.
- Establish the interface between the sender and the receiver.

### **Telecommunications Network**

A **telecommunications network** is an arrangement of computing and telecommunications resources for communication of information between distant locations.

A telecommunications network includes the following components:

1. *Terminals* for accessing the network
2. *Computers* that process information and are interconnected by the network
3. *Telecommunications links* that form a channel through which information is transmitted from a sending device to a receiving device.
4. *Telecommunications equipment* that facilitates the transmission of information.
5. *Telecommunications software* that controls message transmission over the network.

### **Scope of Telecommunications Networks**

Two principal types of telecommunications networks can be distinguished from the point of view of their geographical scope. They are:

1. Local area networks



## 2. Wide area networks

**1. Local area network (LAN)** : is a privately owned network that interconnects processors, usually microcomputers, within a building or on a campus site that includes several buildings.

### Characteristics of a LAN:

- a. LANs are the principal tool of workgroup computing
- b. LANs ensure high-speed communication within a limited area and enables the users to share facilities (peripherals) connected to it.
- c. Usually include a large-capacity, secondary storage device, where database and applications software are maintained, managed by a microcomputer acting as a file server that delivers data or program files to other computers.
- d. Facilities (peripherals) may include jukebox optical memory and fast printers
- e. Frequently, one of the facilities (peripherals) in a LAN is the gateway hardware and software that give the network users access to other networks.
- f. More group members may connect to the network from remote sites using wireless telecommunications.
- g. Links and equipment of LANs are owned by the user company, and these networks are generally much faster than WANs.
- h. LANs are generally composed of a network of microcomputers

**2. Wide area network (WAN)** : is a telecommunications network that covers a large geographical area.

### Characteristics of a WAN:

- a. The information system of an entire organization may be structured as a hierarchy. The WANs system architecture looks very much like an organization chart.
- b. WANs connect all the divisional minicomputers to the headquarters mainframe with a variety of local microcomputers and terminals located at remote sites connected, in turn, to the minicomputers.
- c. WANs provide the backbone through which all other nodes (computers and terminals) communicate.
- d. WANs often use telecommunication links and equipment provided by specialized vendors, called *common carriers*.
- e. WANs serve to interconnect multiple LANs and can make specific resources available to a large number of workstations.

**Metropolitan Area Networks (MAN)** - are telecommunications networks that interconnect various local area networks within a metropolitan area, that is, within approximately a 50 mile range.

Characteristics of a WAN:

- a. Purpose of MANs is to interconnect various LANs within a metropolitan area, that is, within approximately a 50 - mile range.
  - b. Generally, the speed of MANs is equal to that of LANs and they use similar technology.
- Interorganizational Information Systems - are shared by two or more companies.

**Communication media**

Communication media refers to the means of delivering and receiving data or information. In telecommunication, these means are transmission and storage tools or channels for data storage and transmission.

**Telecommunications Links**

Telecommunications links may be implemented with various communication media, with a corresponding variety of characteristics. The main feature of a medium is its potential transmission speed, also known as *channel capacity*, which for data transmission purposes is expressed in bits per second (bps). An alternative measure of transmission channel capacity is bandwidth - the range of signal frequencies that can be transmitted over the channel.

Six potential media are employed to implement telecommunication links:

1. Twisted pair
2. Coaxial cable
3. Fiber Optics cable
4. Terrestrial Microwave
5. Satellite Transmission
6. Radio Transmission

Three of the above transmission media are classified as guided media - in which the signal moves along an enclosed path. Guided media require wiring. They include:

1. Twisted pair
2. Coaxial cable
3. Fiber optic cable

Three of the above transmission media are classified as wireless media - the signal is broadcast (radiated in many directions) over the air or space and received through an antenna. They include:

1. Terrestrial Microwave
2. Satellite Transmission
3. Radio Transmission

#### Characteristics of Communications Media:

**Twisted Pair** a communications medium consisting of a pair of wires.

**Coaxial Cable** a communications medium that consists of a relatively thick central conductor shielded by several layers of insulation and the second conductor just under the cable's shell

**Fiber Optics** high-capacity communications medium that consists of many strands of pure glass with a data carrying core in the middle, surrounded by a reflective coating and a protective sheath.

**Terrestrial Microwave** long-distance telecommunications by means of microwave signals travelling on the surface of the earth.

**Satellite Transmission** form of microwave transmission in which the signal is transmitted by an earth station to a satellite which rebroadcasts the signal to the receiving station.

**Radio Transmission** wireless communications technology that transmits voice or data over the air using a lower frequency band than microwaves.

Note: Transmission speeds keep on rising, particularly in the fiber optics area. We are now moving toward a global infrastructure of gigabit-speed fiber optic links relying on digital transmission. In this multimedia environment, data, text, voice, images, and video will travel at speeds of billions of bits per second.

#### **Analog and Digital Communications**

Most of the lines in the telephone systems of the world at present are *analog*. Signals are transmitted as continuous waves. This is a satisfactory way to transmit voice, but digital data sent by computers (sequences of pulses representing 0s and 1s) must be converted into an analog signal for transmission over an analog line. The analog data must then be converted back into digital before entering the memory of the receiving computer. The conversion of data from digital form into analog for transmission and then back into digital at the receiving end is done by a pair of interface devices called *modems* (*modulator-demodulator*).

Modem-based telecommunications have created a significant bottleneck in an environment where computer and peripheral speeds have increased dramatically. The solution is end-to-end *digital* communications, in which signals are sent as streams of on/off pulses. Digital lines are capable of much faster communication and digital circuitry is now cheaper than analog. All the new equipment now installed in telephone networks is indeed digital.

Trend: There is a shift toward digital telecommunications is taking place throughout the world. A digital system for telecommunications, called *TI carrier*, is in wide use in parts of the telephone network.

Future: Integrated Services Digital Network (ISDN) - a completely digital telecommunications network standardized by an international committee. Although ISDN services are available in some areas, including most of the US, worldwide ISDN is not expected to become operational until after the year 2000.

### **How to Reduce the Costs of Telecommunications Multiplexing and Signal Compression**

With the geographical distribution of information systems, increased volumes of transmission, and the move to multimedia, the costs of telecommunications are a significant business concern. Two principal methods of reducing these costs are:

1. Multiplexing - the sharing of a high-capacity link by a number of transmissions
2. Signal Compression - using the link more efficiently by removing redundancies from the signal.

### **Multiplexing**

Characteristics of multiplexing:

1. There are economies of scale in telecommunications systems: the higher the system capacity, the lower the unit cost of transmissions.
2. Many individual transmissions can share a physical channel through a variety of techniques collectively called **multiplexing**.
3. Multiplexing combines several lower-capacity transmissions into a single transmission, which is split at the receiving end.

### **Signal Compression**

Characteristics of signal compression:

1. Signal compression is the reduction of the need for channel capacity by removing redundancies from the signal.
2. To reduce the transmission needs, we can remove the redundancies at the sender site, transmit the compressed signal, and then restore the signal at the receiving end.
3. Compression has an impressive effect on multimedia transmission needs.

### **Computer Networks**

Computer networks differ in scope from relatively slow wide area networks, employed to transmit messages across vast geographic distances, to very fast local area networks that may

connect computers located in the same building. System designers may select one of several arrangements for interconnecting network nodes, depending on an organization's requirement. There are several ways to establish a connection between the sender and the receiver of a message.

### **Network Topologies**

Computers, switches, and terminals interconnected by network links are collectively called *nodes*. The purpose of network control is to provide a connection between nodes that need to communicate. The arrangement of nodes and links in a network is called *atopology*. A variety of arrangements are possible, each with its own advantages and drawbacks. Network topology has to fit the structure of the organizational unit that will use the network, and this topology should also be adapted to the unit's communication traffic patterns and to the way the databases will be stored in order to facilitate access to them.

The following topologies are the most widely used:

1. Hierarchical Network
2. Star Network
3. Ring Network
4. Bus Network

#### **Hierarchical Networ:**

- a. A corporate host computer (often a mainframe), divisional minicomputers or powerful workstations, and workgroup support via micros.
- b. This topology matches the organizational structure of many firms and is still frequently used in WANs.
- c. The user workstations may be, in turn, interconnected using one of the LAN topologies.
- d. Failure of the host does not disable divisional processing, which is a fail-safe feature.
- e. Cost-effectiveness of micros and the growing importance of groupwork leads some downsizing firms to move away from hierarchical networks to client/server computing.

#### **Star Network:**

- a. In a star network, a hub computer or switch (such as a PBX) interconnects a number of workstations.
- b. The computer at the hub acts as the network server, providing access to the shared database and software. All communications between the workstations must go through this central mode.

- c. The star network is rather easy to manage and expand, since in both cases it is largely the single central node that is affected in an expansion of a processing capacity.
- d. The central node is a locus of vulnerability: it may be overloaded or it may fail, disabling the entire network.

**Ring Network:**

- a. Each node in a ring network is connected to two of its neighbours.
- b. The nodes are usually close to one another; this topology is frequently used in LANs.
- c. When one node sends a message to another, the message passes through each intermediate node, which restores the signal, as signals deteriorate in transmission.
- d. If a node fails, the ring is out of service, unless the ring contains two channels transmitting in opposite directions.

**Bus Network:**

- a. The nodes on a bus network are connected to a common link such as coaxial cable. This arrangement is used in LANs.
- b. A failing device does not affect the rest of the network; failure of the bus itself, of course, brings the network down.

**Switching in Networks**

Many users can be connected at the same time to a network of communication channels. *Switching* devices establish connections between nodes that need to communicate over a network. Principal techniques for switching include:

1. Circuit Switching
2. Packet Switching
3. Fast Packet Switching

**Circuit Switching:**

1. The circuit switching technique is employed in a telephone network.
2. Communication links are connected to switching centers, which connect to one node to another on demand.
3. The circuit is established for the entire duration of the communication
4. Circuit switching is suitable for file transfers and similar longer transmissions

**Packet Switching:**

1. Packet switching is of particular importance for data communication owing to its speed and its superior utilization of communication links when handling Abursty,@ intermittent, traffic.

Indeed, data transmission involves short bursts of activity by a computer or a terminal when the data are sent, followed by long periods when there is no transmission.

2. Packet switching offers flexibility in connecting to a network. It is used by most of the public data networks provided by value-added carriers.

3. In packet switching, messages are divided at the source into fixed-length chunks, called *packets* that also include bits identifying the receiver. Typically, a packet contains 128 bytes of data.

4. Each packet, can be transmitted independently, with routing determined at each node the packet passes through (as opposed to circuit switching, where the route is predetermined).

### **Fast Packet Switching:**

Traditional packet switching checks each packet for errors at every node the packet passes through. Modern telecommunications equipment is far more noise-free than that for which packet switching was originally designed. To take advantage of this, two fast packet-switching technologies are being introduced:

**Frame Relay:** Fast packet switching that checks a packet for errors only at the entry and exit nodes of the telecommunications network, thus reducing transmission delay.

**Cell Relay:** (asynchronous transfer mode, or ATM) transfers very short fixed-length packets, called cells, over fast LANs or WANs.

### **Telecommunications Alternatives**

Telecommunications is a highly technical, rapidly changing field of information systems technology. Most end users do not need a detailed knowledge of its technical characteristics. However, they need a basic understanding and appreciation for some of the important characteristics of the basic components of telecommunications networks.

### **Telecommunications Network model**

Generally, a communications network is any arrangement where a sender transmits a message to receiver over a channel consisting of some type of medium. simple conceptual model of a telecommunications network, which shows that it consists of five basic categories of components

1. Terminals- terminals are any input/output devices that use telecommunications networks to transmit or receive data. They include:

- 1) Video Terminals
- 2) Micro computers
- 3) Telephones

4) Office Equipment

5) Transaction Terminals

2. Telecommunications processors – support data transmission and reception between terminals and computers. They include:

1. Modems

2. Switches

3. Routers

3. Telecommunication channels

Telecommunications channels are the part of the telecommunications network that connects the message source with the message receiver. They include the physical equipment used to connect one location to another for the purpose of transmitting and receiving information. Data are transmitted and received over channels, which use a variety of telecommunications media. Media include:

1. Copper Wires

2. Coaxial Cables

3. Fiber optic Cables

4. Microwave Systems

5. Communication Satellites.

4. Computers

Telecommunications networks interconnect computers all sizes and types. They include

1. Host Computers (mainframes)

2. Front-End Processors (minicomputers)

3. Network Servers (microcomputers)

5. Telecommunications control software

Consists of programs that control telecommunications activities and manage the functions of telecommunications networks. They include:

1. Telecommunications Monitors (mainframe host computers)

2. Network operating systems ( microcomputers network servers)

3. Communications Packages (microcomputers)

## **DTP**

Desktop publishing (DTP) is the creation of documents using page layout software on a personal ("desktop") computer. It was first used almost exclusively for print publications, but now it also assists in the creation of various forms of online content.



Desktop Publishing (DTP) is the creation of electronic forms of information such as documents, presentations, brochures, books, or even website content using computer programs. DTP has evolved to be an important component of creating and disseminating information as it allows an amalgamation of various tasks that are generally performed independently at printing presses such as layouts, typesetting, graphic design, etc.

### **Evolution of DTP Software**

Earlier, DTP was specifically meant to cater to printed matter but modern DTP allows for even more forms of electronic content. A modern DTP software can be your word processor, graphic design tool and publishing tool, all rolled into one package. With the explosive growth of smartphones and mobile PCs, the way people consume information has changed dramatically over the last decade. Modern DTP software enables content output that caters dynamically to all screen sizes, without the need to republish the same for each device or form factor.

### **Types of DTP Content**

The content created by DTP software can be broadly classified into two categories –

- Electronic Pages
- Virtual Pages

Electronic pages commonly refer to websites, manuals, eBooks, digital archives, presentations, etc. which are normally not printed but are shared digitally. This tutorial is an example of an electronic page which can be opened in a browser.

Virtual pages on the other hand are electronic pages created in the DTP software which are eventually published as printed pages. Virtual pages allow the author to visualize exactly how the printed page will look and can help in easy editing. The process is called WYSIWYG which stands for, ‘What You See Is What You Get’. This means all the changes and formatting that are made will be exactly replicated in print.

### **Introduction to Image Processing**

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with

that image. Nowadays, image processing is among rapidly growing technologies. It forms core research area within engineering and computer science disciplines too.

Image processing basically includes the following three steps:

- Importing the image via image acquisition tools;
- Analysing and manipulating the image;
- Output in which result can be altered image or report that is based on image analysis.

### **Types Image Processing**

#### **Analog image processing**

Analog image processing is done on analog signals. It includes processing on two dimensional analog signals. In this type of processing, the images are manipulated by electrical means by varying the electrical signal. The common example include is the television image. Digital image processing has dominated over analog image processing with the passage of time due its wider range of applications.

#### **Digital image processing**

The digital image processing deals with developing a digital system that performs operations on an digital image.

### **Electronic Communications System**

The basic components of electronic communications system are the transmitter, communications channel or medium, receiver, and noise. Analog signals (such human voice) or digital signals (binary data) are inputted to the system, processed in the electronic circuits for transmission, and then decoded by the receiver.

#### **What is an Electronic Communication?**

Electronic communication can be defined as, the communication which uses electronic media to transmit the information or message using computers, e-mail, telephone, video calling, FAX machine, etc. This type of communication can be developed by sharing data like images, graphics, sound, pictures, maps, software, and many things. Because of this e-communication, there is a lot of changes have occurred in work areas, society, etc. Thus, people can simply access global communication with no physical movement.

#### **Types of Electronic Communication**

Electronic communication can be classified into different types like messaging, voice call, e-mail, social media, etc. We know that e-communication has changed due to the way public

interact and communicate with each other for different purposes like personal or business. By using this, it is very simple to communicate with the world.

### **E-Mail**

E-Mail or electronic mail is the most used type of electronic communication. By using this communication, one can send a message to another person through a mail immediately. For that, we need to create an account to send an e-mail, media files, photos, documents, etc. This type of communication has replaced many conventional types of communication due to many benefits.

So this type of communication is more suitable for different methods of communication. The benefits of this communication are ease of usage, completely free, etc. Additionally, this type of electronic communication doesn't affect the surroundings.

### **Messaging**

This type of communication allows people to interact with others who are far away from us. This is possible only due to technology as well as usage of the internet. There are different types of messengers are available like Skype, Windows Live, Gmail, etc. These messengers help in chatting or sending messages to our beloved ones or friends.

There are many benefits by using this kind of communication like the message which we sent & the response are immediate. But in some cases, some files include nil although bug can stop the functioning of your computer by giving you lots of trouble.

### **Blogging**

At present, blogging is the most preferable communication method. This is a type of online journaling, which can be updated daily, or many times a day. It covers all the information or a particular topic.

By using such blogs, one can share, follow, or even post comments. This kind of communication is extremely suitable. This is the reason why people utilize blogs very often. Additionally, by using the internet, people can access, read & follow it worldwide.

### **Video Chat**

This type of communication can be done by adding web cameras for video calling application. By using this application, one can communicate with others and also they can observe with whom they are speaking. The webcam can be connected to the computer externally and also we need to use applications like Skype, Hangouts, etc.

There are many benefits to using video chatting. We can contact anybody immediately. We can communicate with more than one person at a time by using the feature like business conference feature. Also, we can share PPTs, data sheets online.

### **Social Networking**

Social media is one kind of communication between people, which is used with their general advantage otherwise for relationships. In this, mostly Facebook, as well as LinkedIn, give places for people to work together, sometimes in real-time. There is a Micro-blogging service namely Twitter, which allows the short message of more than 140 characters to be transmitted to a huge audience.

Not like text messages, it sends to simply tiny groups. The posts like Microblog are intended to be seen by all the followers and users can repost texts that they desire to share with their followers. Therefore, a microblog post can reach rapidly and a viral post is a message which reports widely.

### **Telex**

This is a significant device for current electronic communication. This system uses a teleprinter to communicate from one position to another using a machine. It includes mainly two parts like keyboard transmitter as well as a receiver.

Whenever a text is to be sent, then the user presses a push-button, and stays for the call tone, calls the number preferred & enters the message on a tiny paper strip at the end of receiver end because it is entered within the creating office. This method is the quickest & most exact methods for exchanging written posts.

### **Fax**

The Fax machine is a kind of communications and use of this is increasing gradually to transmit materials which are visual like illustrations, diagrams, picture, etc. Here, this machine can be connected using a telephonic.

The transmitted document can be fed throughout the machine, after that it is scanned electronically & signals are broadcasted to the end of receiver wherever an equal document copy is replicated on a plain paper sheet using the receiving machine.

This machine has made it achievable to send important documents copies which include testimonials, certificates, degrees, contracts, agreements from one location to another in a telephone call speed. Because of this reason, it is a commonly used technique for communication.

### **Multimedia**

The multimedia is one kind of communication system and it is an excellent innovation to improve the communication system. This is a blend of several media which bring mutually to transmit messages. The multimedia mainly includes a photo, graphics, voice, music, animation, and message. Whenever all these media are located jointly otherwise computer screen then becomes multimedia. This can be used efficiently for marketing and advertising campaigns. This type of communication is extremely powerful.

Thus, this is all about electronic communication principles which include immediate messaging, websites, social networking voicemail, e-mail, and text messaging. This communication has changed completely the way people communicate with each other. This can be used for personal, business, etc. By using this, it is extremely simple to communicate with the entire world.

### **Electronic Meeting System (EMS)**

An **electronic meeting system (EMS)** is a type of computer software that facilitates creative problem solving and decision-making of groups within or across organizations. The term was coined by Alan R. Dennis et al. in 1988. The term is synonymous with group support systems (GSS) and essentially synonymous with group decision support systems (GDSS). Electronic meeting systems form a class of applications for computer supported cooperative work.

Mainly through (optional) anonymization and parallelization of input, electronic meeting systems overcome many deleterious and inhibitive features of group work

Similar to a web conference, a host invites the participants to an electronic meeting via email. After logging into the session, meeting attendees participate primarily through their keyboards, typing responses to questions and prompts from the meeting host.

### **Two types of Electronic Meeting Systems.**

The types are: 1. Audio Conferencing 2. Video Conferencing.

#### **1. Audio Conferencing:**

Audio conferencing allows two or more people who are geographically separated to communicate over the phone. Telephone conversations usually are one-to-one. This can be limitation when more than one person has to participate in the conversation. For example, if a design manager in Delhi wants to communicate with a group of production managers in

Mumbai it would not be possible to do this over the telephone; however, it can be done using audio conferencing. Audio conferencing is ideal for managing small to medium sized projects. It is most useful with groups of 5 to 15 people.

## **2. Video Conferencing:**

Video conferencing is a type of electronic meeting system that uses telephones, TV monitors, computers and networks to link geographically separated decision makers. Sophisticated large scale video conferencing may require specially equipped video conference rooms with facilities for computers, video cameras, microphones, and monitors.

In confidential meetings that involve sensitive information, the information can be encrypted before it is sent over the public telephone network. In audio conferencing, the participants can only hear each other; in video conferencing they can both see and hear each other. This is how video conferencing works.

## **UNIT -IV**

### **INFORMATION SYSTEM APPLICATIONS**

**Information Systems Application** Software is the most common programs that run in the foreground of the computer. They tend to perform useful tasks which are not associated with computer maintenance, **system** boot-up, or hardware communication.

**Information system**, an integrated set of components for collecting, storing, and processing data and for providing information, knowledge, and digital products. Business firms and other organizations rely on information systems to carry out and manage their operations, interact with their customers and suppliers, and compete in the marketplace. Information systems are used to run inter organizational supply chains and electronic markets. For instance, corporations use information systems to process financial accounts, to manage their human resources, and to reach their potential customers with online promotions. Many major companies are built entirely around information systems.

### **Defining Information Systems**

Almost all programs in business require students to take a course in something called *information systems*. But what exactly does that term mean? Let's take a look at some of the more popular definitions, first from Wikipedia and then from a couple of textbooks:

- “An Information system (IS) is the study of complementary networks of hardware and software that people and organizations use to collect, filter, process, create, and distribute data.”
- “Information systems are combinations of hardware, software, and telecommunications networks that people build and use to collect, create, and distribute useful data, typically in organizational settings.”
- “Information systems are interrelated components working together to collect, process, store, and disseminate information to support decision making, coordination, control, analysis, and visualization in an organization.

### **Management Functions and Information System Components**

The function of management as a systematic step continues to grow since long time, and it began from

- POAC (Planning, Organization, Actuating, and Controlling);

Becomes,

- POACD (Planning, Organizing, Actuating, Controlling, Directing);

Becomes,

- POACE (Planning, Organizing , Actuating Controlling, Evaluating);

Becomes,

- POACEI (Planning, Organizing, Actuating, Controlling, Evaluating, Innovating)

It provides a systematic, important step forward in order to implement practical management activities. Thus, running the management becomes easy using the systematic step.

In addition to management functions, there are also elements of management, which continues to grow as well namely,

- 5 M (Man, Money, Method, Material, Market);

Becomes,

- 5 M + T (Man, Money, Method, Material, Market, Technology);

Becomes,

- 5 M + T + I (Man, Money, Method, Material, Market, Technology, Information). This information is originally only data that are processed, as a material to perform step activities.

**Write a short note about management information system (MIS).**

DEFINITION: Management information system is a system consisting of people, machines, procedures, databases and data models, as its elements. The system gathers data from the internal and external sources of an organisation.

MEANING: Management information system is an acronym of three words, viz., Management, information, system .in order to fully understand the term MIS, let us try to understand these three words. Management: Management is the art of getting things done through and with the people in formally organised groups.

Managerial function:

- Planning
- Organising
- Staffing
- Directing and Controlling

**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.

Data usually take the form of historical records. In contrast to information, raw data may not be able to surprise us, may not be organised and may not add anything to our knowledge.

DATA----->PROCESSING----->INFORMATION

System: The term system is the most loosely held term in management literature because of its use in different contexts. However, a system may be defined as a set of elements which are joined together to achieve a common objective. The elements are interrelated and interdependent. The set of elements for a system may be understood as input, process and output.

A system has one or multiple inputs; these inputs are processed through a transformation process to convert these input into outputs.



The three elements of a system are

INPUT----->PROCESS----->OUTPUT

### **Various functions of information systems**

One of the mostly widely used bases for organising activities in almost every organisation is the business function. Business activities are grouped around functions such as production, marketing, finance and personnel etc... Resulting in the respective department or an area of the business organisation. These departments or functional areas are commonly known as the functional areas of business.

There is no standard classification of such sub-system in an organisation, but a typical set of functions in a manufacturing organisation includes:

- Production
- Marketing
- Finance and accounting
- Materials and
- Personnel systems

#### **Production:**

- Production planning and control
- Engineering standards
- Quality control
- R & D etc

#### **Marketing:**

- Sales order
- Forecasting
- Sales analysis
- Billing
- Distribution
- Stock availability
- Sales quota control
- Pricing
- Product promotion

#### **Finance and accounting:**

- Financial planning

- Budgeting
- Cost accounting
- Asset accounting
- Accounts receivable
- Payroll Accounts payable, etc...

**Materials:**

- Material planning
- Bill of material
- Cost estimate
- Warehousing planning etc...

**Personnel:**

- Employee recruitment
- Employee selection
- Employee development
- Employee transfers
- Employee retirements etc...

**INFORMATION SYSTEM RESOURCES.**

In information system includes four major resources, hardware, software, people and data.

Let's briefly discuss some basic concepts and examples of how these resources contributes to the information processing activities of information system.

Hardware---- it includes all physical devices Software-----it includes all set of information processing instructions.

People -----people are required for the operation of all information systems. These people resources include specialists and end users.

Data----data is more than the raw material of information systems. The concepts of data resources have been broadened by managers and information system professionals.

**Different types of information**

Information could be classified on the basis of the purpose for which it is utilised, into three main categories:

**Strategic information** -----it is required by the managers at the strategic level ♣ of management for the formulation of organisational strategies.

**Tactical information** -----information in this category is used in short term ♣ planning and is of use at management control level.

**Operational information**-----it applies to short periods which may vary from ♣ an hour to a few days.

**Need for in information system.**

- Meeting global challenges
- Capturing opportunities in marketplace
- Supporting corporate strategy
- Linking departments whose functions are different
- Enhancing worker productivity
- Increase in quality of goods and service

**Information system for Business Function**

Business information system in marketing, manufacturing, and human resources with a special emphasis on computer integrated manufacturing. It describes the most widely used types of accounting information systems as well as information needed for the effective financial management of a firm.

Functional Business information systems:

- Marketing
- Production/operations
- Accounting
- Finance
- Human resource management

**Accounting information system.**

Accounting information system is the part of organisations information system. The information system processes a mixture of quantitative and qualitative data but the accounting information system focuses almost entirely on processing quantitative data. The accounting system and information system must work together in an effective and efficient way.

Accounting information system provide efficient delivery of information needed to perform necessary accounting work and to assist in delivery of accurate and informative data to users especially those who are not familiar with the accounting and financial reporting areas itself. A high value of data processing characterizes these applications. Data processing consists of 4 major tasks- data gathering, data manipulation, data storage, and document preparation.

**Characteristics of accounting information system:**

- Performs necessary task
- Adheres to relatively standardized procedures
- Handles detailed data
- Has a primarily historical focus
- Provides minimal problem solving information

**Sources of accounting information system:**

- Procedures manual
- Management accounts / balance sheets
- Financial data
- Accounting policies
- Tax details
- Working capital

The financial function of the enterprise consists in taking stock of the flows of money and other assets into and out of an organization, ensuring that its available resources are properly used and that the organization is financially fit. The components of the accounting system include:

1. Accounts receivable records
2. Accounts payable records
3. Payroll records
4. Inventory control records
5. General ledgers

**Types of accounting information system:**

- General ledger system: this module helps organisations leverage the GL processing speeds available streamline accounting processes and reduce the period end close cycle.
- Asset management: this module help streamline tracking, depreciation and maintenance scheduling of asset improve productivity with easier access to critical information derive maximum tax benefits and minimize risk of loss or damage to capital assets. It maintains an inventory of the company's long term assets.
- Order entry system: it captures and manages different kinds of data relating to a transaction such as number of units sold customer billing.

- Account receivable and payable system: this module helps organisations bill customers automatically from any sales channel, streamline accounts receivables processing and automate the invoicing process.
- Inventory control system: it captures processes and manages all issues related to the company's inventory such as items in inventory, inventory cost, lost items and damages items.
- Payroll system: it captures and processes data related to salaries including taxes, other deductions, benefits, overtime and other related data.
- Cash management: this module helps organisations forecast cash flows in any currency and in multiple time periods, streamline the reconciliation process, monitor exceptions and fraud and manage the cash cycle efficiently with control

**Financial information systems** rely on external sources, such as on-line databases and custom produced reports, particularly in the areas of financial forecasting and funds management. The essential functions that financial information systems perform include:

1. Financial forecasting and planning
2. Financial control
3. Funds management
4. Internal auditing

### **Financial Forecasting**

Financial forecasting is the process of predicting the inflows of funds into the company and the outflows of funds from it for a long term into the future. Outflows of funds must be balanced over the long term with the inflows. With the globalization of business, the function of financial forecasting has become more complex, since the activities in multiple national markets have to be consolidated, taking into consideration the vagaries of multiple national currencies.

Scenario analysis is frequently employed in order to prepare the firm for various contingencies. Financial forecasts are based on computerized models known as cash-flow models. They range from rather simple spreadsheet templates to sophisticated models developed for the given industry and customized for the firm or, in the case of large corporations to specify modeling of their financial operations. Financial forecasting serves to identify the need for funds and their sources.

### **Financial Control**

The primary tools of financial control are budgets. *Abudget* specifies the resources committed to a plan for a given project or time period. Fixed budgets are independent of the level of

activity of the unit for which the budget is drawn up. Flexible budgets commit resources depending on the level of activity.

Spreadsheet programs are the main budgeting tools. Spreadsheets are the personal productivity tools in use today in budget preparation.

In the systems-theoretic view, budgets serve as the standard against which managers can compare the actual results by using information systems. Performance reports are used to monitor budgets of various managerial levels. A performance report states the actual financial results achieved by the unit and compares them with the planned results.

Along with budgets and performance reports, financial control employs a number of financial ratios indicating the performance of the business unit. A widely employed financial ratio is *return on investment* (ROI). ROI shows how well a business unit uses its resources. Its value is obtained by dividing the earnings of the business unit by its total assets.

### **Funds Management**

Financial information systems help to manage the organization's liquid assets, such as cash or securities, for high yields with the lowest degree of loss risk. Some firms deploy computerized systems to manage their securities portfolios and automatically generate buy or sell orders.

### **Internal Auditing**

The *audit* function provides an independent appraisal of an organization's accounting, financial, and operational procedures and information. All large firms have *internal auditors*, answerable only to the audit committee of the board of directors. The staff of the chief financial officer of the company performs financial and operational audits. During a *financial audit*, an appraisal is made of the reliability and integrity of the company's financial information and of the means used to process it. An *operational audit* is an appraisal of how well management utilizes company resources and how well corporate plans are being carried out.

### **Financial information system.**

Financial information system is a sub system of organisational management information system. This sub system supports the decision making process of financial functions at the level of an organisation. A brief description of each of the financial decisions that a financial manager has to take is given below.

- **Capital budgeting decision**---in this decision funds are allocated to long term asset which would yield benefits in the future. Example: funds allocated for land, building, machinery, etc...

- **Financial decision**----the financial manager has to decide about the proportion of equity and debt capital.
- **Dividend decision**----this decision relates to the dividend policy of the organisation. A decision whether the organisation should distribute all profits or retain them or distribute a portion and retain the balance has to be taken by the financial managers.
- **Current asset management**-----in order to safeguard the org against liquidity or insolvency current assets of the organisation are also required to be efficiently managed.

### **Manufacturing Information Systems**

- Global competitive pressures of the information society have been highly pronounced in manufacturing and have radically changed it. The new marketplace calls for manufacturing that are:
  - 1. Lean - highly efficient, using fewer input resources in production through better engineering and through production processes that rely on low inventories and result in less waste.
  - 2. Agile - fit for time-based competition. Both the new product design and order fulfilment are drastically shortened.
  - 3. Flexible - able to adjust the product to a customer's preferences rapidly and cost effectively.
  - 4. Managed for quality - by measuring quality throughout the production process and following world standards, manufacturers treat quality as a necessity and not a high-price option.

### **Structure of Manufacturing Information Systems**

Information technology must play a vital role in the design and manufacturing processes.

Manufacturing information systems are among the most difficult both to develop and to implement.

TPSs are embedded in the production process or in other company processes. The data provided by the transaction processing systems are used by management support subsystems, which are tightly integrated and interdependent.

Manufacturing information subsystems include:

- 1. Product design and engineering
- 2. Product scheduling
- 3. Quality control

- 4. Facilities planning, production costing, logistics and inventory subsystems

### **1. Product Design and Engineering**

Product design and engineering are widely supported today by *computer-aided design* (CAD) and *computer-aided engineering* (CAE) systems. CAD systems assist the designer with automatic calculations and display of surfaces while storing the design information in databases. The produced designs are subject to processing with CAE systems to ensure their quality, safety, manufacturability, and cost-effectiveness. CAD/CAE systems increasingly eliminate paperwork from the design process, while speeding up the process itself. As well, the combined techniques of CAD/CAE and rapid prototyping cut time to market.

### **2. Product Scheduling**

Production scheduling is the heart of the manufacturing information system. This complex subsystem has to ensure that an appropriate combination of human, machinery, and material resources will be provided at an appropriate time in order to manufacture the goods.

Production scheduling and the ancillary processes are today frequently controlled with a *manufacturing resource planning* system as the main informational tool. This elaborate software converts the sales forecast for the plants products into a detailed production plan and further into a master schedule of production.

**3. Computer integrated manufacturing** (CIM) is a strategy through which a manufacturer takes control of the entire manufacturing process. The process starts with CAD and CAE and continues on the factory floor where robots and numerically controlled machinery are installed - and thus *computer-aided manufacturing* (CAM) is implemented. A manufacturing system based on this concept can turn out very small batches of a particular product as cost-effectively as a traditional production line can turn out millions of identical products. A full-fledged CIM is extremely difficult to implement; indeed, many firms have failed in their attempts to do so.

**4. Quality Control** The quality control subsystem of a manufacturing information system relies on the data collected on the shop floor by the sensors embedded in the process control systems.

**5. Total quality management** (TQM) is a management technique for continuously improving the performance of all members and units of a firm to ensure customer



satisfaction. In particular, the principles of TQM state that quality comes from improving the design and manufacturing process, rather than inspecting out defective products. The foundation of quality is also understanding and reducing variation in the overall manufacturing process.

#### **6. Facilities Planning, Production Costing, Logistics and Inventory Subsystems**

Among the higher-level decision making supported by manufacturing information systems are facilities planning - locating the sites for manufacturing plants, deciding on their production capacities, and laying out the plant floors.

Manufacturing management requires a cost control program, relying on the information systems. Among the informational outputs of the production costing subsystem are labor and equipment productivity reports, performance of plants as cost centers, and schedules for equipment maintenance and replacement.

Managing the raw-materials, packaging, and the work in progress inventory is a responsibility of the manufacturing function. In some cases, inventory management is combined with the general logistics systems, which plan and control the arrival of purchased goods into the firm as well as shipments to the customers.

#### **Human Resources Information System.**

This functional information system supports the functions of human resource management of an organisation. The function involves:

- **Manpower planning:** It is about deciding the present and future needs of manpower in the organisation.
- **Staffing:** This function includes recruitment, selection and placement of employees. Recruitment refers to attracting qualified and competent people for different jobs.
- **Training and development:** The need to train and develop the employees is felt due to A gap between the job requirements and competence of the employee. The need to develop lower level managers to assume higher level responsibility when required.
- **Performance evaluation:** This task is concerned with evaluating employee performance at work in terms of pre determined standards and norms. Evaluation or performance appraisal includes the formulation of performance appraisal plans, development of appraisal techniques and programmes etc...
- **Separation activities:** The employee employer relations may come to an end due to the resignation of an employee, layoff, death or retirement. HRM besides the above mentioned functions is also responsible for the wages and salary administration,

sustaining and maintaining the work force in the organisation and maintaining of healthy and peaceful labour management relations. It contains 3 function flow of human resource information system.

- ✓ Transaction data-----is a basis for various types of output information or analysis. The data includes employee number, name, qualification, experience, joining data etc... Categories and grades of posting and daily performance etc...
- ✓ Environmental data----includes data about the availability of personnel, trends in the labour force, competition, market offering to the employees, government and labour laws etc...
- ✓ Organisational plans-----also provide an important input in human resource information system, on the basis of which future planning for recruitment, job assignment, etc..

### **Marketing Information Systems**

- ✓ Marketing activities are directed toward planning, promoting, and selling goods and services to satisfy the needs of customers and the objectives of the organization.
- ✓ Marketing information systems support decision making regarding the marketing mix. These include:
  - ✓ 1. Product
  - ✓ 2. Price
  - ✓ 3. Place
  - ✓ 4. Promotion

### **Sources of Data and Information for Marketing: Boundary-Spanning and Transaction Processing Subsystems**

- ✓ A marketing information system relies on external information to a far greater degree than other organizational information systems. It includes two subsystems designed for boundary spanning - bringing into the firm data and information about the marketplace.

- ✓ The objective of **marketing research** is to collect data on the actual customers and the potential customers, known as prospects. The identification of the needs of the customer is a fundamental starting point for total quality management (TQM). Electronic commerce on the WEB makes it easy to compile statistics on actual buyer behaviour.
- ✓ Marketing research software supports statistical analysis of data. It enables the firm to correlate buyer behaviour with very detailed geographic variables, demographic variables, and psychographic variables.
- ✓ **Marketing (competitive) intelligence** is responsible for the gathering and interpretation of data regarding the firm's competitors, and for the dissemination of the competitive information to the appropriate users. Most of the competitor information comes from corporate annual reports, media-tracking services, and from reports purchased from external providers, including on-line database services. The Internet has become a major source of competitive intelligence.

### **Marketing Mix Subsystems**

- ✓ The marketing mix subsystems support decision making regarding product introduction, pricing, promotion (advertising and personal selling), and distribution. These decisions are integrated into the sales forecast and marketing plans against which the ongoing sales results are compared.
- ✓ Marketing mix subsystems include:
  - ✓ 1. Product subsystem
  - ✓ 2. Place subsystem
  - ✓ 3. Promotion subsystem
  - ✓ 4. Price subsystem
  - ✓ 5. Sales forecasting

#### **1. Product Subsystem**

- ✓ The product subsystem helps to plan the introduction of new products. Continually bringing new products to market is vital in today's competitive environment of rapid change. The product subsystem should support balancing the degree of risk in the overall new-product portfolio, with more aggressive competitors assuming higher degrees of risk for a potentially higher payoff.
- ✓ Although decisions regarding the introduction of new products are unstructured, information systems support this process in several ways:
  - ✓ 1. Professional support systems assist designers in their knowledge work
  - ✓ 2. DSSs are used to evaluate proposed new products
  - ✓ 3. With a DSS, a marketing manager can score the desirability of a new product.
  - ✓ 4. Electronic meeting systems help bring the expertise of people dispersed in space and time to bear on the problem
  - ✓ 5. Information derived from marketing intelligence and research is vital in evaluating new product ideas.

## **2. Place Subsystem**

- ✓ The place subsystem assists the decision makers in making the product available to the customer at the right place at the right time. The place subsystem helps plan the distribution channels for the product and track their performance.
- ✓ The use of information technology has dramatically increased the availability of information on product movement in the distribution channel. Examples include:
  - ✓ 1. Bar-coded Universal Product Code (UPC)
  - ✓ 2. Point-of-sale (POS) scanning
  - ✓ 3. Electronic data interchange (EDI)

- ✓ 4. Supports just-in-time product delivery and customized delivery

### 3. Promotion Subsystem

- ✓ The promotion subsystem is often the most elaborate in the marketing information system, since it supports both personal selling and advertising. Media selection packages assist in selecting a mix of avenues to persuade the potential purchaser, including direct mail, television, print media, and the electronic media such as the Internet and the WEB in particular. The effectiveness of the selected media mix is monitored and its composition is continually adjusted.
- ✓ **Database marketing** relies on the accumulation and use of extensive databases to segment potential customers and reach them with personalized promotional information.
- ✓ The role of **telemarketing**, marketing over the telephone, has increased. Telemarketing calls are well supported by information technology.
- ✓ Sales management is thoroughly supported with information technology. Customer profitability analysis help identify high-profit and high-growth customers and target marketing efforts in order to retain and develop these accounts.
- ✓ **Sales force automation** involves equipping salespeople with portable computers tied into the corporate information systems. This gives the salespeople instantaneous access to information and frees them from the reporting paperwork. This increases selling time and the level of performance. Access to corporate databases is sometimes accompanied by access to corporate expertise, either by being able to contact the experts or by using expert systems that help specify the product meeting customer requirements.

### 4. Price Subsystem

- ✓ Pricing decisions find a degree of support from DSSs and access to databases that contain industry prices. These highly unstructured decisions are made in pursuit of the company's pricing objectives. General strategies range from

profit maximization to forgoing a part of the profit in order to increase a market share.

- ✓ Information systems provide an opportunity to finely segment customer groups, and charge different prices depending on the combination of products and services provided, as well as the circumstances of the sale transaction.

## 5. Sales Forecasting

- ✓ Based on the planned marketing mix and outstanding orders, sales are forecast and a full marketing plan is developed. *Sale forecasting* is an area where any quantitative methods employed must be tempered with human insight and experience. The actual sales will depend to a large degree on the dynamics of the environment.
- ✓ Qualitative techniques are generally used in *environmental forecasting* an attempt to predict the social, economic, legal, and technological environment in which the company will try to realize its plans. Sales forecasting uses numerous techniques, which include:
  - ✓ 1. Group decision making techniques are used to elicit broad expert opinion
  - ✓ 2. Scenario analysis in which each scenario in this process is a plausible future environment
  - ✓ 3. Extrapolation of trends and cycles through a time-series analysis.

## A geographic information system (GIS)

- ✓ A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. The key word to this technology is **Geography** – this means that some portion of the data is spatial. In other words, data that is in some way referenced to locations on the earth.

- ✓ Coupled with this data is usually tabular data known as attribute data. Attribute data can be generally defined as additional information about each of the spatial features. An example of this would be schools. The actual location of the schools is the spatial data. Additional data such as the school name, level of education taught, student capacity would make up the attribute data.
- ✓ It is the partnership of these two data types that enables GIS to be such an effective problem solving tool through spatial analysis.

Like the field of geography, the term Geographic Information System (GIS) is hard to define. It represents the integration of many subject areas. Accordingly there is no absolutely agreed upon definition of a GIS (deMers, 1997). A broadly accepted definition of GIS is the one provided by the National Centre of Geographic Information and Analysis:

A GIS is a system of hardware, software and procedures to facilitate the management, manipulation, analysis, modelling, representation and display of geo referenced data to solve complex problems regarding planning and management of resources (NCGIA, 1990)

Geographic information systems have emerged in the last decade as an essential tool for urban and resource planning and management. Their capacity to store, retrieve, analyse, model and map large areas with huge volumes of spatial data has led to an extraordinary proliferation of applications. Geographic information systems are now used for land use planning, utilities management, ecosystems modelling, landscape assessment and planning, transportation and infrastructure planning, market analysis, visual impact analysis, facilities management, tax assessment, real estate analysis and many other applications.

Functions of GIS include: data entry, data display, data management, information retrieval and analysis. A more comprehensive and easy way to define GIS is the one that looks at the disposition, in layers of its data sets. "Group of maps of the same portion of the territory, where a given location has the same coordinates in all the maps included in the system". This way, it is possible to analyse its thematic and spatial characteristics to obtain a better knowledge of this zone.

**GIS applications mapping locations:** GIS can be used to map locations. GIS allows the creation of maps through automated mapping, data capture, and surveying analysis tools.

- **Mapping quantities:** People map quantities, like where the most and least are, to find places that meet their criteria and take action, or to see the relationships between places. This gives an additional level of information beyond simply mapping the locations of features.

- **Mapping densities:** While you can see concentrations by simply mapping the locations of features, in areas with many features it may be difficult to see which areas have a higher concentration than others. A density map lets you measure the number of features using a uniform areal unit, such as acres or square miles, so you can clearly see the distribution.
- **Finding distances:** GIS can be used to find out what's occurring within a set distance of a feature.
- **Mapping and monitoring change:** GIS can be used to map the change in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy.

### **Electronic commerce,**

Electronic commerce, commonly known as E-commerce or e-commerce, is trading in products or services conducted via computer networks such as the Internet. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices, social media, and telephones as well.

Electronic commerce is generally considered to be the sales aspect of e-business. It also consists of the exchange of data to facilitate the financing and payment aspects of business transactions. This is an effective and efficient way of communicating within an organization and one of the most effective and useful ways of conducting business. It is a Market entry strategy where the company may or may not have a physical presence.

### **E-Business**

E-Business is the term used to describe the information systems and applications that support and drive business processes, most often using web technologies.

E-Business allows companies to link their internal and external processes more efficiently and effectively, and work more closely with suppliers and partners to better satisfy the needs and expectations of their customers, leading to improvements in overall business performance.

While a website is one of the most common implementations, E-Business is much more than just a web presence. There are a vast array of internet technologies all designed to



help businesses work smarter not harder. Think about collaboration tools, mobile and wireless technology, Customer Relationship Management and social media to name a few.

### **‘E-commerce’ and ‘E-business’**

The terms ‘e-commerce’ and ‘e-business’ are often used interchangeably but what do these words really mean?

E-commerce refers to online transactions - buying and selling of goods and/or services over the Internet.

E-business covers online transactions, but also extends to all Internets based interactions with business partners, suppliers and customers such as: selling direct to consumers, manufacturers and suppliers; monitoring and exchanging information; auctioning surplus inventory; and collaborative product design. These online interactions are aimed at improving or transforming business processes and efficiency.

### **E-Commerce under Different Perspective**

There are several ways of looking at e-commerce which is given below:

- **Communication:** It is the ability to deliver products, services, information, or payments via networks like the internet.
- **Interface:** E-commerce means information and transaction exchange: (Business to business, Business to consumer, Consumer to consumer, and business to government.)
- **Business process:** E-Commerce means activities that support commerce electronically by networked connections. For Example business processes like manufacturing and inventory etc.
- **Online:** E commerce is an electronic environment that allows sellers to buy and sell products, services, and information on the internet. The Products may be physical like Cars, Computers, Books or services like news or consulting.
- **Structure:** Ecommerce deals with various media: data, text, video, web pages, and internet telephony.
- **Market:** E-commerce is a worldwide network. A local store can open a web storefront and find the world at doorstep- customers, suppliers,

competitors, and payments services, Of course, an advertising presence is essential.

### **Architectural framework of e-commerce**

- Architectural framework of e-commerce means the synthesizing of various existing resources like DBMS, data repository, computer languages, software agent-based transactions, monitors or communication protocols to facilitate the integration of data and software for better applications.
- The architectural framework for e-commerce consists of six layers of functionality or services as follows:
  1. Application services.
  2. Brokerage services, data or transaction management.
  3. Interface and support layers.
  4. Secure messaging, security and electronic document interchange.
  5. Middleware and structured document interchange, and
  6. Network infrastructure and the basic communication services.

#### **1. Application services**

- In the application layer services of e-commerce, it is decided that what type of e-commerce application is going to be implemented. There are three types of distinguished e-commerce applications i.e., consumer to business application, business to-business application and intra-organizational application.

#### **2. Brokerage and Management Layer**

- This layer is rapidly becoming necessary in dealing with the voluminous amounts of information on the networks. This layer works as an intermediary who provides service integration between customers and information providers, given some constraint such as low price, fast services or profit maximization for a client. For example, a person wants to go to USA from Bangladesh. The person checks the sites of various airlines for the low-price ticket with the best available service. For this he must know the URLs of all the sites. Secondly, to search the services and the best prices, he also has to feed the details of the journey again and again on different sites. If there is a site that can work as information broker and can arrange the ticket as per the need of the person, it will save the lot of time and efforts of the person. This is just one example of how information brokerages can add value.

- Another aspect of the brokerage function is the support for data management and traditional transaction services. Brokerages may provide tools to accomplish more sophisticated, time-delayed updates or future-compensating transactions.

### **3. Interface and Support Services**

- The third layer of the architectural framework is interface layer. This layer provides interface for e-commerce applications. Interactive catalogs and directory support services are the examples of this layer.
- Interactive catalogs are the customized interface to customer applications such as home shopping. Interactive catalogs are very similar to the paper-based catalog. The only difference between the interactive catalog and paper-based catalog is that the first one has the additional features such as use of graphics and video to make the advertising more attractive.
- Directory services have the functions necessary for information search and access. The directories attempt to organize the enormous amount of information and transactions generated to facilitate e-commerce.
- The main difference between the interactive catalogs and directory services is that the interactive catalogs deal with people while directory support services interact directly with software applications.

### **4. Secure Messaging Layer**

- In any business, electronic messaging is an important issue. The commonly used messaging systems like phone, fax and courier services have certain problems like in the case of phone if the phone line is dead or somehow the number is wrong, you are not able to deliver the urgent messages. In the case of courier service, if you want to deliver the messages instantly, it is not possible as it will take some time depending on the distance between the source and destination places. The solution for such type of problems is electronic messaging services like e-mail, enhanced fax and EDI.
- The electronic messaging has changed the way the business operates. The major advantage of the electronic messaging is the ability to access the right information at the right time across diverse work groups.
- The main constraints of the electronic messaging are security, privacy, and confidentiality through data encryption and authentication techniques.

### **5. Middleware services**

- The enormous growth of networks, client server technology and all other forms of communicating between/among unlike platforms is the reason for the invention of middleware services. The middleware services are used to integrate the diversified software programs and make them talk to one another.

## **6. Network Infrastructure**

- We know that the effective and efficient linkage between the customer and the supplier is a precondition for e-commerce. For this a network infrastructure is required. The early models for networked computers were the local and long distance telephone companies. The telephone company lines were used for the connection among the computers. As soon as the computer connection was established, the data travelled along that single path. Telephone company switching equipment (both mechanical and computerized) selected specific telephone lines, or circuits, that were connected to create the single path between the caller and the receiver. This centrally-controlled, single-connection model is known as circuit switching.

## **UNIT-V**

### **Strategic information systems**

**Strategic information systems (SIS)** are information systems that are developed in response to corporate business initiative. They are intended to give competitive advantage to the organization. They may deliver a product or service that is at a lower cost, that is differentiated, that focuses on a particular market segment, or is innovative.

Strategic information management (SIM) is a salient feature in the world of information technology (IT). In a nutshell, SIM helps businesses and organizations categorize, store, process and transfer the information they create and receive. It also offers tools for helping companies apply metrics and analytical tools to their information repositories, allowing them to recognize opportunities for growth and pinpoint ways to improve operational efficiency.

### **Resources of Information System**

An **Information System** is generally integrated and co-ordinate a network of components, which combine together to convert data into information. The information system provides access of information when it is required. The information system is a set of the component which generally helps a system.

## **Resources of Information System:**

There are 5 resources of information system which are given below:

### **1.Hardware:**

The system components which can physically touch – the system unit (tower, desktop, laptop), internal devices and peripheral devices (keyboards and monitors) – are called hardware and it is important to remember that basic definition: The hardware are the parts of the computer that are tangible and can be touched.

Peripheral devices are provided in many other ways, but think of them as hardware that surrounds the system unit. These peripherals devices may be connected by wired or wireless technology to the system unit. Generally peripherals devices communicate with the interior components of the system unit via installed software. The software itself is intangible and can't be touched physically.

### **2.Software:**

We know that, the hardware needs to know what to do, and that is the role of software. The software may be divided into two types: first system software and second application software. Primary piece of system software is the operating system, such as Windows or iOS, which manages the hardware's operation. Application software is perform for specific tasks, such as handling a spreadsheet, creating a document, or designing a Web page.

### **3.People:**

The human element is the most important component of information system and the people that are needed to run the system and the procedures they follow so that the knowledge in the huge databases and data warehouses can be turned into learning that can interpret what has happened in the past and guide future action.

### **4.Data:**

Data is one of the most important component which is generally store in form of information in a database system and 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. All types of data store in warehouse without knowing whatever form that an organization needs. The databases and data warehouses have assumed even greater importance in information systems with the emergence of "big data," a term for the truly massive amounts of data that can be collected and analyzed.

## **5.Network:**

The network is defined as a system in which more than the system is connected through a transmission media. It provides an interface to receive a piece of information or send an information. It is also one of the best resources in the information system.

### **Scope of Information Resource Management**

Information Resource Management (IRM) is the management (planning, organization, operations and control) of the resources (human and physical) concerned with the systems support (development, enhancement and maintenance) and the servicing (processing, transformation, distribution, storage and retrieval) of information (data, text, voice, image) for an enterprise (Schneyman, 1985). IRM is recognition by an organization that data and information are valuable resources and the application of the same principles an managing data and information as are used in managing physical resources such as personnel. (McLeod and Brittain-White, 1988).Information is an asset that should be managed rigorously (Kerr, 1991).

### **Benefits of IRM**

- Identifies gaps and duplication of information.
- Clarifies roles and responsibilities of owners and users of information.
- Provide costs saving in the procurement and handling of information
- Identifies cost/benefits of different information resources
- Actively supports management decision processes with quality information.

### **Significance of Information Resource Management**

Any organization that wants to survive in today's turbulent dynamic environment need IRM in order to be adaptive, knowing and learning. Information Resource Management (IRM) plays a significant role due to following reasons:

- Challenge to perform better, effectively and quickly, sharing of information and knowledge is critical for organizations.
- Wherever and whenever possible information should be stored in a form that maximizes its inherent usefulness.
- Information is a valuable resource and requires careful stewardship/Organizations that handle information processes with people who regularly needs to access distributed

information in course of workflow such as data workers. Information workers, and knowledge workers.

### **Other Information System**

**DEFINITION OF INFORMATION SYSTEM** – “An information system is a set of interrelated components that works together to collect, process, store and breakdown the information to support decision making. ”

Following are the DIMENSIONS of information system:

- 1. ORGANIZATIONAL DIMENSION** : Information system is part of organization. Information system will have the standard operating procedure and culture of an organization embedded within them. This involves: a) Functional specialties b) Business processes c) Culture d) Political interest groups
- 2. MANAGEMENT DIMENSION** : Managers perceive business challenges in the environment. Information systems supply tools and information needed by the managers to allocate, coordinate and monitor their work, make decision, create new products and services and make long range strategic decision.
- 3. TECHNOLOGY DIMENSION** : Management uses technology to carry out their functions. It consists of – computer hardware/software, data management technology, networking/telecom technology. Its one of the many tools managers use to cope with the change.

**Information Systems** are classified by organisational levels, mode of data, processing, system objectives and type of support provided.

Following are the TYPE of information system:

#### **1. Transaction Processing System (TPS):**

- Transaction Processing System are information system that processes data resulting from the occurrences of business transactions
- Their objectives are to provide transaction in order to update records and generate reports i.e to perform store keeping function
- The transaction is performed in two ways: **Batching processing** and **Online transaction processing**.
- **Example:** Bill system, payroll system, Stock control system.

#### **2. Management Information System (MIS):**

- Management Information System is designed to take relatively raw data available through a Transaction Processing System and convert them into a summarized and

aggregated form for the manager, usually in a report format. It reports tending to be used by middle management and operational supervisors.

- Many different types of report are produced in MIS. Some of the reports are a summary report, on-demand report, ad-hoc reports and an exception report.
- **Example:** Sales management systems, Human resource management system.

### **3. Decision Support System (DSS):**

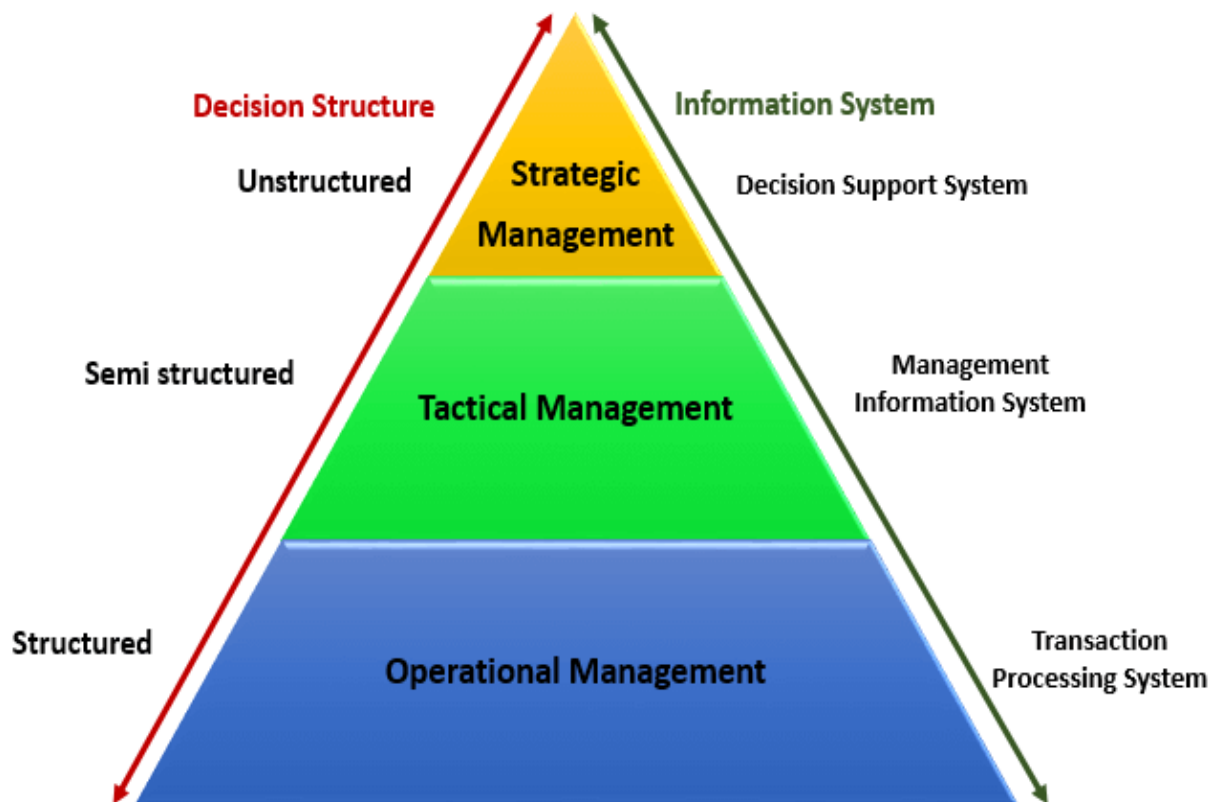
- Decision Support System is an interactive information system that provides information, models and data manipulation tools to help in making the decision in a semi-structured and unstructured situation.
- Decision Support System comprises tools and techniques to help in gathering relevant information and analyze the options and alternatives, the end user is more involved in creating DSS than an MIS.
- **Example:** Financial planning systems, Bank loan management systems.

### **4. Experts System:**

- Experts systems include expertise in order to aid managers in diagnosing problems or in problem-solving. These systems are based on the principles of artificial intelligence research.
- Experts Systems is a knowledge-based information system. It uses its knowledge about a specify are to act as an expert consultant to users.
- Knowledgebase and software modules are the components of an expert system. These modules perform inference on the knowledge and offer answers to a user's question

### **Information System Model:**





### **Operational management level**

The operational level is concerned with performing day to day business transactions of the organization.

Examples of users at this level of management include cashiers at a point of sale, bank tellers, nurses in a hospital, customer care staff, etc.

Users at this level use make structured decisions. This means that they have defined rules that guides them while making decisions.

For example, if a store sells items on credit and they have a credit policy that has some set limit on the borrowing. All the sales person needs to decide whether to give credit to a customer or not is based on the current credit information from the system.

### **Tactical Management Level**

This organization level is dominated by middle-level managers, heads of departments, supervisors, etc. The users at this level usually oversee the activities of the users at the operational management level.

Tactical users make semi-structured decisions. The decisions are partly based on set guidelines and judgmental calls. As an example, a tactical manager can check the credit limit and payments history of a customer and decide to make an exception to raise the credit limit for a

particular customer. The decision is partly structured in the sense that the tactical manager has to use existing information to identify a payments history that benefits the organization and an allowed increase percentage.

### **Strategic Management Level**

This is the most senior level in an organization. The users at this level make unstructured decisions. Senior level managers are concerned with the long-term planning of the organization. They use information from tactical managers and external data to guide them when making unstructured decisions.

### **Transaction Processing System (TPS)**

It is an information processing system that captures and processes every single transaction that takes place within the organisation. These transactions include activities involving collection, retrieval, modification and all other set of activities that trigger the retrieval of all transactions. A transaction processing system is highly reliable, consistent and efficient. Transaction processing systems may also be referred to as a real-time processing system.

A transaction processing is often compared with batch processing. These two are fundamentally different processing systems that vary in their speed, processing manner and accuracy of the events.

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Since a TPS is a real-time processing system, all the events and transactions that occur in the organization or over the system are processed immediately causing no delay. It is one of the most used technologies in all online transactions and is called an Online Transaction Processing System (OLTP).

### **Importance of Transaction Processing System**

#### ***1. Handling and managing operations***

TPS is an excellent technology in handling and managing the everyday operations for any given organisation. It allows multitasking at a wider level with an unmatched ability to process thousands of transactions at the same time without any delay or break-down.

#### ***2. Tapping the raw markets***

TPS is a carrier tool for any business since it gives the businesses the freedom to operate in different segments of the society by working remotely. This operability gives the businesses an opportunity to tap, exist and grow in newer markets that are raw and full of opportunities.

### **Different Types of Transaction Processing System?**

**There are basically two types of transaction processing:**

### **1. Batch processing**

As the name suggests, the processing of transactions takes place over batches. These batches can be customised as per organisation requirements. For example, a company may want to process the payroll of its employees in a weekly or bi-weekly manner, thus the batches of employee salaries will be processed over a span of one and two weeks respectively. There is generally a time delay in this type of processing.

### **2. Real-time processing**

Under the real-time processing, every single transaction is processed with immediate effect. There is no time delay in the real-time processing system.

### **What are the Main Features of a Transaction Processing System?**

A transaction processing system has the following features:

#### **#1 Reliability**

One of the biggest advantages of using a transaction processing system is that it is a highly reliable system that manages and handles the important transactions of an organisation. Since the revenue system is completely dependent on the TPS, it is crucial to the seamless working of any organisation.

#### **#2 Fast response**

The biggest differentiating factor between a real-time processing system and batch processing system is its speed and accuracy. Rapid response time ensures that your customers do not have to wait for their transaction to be processed.

#### **#3 Similar structure and integrity**

There are certain features of the TPS that need to stay intact to work the way it is supposed to. In order to ensure that the processing system works exactly the same way for every organisation every single time, the structure must stay intact.

#### **#4 Authorised control**

A good and ideal TPS allows only the authorised personnel to conduct the processing activities anytime. With the recent advancements, the newer versions even allow authorised personnel to gain access from a remote location as well but with high and stringent security checks.

#### **#5 User friendliness**

A good TPS must be easy to use and user friendly in order to promote increased usage of it. An easily operable TPS would also ensure there are minimal errors in the inputting data and conducting the processing activities.

## **What are the Primary components of a Transaction Processing System (TPS)?**

Following are the **4 major components** of an ideal TPS:

1. **Inputs:** The source documents fetched from the transactions made by customers or organisations and contain information regarding money. These may be bills, invoices, coupons, customer order etc.
2. **Outputs:** The documents generated after the complete processing of the inputs are called outputs.
3. **Processing units:** Processing refers to the step where the information provided at the input step is broken down into segments to be processed into relevant output.
4. **Storage:** The location in the memory where all the desired information is stored is called memory. Generally, the information is stored in the form of ledgers.

## **What are the main functions of a TPS (Transaction Processing System)?**

The main functions of a TPS are conducted by the above-mentioned primary components.

These include:

1. **Input functions:** Securing and inputting the data of the transactions that have taken place
2. **Output functions:** Producing the report and record of the input data to be used for future references and validating the transaction
3. **Storage functions:** Storing the data from both input and output operations and ensuring the availability of data for operations like information access, retrieval, sorting and updating.
4. **Processing functions:** Computing, calculating, sorting and defining the input data to get the desired results.

## **Examples of Transaction Processing System**

There are several examples of transaction processing systems we use in day-to-day life. Some of these are:

**#1 Hotel reservation:** It is extremely useful in reservation of all types wherein in the customer needs an instant verification of the request.

**#2 Cheque Clearance:** Like in physical banks, all the cheques are collected in the drop box and processed together as a batch with a certain delay (batch processing).

**#3 POS(Point of Sale):** IT reduces the work of sales executives as once the product is tagged and the related information is entered in the system, the executive only needs to scan the code and the complete information will be withdrawn from the database.

## **Transaction Processing System Advantages & Disadvantages**

### **Advantages of using TPS**

1. It is a highly cost-effective and fast solution to all the revenue related operations of any given organisation.
2. It works through a highly stable and reliable database that stores and reflects the information as and when desired without any risk of information loss.
3. It allows for a quick recovery from any operational failure causing very little delay in the transaction processing.
4. It allows remote functioning giving the freedom of free operation to businesses who want to grow across the globe.
5. It can be used both in real-time manner and batch processing manner.

### **Disadvantages of using TPS**

1. Every business has different needs that must be dealt with exclusively. This calls for designing a customised solution for every single business that has some specific requirements.
2. Though it is a cost-effective solution, the initial cost of set up and installation can be on the higher side.
3. Even with a highly sophisticated setup, you may need to deploy a large number of work forces for data input, managing and recording inventory etc.
4. Though TPS is designed for handling a lot of data and work, overloading may lead to system crash.
5. You need to have a certain specification of the hardware for TPS software to work smoothly.

### **Decision Support System (DSS)**

Decision support systems (DSS) are interactive software-based systems intended to help managers in decision-making by accessing large volumes of information generated from various related information systems involved in organizational business processes, such as office automation system, transaction processing system, etc.

DSS uses the summary information, exceptions, patterns, and trends using the analytical models. A decision support system helps in decision-making but does not necessarily give a decision itself. The decision makers compile useful information from raw data, documents, personal knowledge, and/or business models to identify and solve problems and make decisions.

## **Programmed and Non-programmed Decisions**

There are two types of decisions - programmed and non-programmed decisions.

Programmed decisions are basically automated processes, general routine work, where –

- These decisions have been taken several times.
- These decisions follow some guidelines or rules.

For example, selecting a reorder level for inventories, is a programmed decision.

Non-programmed decisions occur in unusual and non-addressed situations, so –

- It would be a new decision.
- There will not be any rules to follow.
- These decisions are made based on the available information.
- These decisions are based on the manager's discretion, instinct, perception and judgment.

For example, investing in a new technology is a non-programmed decision.

Decision support systems generally involve non-programmed decisions. Therefore, there will be no exact report, content, or format for these systems. Reports are generated on the fly.

## **Attributes of a DSS**

- Adaptability and flexibility
- High level of Interactivity
- Ease of use
- Efficiency and effectiveness
- Complete control by decision-makers
- Ease of development
- Extendibility
- Support for modeling and analysis
- Support for data access
- Standalone, integrated, and Web-based

## **Characteristics of a DSS**

- Support for decision-makers in semi-structured and unstructured problems.
- Support for managers at various managerial levels, ranging from top executive to line managers.
- Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level.
- Support for interdependent or sequential decisions.
- Support for intelligence, design, choice, and implementation.

- Support for variety of decision processes and styles.
- DSSs are adaptive over time.

### **Benefits of DSS**

- Improves efficiency and speed of decision-making activities.
- Increases the control, competitiveness and capability of futuristic decision-making of the organization.
- Facilitates interpersonal communication.
- Encourages learning or training.
- Since it is mostly used in non-programmed decisions, it reveals new approaches and sets up new evidences for an unusual decision.
- Helps automate managerial processes.

### **Components of a DSS**

Following are the components of the Decision Support System –

- **Database Management System (DBMS)**– To solve a problem the necessary data may come from internal or external database. In an organization, internal data are generated by a system such as TPS and MIS. External data come from a variety of sources such as newspapers, online data services, databases (financial, marketing, human resources).
- **Model Management System** – It stores and accesses models that managers use to make decisions. Such models are used for designing manufacturing facility, analyzing the financial health of an organization, forecasting demand of a product or service, etc.

**Support Tools** – Support tools like online help; pulls down menus, user interfaces, graphical analysis, error correction mechanism, facilitates the user interactions with the system.

### **Classification of DSS**

There are several ways to classify DSS. Hoi Apple and Whinstone classifies DSS as follows –

- **Text Oriented DSS**– It contains textually represented information that could have a bearing on decision. It allows documents to be electronically created, revised and viewed as needed.
- **Database Oriented DSS** – Database plays a major role here; it contains organized and highly structured data.
- **Spreadsheet Oriented DSS** – It contains information in spread sheets that allows create, view, modify procedural knowledge and also instructs the system to execute self-contained instructions. The most popular tool is Excel and Lotus 1-2-3.
- **Solver Oriented DSS** – It is based on a solver, which is an algorithm or procedure written for performing certain calculations and particular program type.
- **Rules Oriented DSS** – It follows certain procedures adopted as rules.

- **Rules Oriented DSS**– Procedures are adopted in rules oriented DSS. Expert system is the example.
- **Compound DSS** – It is built by using two or more of the five structures explained above.

## Types of DSS

Following are some typical DSSs –

- **Status Inquiry System**– It helps in taking operational, management level, or middle level management decisions, for example daily schedules of jobs to machines or machines to operators.
- **Data Analysis System**– It needs comparative analysis and makes use of formula or an algorithm, for example cash flow analysis, inventory analysis etc.
- **Information Analysis System**– In this system data is analyzed and the information report is generated. For example, sales analysis, accounts receivable systems, market analysis etc.
- **Accounting System** – It keeps track of accounting and finance related information, for example, final account, accounts receivables, accounts payables, etc. that keep track of the major aspects of the business.
- **Model Based System**– Simulation models or optimization models used for decision-making are used infrequently and creates general guidelines for operation or management.

## Office Automation Systems

An Office automation system (OAS) is a collection of communication technology, computers and persons to perform official tasks. It executes office transactions and supports official activities at every organization level. These activities can be divided into clerical and managerial activities.

Clerical activities performed with the help of office automation system include preparing written communication, typesetting, printing, mailing, scheduling meetings, calendar keeping etc., Under managerial activities, office automation system helps in conferencing, creating reports and messages, and controlling performance of organization. Many applications like work processing, electronic filing and e-mail are integrated in office automation system.

- **Word Processing**

Word processing is used for the preparation of documents like letters, reports, memos, or any type of printable material by electronic means. The text is entered by keyboard and displayed on the computer's display unit. This text can be edited, stored, and reproduced with the help of commands present in the word processor. Word processors have facilities for spell checking, grammar checking, counting (character, lines, pages,etc.,) Automatic page numbering, index creation, header and footer, etc.,



- **E-mail**

E-mail or electronic mail facilitates the transfer of message or documents with the help of computer and communication lines. This helps in speedy delivery of mails and also reduces time and cost of sending a paper mail. E-mail supports not only the transfer of text messages but it also has options for sending images, audio, video, and many other types of data.

- **Voice Mail**

Voice mail, an important call service, allows recording and storing of telephone messages into the computer's memory. The intended person can retrieve these messages any time.

### **Executive Information System (EIS)**

An **Executive Information System (EIS)** is a kind of decision **support system (DSS)** used in organizations to help executives in decision making. It does so by providing easy access to important data needed in an organization to achieve strategic goals.

Executive support systems are intended to be used by the senior managers directly to provide support to non-programmed decisions in strategic management.

These information are often external, unstructured and even uncertain. Exact scope and context of such information is often not known beforehand.

This information is intelligence based –

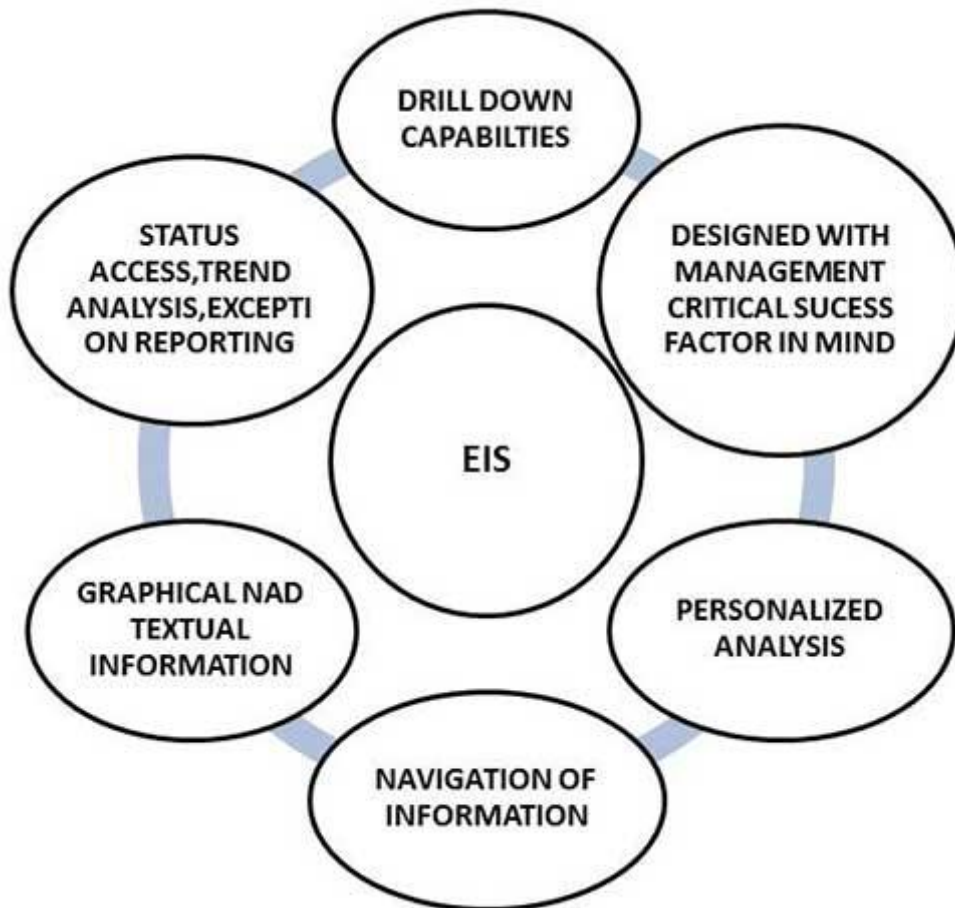
- Market intelligence
- Investment intelligence
- Technology intelligence

### **Examples of Intelligent Information**

Following are some examples of intelligent information, which is often the source of an ESS

- External databases
- Technology reports like patent records etc.
- Technical reports from consultants
- Market reports
- Confidential information about competitors
- Speculative information like market conditions
- Government policies
- Financial reports and information

### **Features of Executive Information System**



### **Advantages of ESS**

- Easy for upper level executive to use
- Ability to analyze trends
- Augmentation of managers' leadership capabilities
- Enhance personal thinking and decision-making
- Contribution to strategic control flexibility
- Enhance organizational competitiveness in the market place
- Instruments of change
- Increased executive time horizons.
- Better reporting system
- Improved mental model of business executive
- Help improve consensus building and communication
- Improve office automation
- Reduce time for finding information
- Early identification of company performance

- Detail examination of critical success factor
- Better understanding
- Time management
- Increased communication capacity and quality

### **Disadvantage of ESS**

- Functions are limited
- Hard to quantify benefits
- Executive may encounter information overload
- System may become slow
- Difficult to keep current data
- May lead to less reliable and insecure data
- Excessive cost for small company

### **Artificial Intelligence System (AIS)**

Artificial intelligence (AI) is the simulation of human intelligence processes by machines, especially computer systems. Specific applications of AI include expert systems, natural language processing (NLP), speech recognition and machine vision.

AI programming focuses on three cognitive skills: learning, reasoning and self-correction.

- **Learning processes.** This aspect of AI programming focuses on acquiring data and creating rules for how to turn the data into actionable information. The rules, which are called algorithms, provide computing devices with step-by-step instructions for how to complete a specific task.
- **Reasoning processes.** This aspect of AI programming focuses on choosing the right algorithm to reach a desired outcome.
- **Self-correction processes.** This aspect of AI programming is designed to continually fine-tune algorithms and ensure they provide the most accurate results possible.

### **What is Artificial Intelligence?**

According to the father of Artificial Intelligence, John McCarthy, it is “The science and engineering of making intelligent machines, especially intelligent computer programs”.

Artificial Intelligence is a way of **making a computer, a computer-controlled robot, or a software think intelligently**, in the similar manner the intelligent humans think.

AI is accomplished by studying how human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basis of developing intelligent software and systems

## **Philosophy of AI**

While exploiting the power of the computer systems, the curiosity of human, lead him to wonder, “*Can a machine think and behave like humans do?*”

Thus, the development of AI started with the intention of creating similar intelligence in machines that we find and regard high in humans.

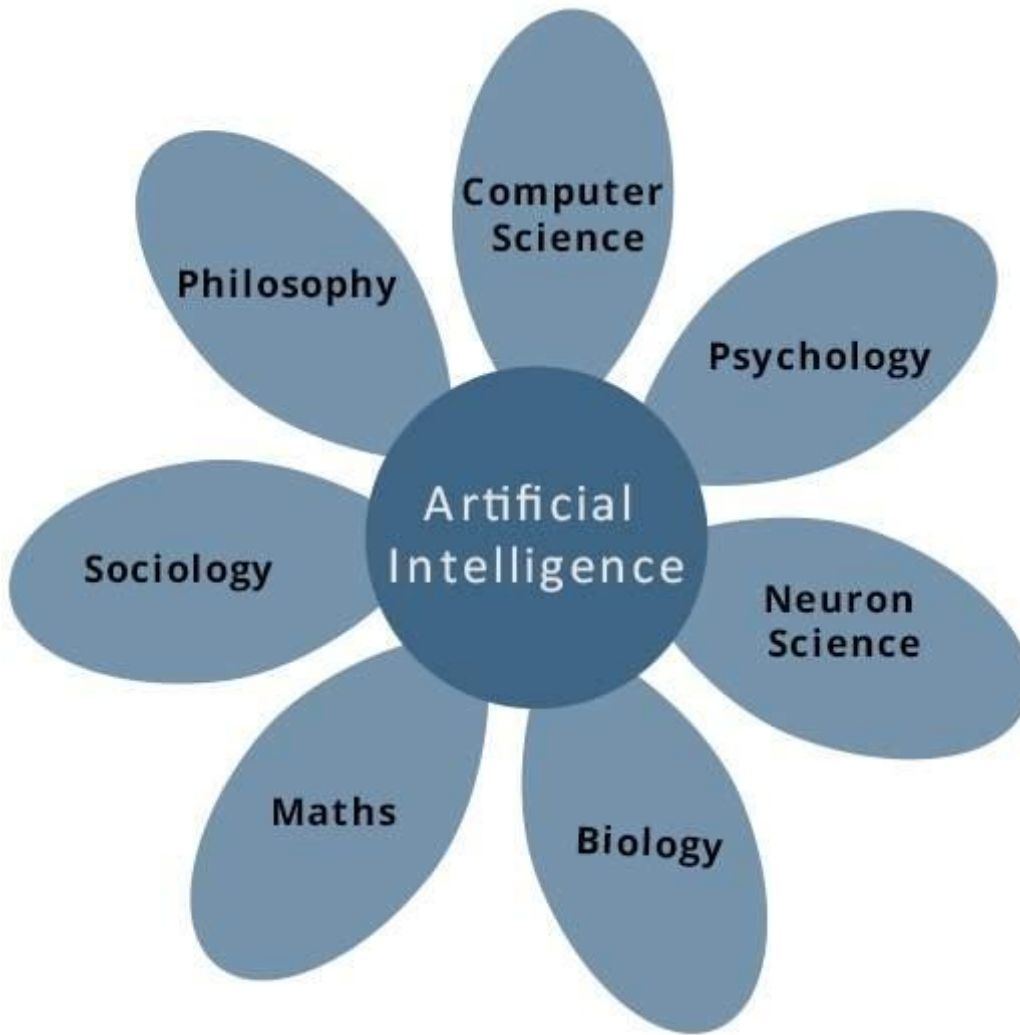
## **Goals of AI**

- **To Create Expert Systems**– The systems which exhibit intelligent behavior, learn, demonstrate, explain, and advice its users.
- **To Implement Human Intelligence in Machines** – Creating systems that understand, think, learn, and behave like humans.

## **What Contributes to AI?**

Artificial intelligence is a science and technology based on disciplines such as Computer Science, Biology, Psychology, Linguistics, Mathematics, and Engineering. A major thrust of AI is in the development of computer functions associated with human intelligence, such as reasoning, learning, and problem solving.

Out of the following areas, one or multiple areas can contribute to build an intelligent system.



### Programming Without and With AI

The programming without and with AI is different in following ways –

Programming Without AI	Programming With AI
A computer program without AI can answer the specific questions it is meant to solve.	A computer program with AI can answer the generic questions it is meant to solve.
Modification in the program leads to change in its structure.	AI programs can absorb new modifications by putting highly independent pieces of information together. Hence you can modify even a minute piece of information of program without affecting its structure.
Modification is not quick and easy. It may lead to affecting the program adversely.	Quick and Easy program modification.

## Applications of AI

AI has been dominant in various fields such as –

- **Gaming** – AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.
- **Natural Language Processing** – It is possible to interact with the computer that understands natural language spoken by humans.
- **Expert Systems** – There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users.
- **Vision Systems** – These systems understand, interpret, and comprehend visual input on the computer. For example,
  - A spying aeroplane takes photographs, which are used to figure out spatial information or map of the areas.
  - Doctors use clinical expert system to diagnose the patient.
  - Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.
- **Speech Recognition** – Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.
- **Handwriting Recognition** – The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.
- **Intelligent Robots** – Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bump, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

## Enterprise Resource Planning

ERP stands for Enterprise Resource Planning and refers to software and systems used to plan and manage all the core supply chain, manufacturing, services, financial and other processes of an organization.

### Benefits of ERP

1. **Higher productivity:** Streamline and automate your core business processes to help everyone in your organization do more with fewer resources.

2. **Deeper insights:** Eliminate information silos, gain a single source of truth, and get fast answers to mission-critical business questions.
3. **Accelerated reporting:** Fast-track business and financial reporting and easily share results. Act on insights and improve performance in real time.
4. **Lower risk:** Maximize business visibility and control, ensure compliance with regulatory requirements, and predict and prevent risk.
5. **Simpler IT:** By using integrated ERP applications that share a database, you can simplify IT and give everyone an easier way to work.
6. **Improved agility:** With efficient operations and ready access to real-time data, you can quickly identify and react to new opportunities.

### **Advantages and disadvantages**

#### **Advantages**

- ERP can save businesses money over the long run by streamlining processes.
- It provides a unified system that can lower IT, labor and training costs.
- It enables greater visibility into critical parts of the business, such as sales, working capital and inventory.
- It facilitates reporting and planning through improved data and analytics.
- It offers better compliance and security through fine-grained control of user rights and standardized workflows.

#### **Disadvantages**

- ERP software can be expensive to deploy and maintain.
- It is often difficult to implement.
- It requires significant change management.
- ERP modules are often less sophisticated than specialized software and go unused or must be replaced.

#### **Features of ERP systems**

The scale, scope, and functionality of ERP systems vary widely. However, most ERP software features the following characteristics:

1. **Enterprise-wide integration.** Business processes are integrated end to end across departments and business units. For example, a new order automatically initiates a credit check, queries product availability, and updates the distribution schedule. Once the order is shipped, the invoice is sent.

2. **Real-time (or near real-time) operations** Since the processes in the example above occur within a few seconds of order receipt, problems are identified quickly, giving the seller more time to correct the situation.
3. **A common database** A common database enables data to be defined once for the enterprise with every department using the same definition. Some ERP systems split the physical database to improve performance.
4. **Consistent look and feel** Early ERP vendors realized that software with a consistent user interface reduces training costs and appears more professional. When other software is acquired by an ERP vendor, common look and feel is sometimes abandoned in favor of speed to market. As new releases enter the market, most ERP vendors restore the consistent user interface.

### **Types of ERP solutions**

ERP systems are categorized in tiers based on the size and complexity of enterprises served.

Typical tiers include:

- **Tier I ERPs** support large, global enterprises and handle all internationalization issues, including currency, language, alphabet, postal code, accounting rules, etc. For decades, Oracle and SAP have been considered Tier I. Microsoft and Infor are more recent competitors but are frequently categorized as Tier I as well.
- **Tier I Government ERPs** support large, mostly federal, government agencies. These vendors support the nuances of government accounting, HR, and procurement. Oracle, SAP and CompuServe's PRISM are considered Tier I with Infor and CGI's Momentum close behind.
- **Tier II ERPs** support large enterprises that may operate in multiple countries but lack global reach. Tier II customers can be standalone entities or business units of large global enterprises. Most of these ERPs have some internationalization but lack Tier I breadth. Depending on how vendors are categorized there are 25 to 45 vendors in this tier.
- **Tier II Government ERPs** focus mostly on state and local governments with some federal installations. Tyler Technologies and UNIT4 fall in this category.
- **Tier III ERPs** support mid-tier enterprises. Most handle a handful of languages and currencies but only a single alphabet. Depending on how ERPs are categorized, there are 75 to 100 Tier III ERP solutions.
- **Tier IV ERPs** are designed for small enterprises and often focus on accounting.