Management Information System

EG 3111 CT

Year: III **Total: 5 hours**
Semester: V **Lecture: 3 hours/week**
Practical: 2 hrs/wk

Course Description:

The main aim of this course is to provide an introduction to the management of information systems (MIS). Managing information systems has become a task for all levels of managers and all function areas of the business. This MIS course is designed to familiarize students with the concepts related to the utilization of information technology in business organizations. This course will focus on technical and managerial aspects of information technology adoption in the organization. This course should provide the student with knowledge of the core principles of MIS, focusing on breadth rather than depth of knowledge. In this course has included case studies, group assignments, and related software exercises that will provide an opportunity to apply MIS concepts to real-world applications.

Course Objectives:

After completing this course the student will able to:

1. Explain the significance of information systems in organizations, Strategic management processes and the implications for the management.
2. Describe different types of management information systems.
3. Identify the basic technologies used in the field of Management Information System.
4. Explain the developments of electronic commerce and the role of Internet.
5. Describe the processes of developing and implementing information systems.
6. Familiarize with ethical and social issues related to information system

Course Contents:

Unit	Topics	Contents	Hours	Methods /Media	Marks
1	**Foundation of Information System**	1.1 Introduction to information system in business 1.2 Fundamentals of information systems 1.3 Solving business problems with information systems 1.4 Types of information systems 1.5 Effectiveness and efficiency criteria in information system	**8 hours**		
2	**An overview of Management Information Systems**	2.1 Definition of a management information system 2.2 MIS versus Data processing 2.3 MIS & Decision Support Systems	**8 hours**		

Unit	Topics	Contents	Hours	Methods /Media	Marks
		2.4 MIS & Information Resources Management 2.5 End user computing 2.6 Concept of an MIS 2.7 Structure of a Management information system			
3	**Concepts of planning**	3.1 Concept of organizational planning 3.2 The Planning Process 3.3 Computational support for planning 3.4 Business applications of information technology 3.5 Internet & electronic commerce and its applications Enterprise Solutions 3.6 Information System for Business Operations (SDLC) 3.7 Information System for Strategic Advantage 3.8 Decision Support Systems and its benefits and characteristics	**8 hours**		
4	**Managing Information Technology**	4.1 Enterprise & global management 4.2 Security & Ethical challenges 4.3 Planning & implementing changes 4.4 Advanced Concepts in Information Systems 4.4.1 Enterprise Resource Planning 4.4.2 Supply Chain Management 4.4.3 Customer Relationship Management and 4.4.4 Procurement Management.	**7 hours**		
5	**MIS in functional areas of business**	5.1 Accounting information systems 5.2 Geographical information systems 5.3 Human resource information systems 5.4 Inventory information systems 5.5 Manufacturing information systems 5.6 Marketing information systems 5.7 Quality information systems	**8 hours**		

Unit	Topics	Contents	Hours	Methods /Media	Marks
6	**Knowledge based systems**	6.1 Artificial intelligence 6.2 Expert systems 6.3 Neural networks	**3 hours**		
7	**Office information system**	7.1 Nature of office 7.2 Types of office information systems 7.3 Client server computing	**3 hours**		
Case Study: Teacher/ instructor should select at least three case study from the above contents.					

REFERENCE BOOKS:

1. O Brian, “Introduction to Information System”, MCGRAW HILL.
2. Murdick, “Information System for Modern Management”, PHI.
3. Jawadekar, “ Management Information System”, TMH.

Unit-1
Foundation of Information System

- Introduction to information system in business
- Fundamentals of information systems
- Solving business problems with information systems
- Types of information systems
- Effectiveness and efficiency criteria in information system

Information system in business/ (Why information system is important in business)

- Any business can be successful only when there is a consistent management of organizational and financial data with efficient information systems.
- Most of the companies have seen a drift in the process of workflow due to the accuracy and reliability of information.
- There is no alternative for the right information at the required time in the world of business where every industry revolves round the "Internet of Things".
- This raised the need to innovate and develop the systems that can be implemented to make information accurate, that can be quickly accessed on demand.
- An effective information system can entitle an organization with better planning, decision-making and hence desired results.
- With the constant change and evolution of customer preferences and requirements – businesses that can bring about new methods and innovative techniques can survive the market and continue to function as per the customer demands.
- The implementation of information system can benefit a lot in businesses and helps in controlling the internal and external processes.

Fundamentals of Information System

Data, information, and knowledge

– **Data**: Raw facts.

– **Information**: Collection of facts organized in such a way that they have additional value beyond the value of the facts themselves.

– **Process**: Set of logically related tasks performed to achieve a defined outcome.

– **Knowledge**: Awareness and understanding of a set of information.

Information System:

- “Information systems (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."
- Most of the 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 interorganizational 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.
- Hardware, software, computer system connections and information, information system users, and the system's housing are all part of an Information System.
- Personal computers, smartphones, databases, and networks are just some examples of information systems.

Components of information system

Information systems consist of the following general components:

- Hardware
- Software
- Databases
- Telecommunication
- Human resources
- Procedures

Computer hardware

- This is the physical technology that works with information.
- Hardware can be as small as a smartphone that fits in a pocket or as large as a supercomputer that fills a building.
- Hardware also includes the peripheral devices that work with computers, such as keyboards, external disk drives, and routers.
- With the rise of the Internet of things, in which anything from home appliances to cars to clothes will be able to receive and transmit data.

Computer software

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

Telecommunications

- This component connects the hardware together to form a network.
- Connections can be through wires, such as Ethernet cables or fiber optics, or wireless, such as through Wi-Fi.
- A network can be designed to tie together computers in a specific area, such as an office or a school, through a local area network (LAN).

- If computers are more dispersed, the network is called a wide area network (WAN). The Internet itself can be considered a network of networks.

Databases and data warehouses

- A database is a place where data is collected and from which it can be retrieved by querying it using one or more specific criteria.
- A data warehouse contains all of the data in whatever form that an organization needs.
- 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.

Human resources and procedures

- The final, and possibly most important, component of information systems is the human element: 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.

Solving business problems with information systems

There are two common approaches to solve the business problems with information system:

The Scientific Method

- The systems approach is based on the established problem-solving methodology known as the scientific method. The scientific method consists of five steps:
    - Recognize phenomena in the real world.
    - Formulate a hypothesis about the causes or effects of the phenomena.
    - Test the hypothesis through experimentation.
    - Evaluate the results of the experiments.
    - Draw conclusions about the hypothesis.

The Systems Approach

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

    - Define a problem or opportunity in a systems context.
    - Gather data describing the problem or opportunity.
    - Identify alternative solutions.
    - Evaluate each alternative solution.
    - Select the best solution.
    - Implement the selected solution.
    - Evaluate the success of the implemented solution.

Types of information system:

Executive Support Systems (ESS)

- This type of IS was designed to help senior management support the business and make strategic decisions.
- It gathers, analyses and summarizes the key internal and external information used in the everyday business.
- It supports an inventory of all present information assets; projected revenue figures based on new product sales expectations and reasonable sales figures between one week and the next.
- For example, a CEO may require overall sales for the company, along with sales for every department separately, and general economic data for the year.

Management Information Systems (MIS)

- MIS is mostly concerned with internal sources of information.
- These systems usually take data from the transaction processing systems and summarize it into a series of management reports.
- MIS is an information system that generates exact, timely and structured information so managers and other users can make decisions, resolve problems, supervise activities, and track progress.
- For example, complied data of call volume in a call center with abandon % and call service levels for every hour, every day and monthly summary.

Decision Support Systems (DSS)

- DSS is an information system intended to help users reach a decision when a decision-making situation arises.
- This system comprises tools and techniques to help collect relevant information and analyze the choices and alternatives.
- DSS usually involves use of complex spreadsheet and databases to create models which will help determine difficult situations and its possible outcomes.

Knowledge Management Systems (KMS)

- KMS exist to help businesses create and share various information.
- These are typically used in industries where employees create new knowledge and expertise – which can then be shared by other people in the organization to create additional commercial opportunities.
- Good examples include firms of lawyers, training related businesses, accountants and management consultants.

Transaction Processing Systems (TPS)

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

Office Automation Systems (OAS)

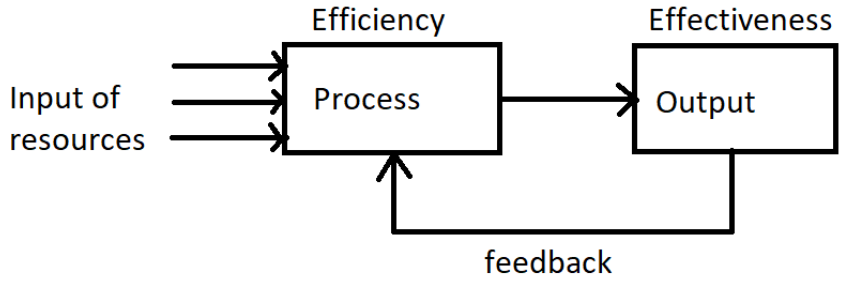
- OAS are systems that try to improve the efficiency of employees who need to process data and information.
- The best example is the wide range of software systems that exist to improve the productivity of employees functioning in an office (e.g., Microsoft Office) or systems that allow personnel to work from home or while on the move.
- Another good example would be salesforce system which is a ticketing system used to process IT information in the office and on the go.

Effectiveness and efficiency criteria in information system

- **Efficiency**: It is a measure of the number of resources required to achieve the output which is use of resources to get results. Being efficient implies that the system is operating in the right way.

- **Effectiveness**: Research to quality of output from the system. Effectiveness means doing the right thing in the right manner so that desired result may be achieved.

The relationship between efficiency and effectiveness is that effectiveness is the measure of goodness of the output.



Following attributes measure the effectiveness of the information system.

- Timeliness
- Accuracy
- Completeness
- Adequacy
- Secured
- Exception based

Unit-2

An overview of Management Information Systems

- Definition of a management information system
- MIS versus Data processing
- MIS & Decision Support Systems
- MIS & Information Resources Management
- End user computing
- Concept of an MIS
- Structure of a Management information system

Management Information System

- Management Information System is an accumulation of 3 different terms as explained below.
- **Management**: Management is an art of getting things done by others. However, for the purpose of Management Information System, management comprises the process and activity that a manager does in the operation of their organization, i.e., to plan, organize, direct and control operations.
- **Information**: Information simply means processed data or in the layman language, "data which can be converted into meaningful and useful form for a specific user".
- **System**: The system is a set of elements joined together for a common objective.

- According to Schwartz, 'MIS is a system of people, equipment, procedure, documents and communication that collects, validates, operates on transformers, stores, retrieves and present data for use in planning, budgeting, accounting, controlling and other management process'.
- According to Jerome Kanter, 'MIS is a system that aids management in making, carrying out and controlling decisions.'
- According to Davis and Olson, 'MIS is an integrated user machine system designed for providing information to support operational control, management control and decision-making functions in an organization. The information systems make use of resources such as hardware, software, human, procedures as well as suppliers'.

Data processing

- Data processing is the manipulation of data by computers. It represents the automation of routines processing to support operations. Basically, it converts raw data into readable format which can be easily utilized by the people in the organization.
- The data processing functions are data collection, manipulation, storage as used to report and analyze business activities. It is primarily oriented to processing transaction data for day-to-day transactions.

MIS versus Data processing

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

MIS & Decision Support Systems

- Decision support system (DSS) in an outcome of management information system, providing support for management at operational control, management control, and strategic planning.
- Management activity of each of these classes includes planning, control, and decision making.
- DSS are ideally suited for problem like location selection, identifying new products to be marketed, scheduling personnel, and analyzing the effect that price increases for resources have on profits.
- DSS are human/machine systems and are suitable of semi structured problems. The problem must be important to the manager and the decision required must be an important one.
- DSS use internal information from TPS and MIS; they often bring in information from external sources such as current stock prices or product prices of competitors.
- DSS have more analytical power than other systems.
- The most recent embellishment of the DSS concept is the group decision support system (GDSS).
- The GDSS endeavors to improve communication among group members by providing simulating environment

MIS vs DSS

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

MIS & Information Resources Management

- Information Resource Management (IRM) as "techniques of managing information as a shared organizational resource." IRM includes
    - identification of information sources,
    - type and value of information they provide, and
    - ways of classification, valuation, processing, and storage of that information.

- Information Resource Management (IRM) is a broad term in IT that refers to the management of records or information or data sets as a resource. This can relate to either business or government goals and objectives.

Functional components of IRM:

- There are basically three main components of IRM. These are:
- **Data processing:** Organizations where information systems have a broader charter, data processing continues to play a signification role. Development of major applications, ongoing operations of 'production' systems, operations of the corporate data base, and cost control over major system expenditures are part of the data processing.

- **Telecommunications:** The advances in communication technology support corporate –wide telecommunications capabilities that integrate voice and data communications. Data communications are also an integral component of both data processing and office automation applications.

- **0ffice automation:** The components typically began as the word processing function under the responsibility of office administrators. Local area network and wide area communications are key components for interacting office automation function and providing access to data processing facilities

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.

MIS Vs IRM

- While MIS deals with the business as a whole, Information resource management deals with information as a resource.
- IRM allocates, stores and plans the information and its use. MIS uses IRM for implementation.
- MIS also helps in IRM by allocation information across the organization through the central database. It also preserves information in the central repository (database) and uses this information for taking decisions. Thus, MIS has a larger perspective than IRM.
- IRM is the responsibility of Chief information officer. Similarly, MIS development is his responsibility but not sole responsibility.
- IRM focuses on data as resource, MIS is correct utilization of that data.

End-user computing (EUC)

- End-user computing (EUC) is a class of technology that allows non-programmers to achieve results that would have required help from a programmer.
- EUC is a group of approaches to computing that aim to better integrate end users into the computing environment.
- These approaches attempt to realize the potential for high-end computing to perform problem-solving in a trustworthy manner.
- End-user computing can range in complexity from users simply clicking a series of buttons, to writing scripts in a controlled scripting language, to being able to modify and execute code directly.

Types of EUC

1. **Business Rules:** Tools that allow users to configure business rules form a user interface.
2. **Analytics:** Tools that allow users to explore data to build dashboards and reports.
3. **Scripts:** Scripting language designed for end-users. For example, an office productivity suite that allows users to change a wide range of information processing functions with scripts.
4. **Bots:** An application or web platform that allows users to automate things with bots.
5. **Configuration:** A software that allows users to achieve a high degree of customization without touching code.
6. **Skins:** A toolkit for changing the user interface of an application with skin or theme.
7. **Visual programming:** visual environment that generate code.
8. **Fifth generation language:** A programming language that seeks to solve problems input.
9. **Artificial intelligence:** Tools that allows end users to train AI to solve particular sets of problems.

EUC Advantages

- Systems tailored to users
- Enables creative use of IS

- Generates competitive advantage
- Puts users nearer the information
- Allows for variety
- Increases user awareness of IS
- Relieves work load of IT professional

EUC Disadvantages

- Produces inappropriate systems
- Causes duplication
- Takes users away from their real job
- Ignores long range and technical issues
- Causes integration problems

Challenges of EUC

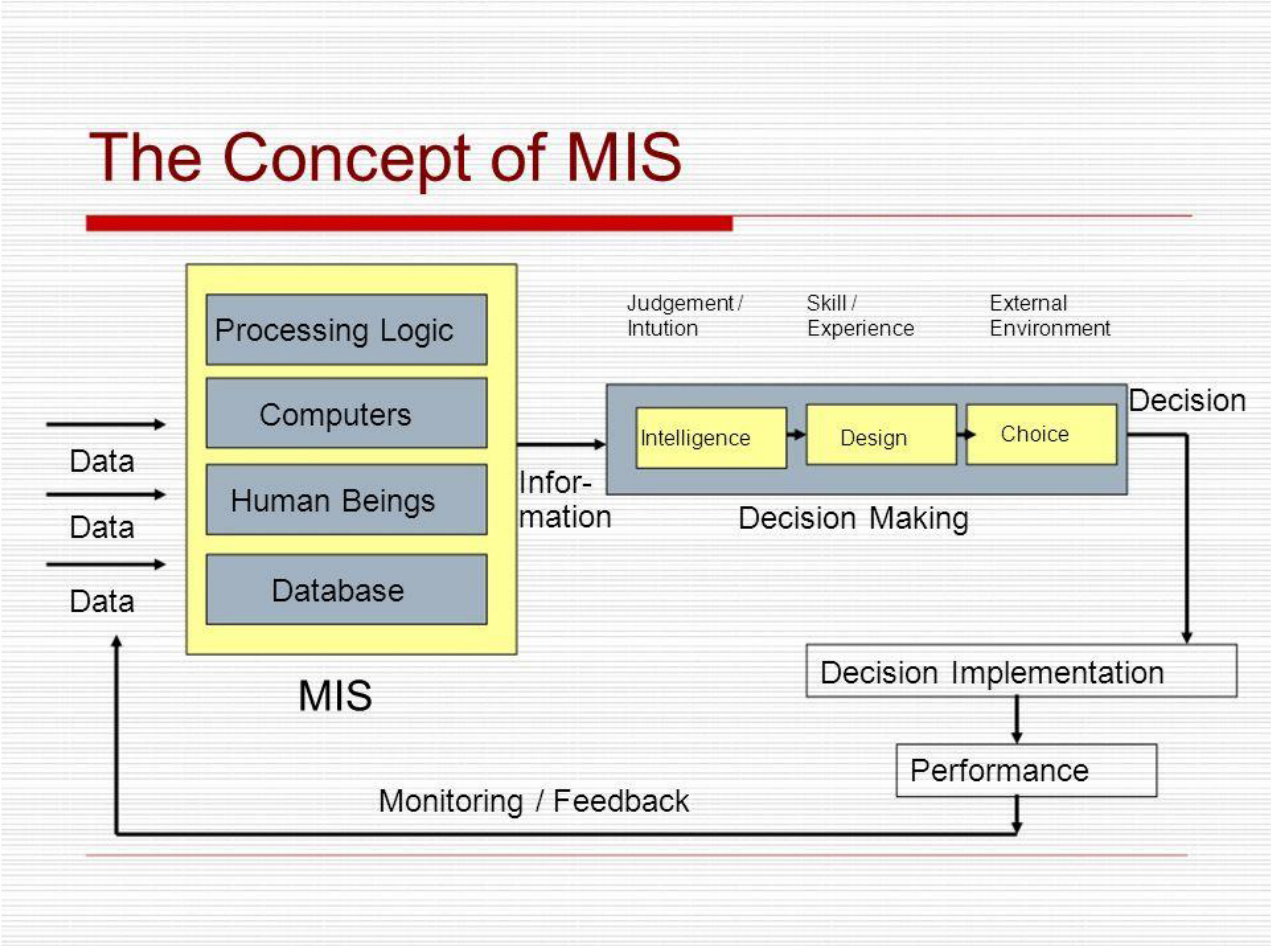
- For all the benefits of adopting EUC, there are risks to watch for. First, since every user requires connectivity to the data center, any loss of availability of either the data center itself (whether on-premises or cloud-based) or the connectivity to the data center will result in downtime for a considerable number of users.

- From a user experience perspective, rapid growth in the number of concurrent users can lead to a poor experience as the number users scales upwards, unless there is adequate room in the infrastructure or at the cloud provider to support such growth. Increases in latency or sluggishness can rapidly lead to user frustration and the desire to seek work-arounds for the enterprise application at hand.

- Complexity always leads to more risk, and so as EUC applications themselves become more intricate the opportunity for problems in performance, security, or availability will grow, for instance to ensure data entered and created on EUC devices has not been compromised in any way.

Concept of an MIS

- The MIS is an idea which is associated with human, machine, marketing and methods for collecting information's from the internal and external source and processing this information for the purpose of facilitating the process of decision-making of the business.
- MIS is not new, only the computerization is new, before computers MIS techniques existed to supply managers with the information that would permit them to plan and control business operations. The computer has added on more dimensions such as speed, accuracy and increased volume of data that permit the consideration of more alternatives in decision-making process.
- Management information system is an integrated set of component or entities that interact to achieve a particular function, objective or goal. Therefore, it is a computer-based system that provides information for decisions making on planning, organizing and controlling the operation of the sub-system of the firm and provides a synergistic organization in the process.
- The component of an information system includes: a hardware which is used for input/output process and storage of data, software used to process data and also to instruct the hand-ware component, data bases which is the location in the system where all the organization data will be automated and procedures which is a set of documents that explain the structure of that management information system.



Structure of a Management information system

MIS structure be described by following a variety of different approaches:

- Physical components,
- Information system processing functions,
- Decision support
- Levels of management activities
- Organizational functions

Structure of MIS may be understood by looking at the physical components of the information system in an organization.

- Hardware: Hardware refers the physical data processing equipment and peripheral devices.
- Software: software is broad term given to the instruction or program that direct the operation of the hardware. Database: the data base consists of all data utilized by application software.
- Input and output: various physical input and output from the information system, existing in the form like printout, report etc.

Information system structure can also be understood in term of its processing functions. The main processing functions of information system are described below:

- To Process Transactions: Information systems process transaction may be defined as an activity taking place in an organization.
- To Maintain Master files: Information systems create and maintain master files in the organization. A master file stores the historical data about the organization.

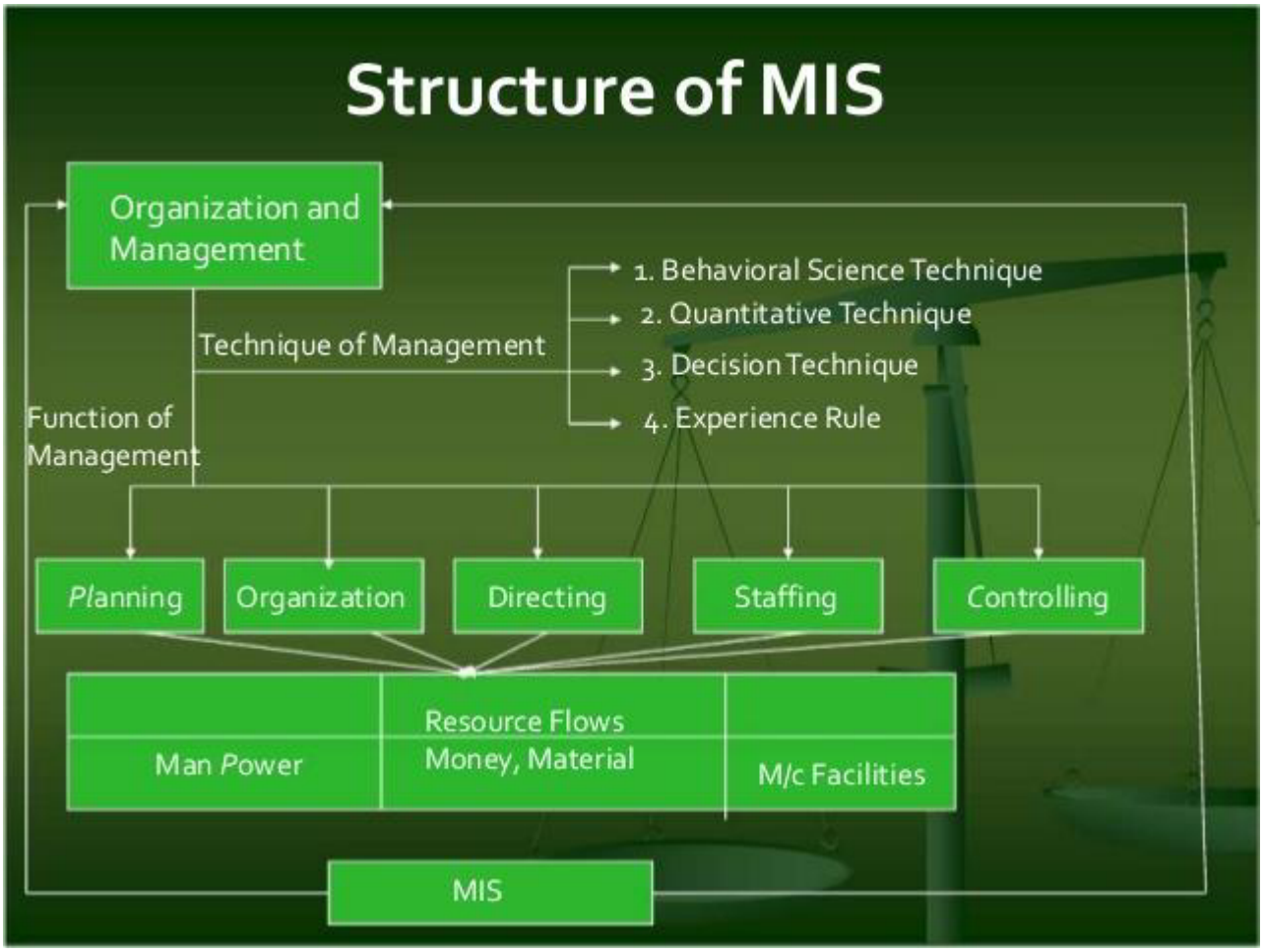
- To Produce Reports: Reports are significant products of an information system. Many reports are produces on a regular basis, which are called scheduled reports.
- To Process Interactive Support Applications

Decision varies with respect to the structure that can be provided for making them. A highly structured decision can be pre-planned. A structured decision, because of its well-defined nature can be said to be programmable.

The structure of an information system can be categorized in terms of level of the management activities.

- Strategic planning deals with long-range considerations. The decisions include the choice of business directions, market strategy, product etc.
- Management control level includes acquisition and organization of resource, structuring of work and training of personnel.
- Operational control is related to short-term decision for current operations. Pricing, inventory level etc.

The structure of management information system can also be described in terms of the organizational functions such as planning, organization, directing, staffing, controlling etc.



Assignment;

1. Why EUC is necessary/important?
2. Explain about role and impact of MIS.

Unit-3
Concepts of planning

- Concept of organizational planning
- The Planning Process
- Computational support for planning
- Business applications of information technology
- Internet & electronic commerce and its applications Enterprise Solutions
- Information System for Business Operations (SDLC)
- Information System for Strategic Advantage
- Decision Support Systems and its benefits and characteristics

Planning:

- A plan is a method of doing or making something, consisting of at least one goal and predefined course of action for achieving that goal.
- Planning: According to Terry and Franklin, “planning is selecting information and making assumptions concerning the future to put together the activities necessary to achieve organizational objectives.”
- Planning includes both the broadest view of the organization, e.g., its mission, and the narrowest, e.g., a tactic for accomplishing a specific goal.

Concept of organizational planning

- Organizational planning is the process of defining a company’s reason for existing, setting goals aimed at realizing full potential, and creating increasingly discrete tasks to meet those goals.
- Each phase of planning is a subset of the prior, with strategic planning being the foremost.
- There are four phases of a proper organizational plan: strategic, tactical, operational, and contingency. Each phase of planning is a subset of the prior, with strategic planning being the foremost.

Types/Phases of Organizational Planning

Strategic Planning

- Strategic planning covers long-term goals with all the necessary resources to achieve these goals. It typically includes a timeframe from 1 to 5 years.
- Also, a well thought out strategic plan considers controllable and non-controllable variables, and how to adjust to them.

Tactical Planning

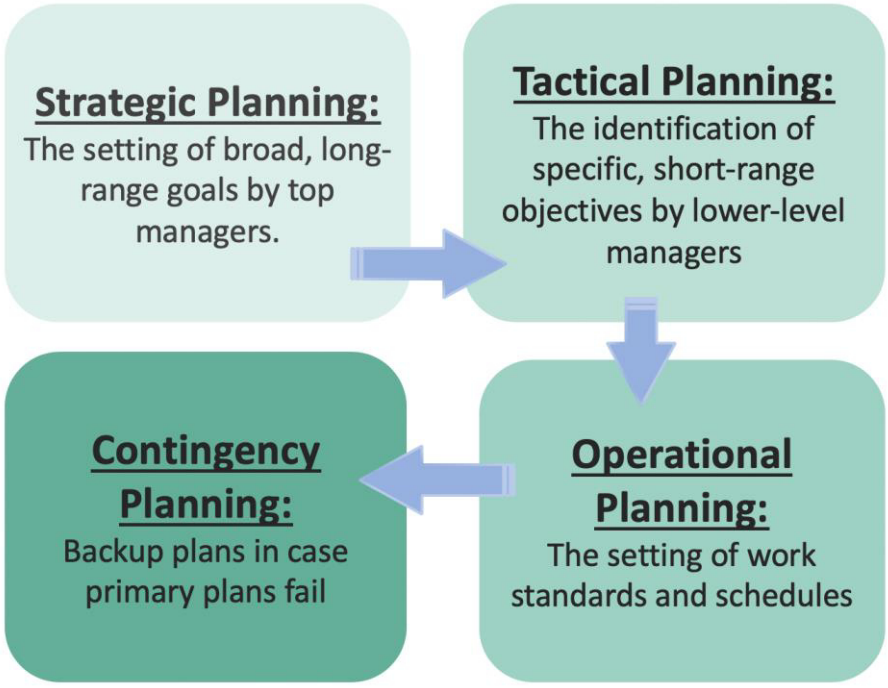
- Tactical planning includes activity and implementation details on how your organization will reach strategic goals (a separate document). Also, tactical planning timeframes are typically short (less than one year).

Operational Planning

- Operational planning includes specific methods, procedures, and standards for different areas of an organization.
- For example, you would typically have an operational plan for the Marketing department, HR department, IT department, and so on.
- An operational plan also includes specific objectives and targets, which are then assigned to employees to carry out.

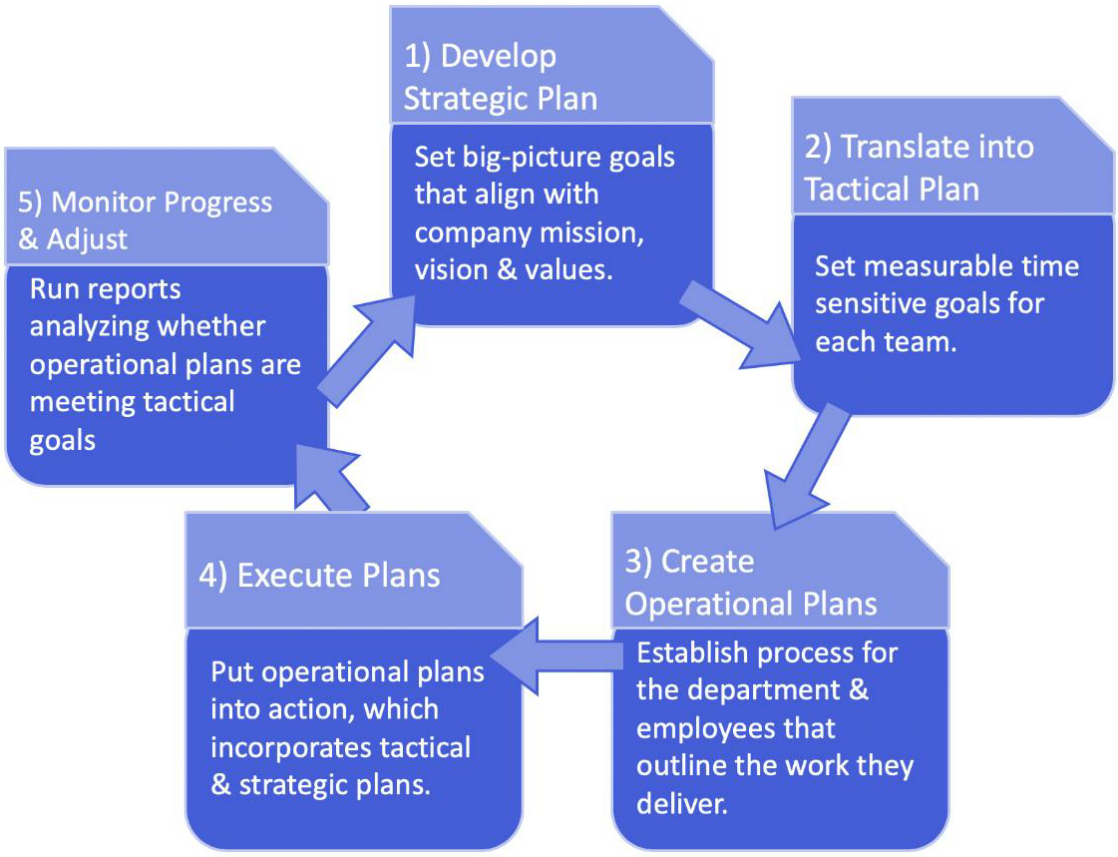
Contingency Planning

- Contingency planning covers alternative courses of action - typically outlining unusual and crisis situations.
- Rightly so, contingency planning is often associated with risk management, because a good contingency plan will address known and unknown risks.



The 5 Process Steps of Organizational Planning

The organizational planning process includes five phases that, ideally, form a cycle.



1. Develop the strategic plan

- Steps in this initial stage include:
  - Review your mission, vision, and values.
  - Gather data about your company, like performance-indicating metrics from your sales department
  - Perform a SWOT analysis; take stock of your company's strengths, weaknesses, opportunities, and threats
  - Set big picture goals that take your mission, vision, values, data, and SWOT analysis into account

2. Translate the strategic plan into tactical steps

- At this point, it's time to create tactical plans. Bring in middle managers to help do the following:

- Define short-term goals—quarterly goals are common—that support the strategic plan for each department, such as setting a quota for the sales team so the company can meet its strategic revenue goal.
- Develop processes for reviewing goal achievement to make sure strategic and tactical goals are being met.
- Develop contingency plans, like what to do in case the sales team's CRM malfunctions or there's a data breach.

3. Plan daily operations

- This stage should include setting goals and targets that individual employee should hit during a set period.
- Managers may choose to set some plans, such as work schedules, themselves. On the other hand, individual tasks that make up a sales plan may require the input of the entire team. This stage should also include setting goals and targets that individual employee should hit during a set period.

4. Execute the plans

- It's time to put plans into action. Theoretically, activities carried out on a day-to-day basis (defined by the operational plan) should help reach tactical goals, which in turn supports the overall strategic plan.

5. Monitor progress and adjust plans

- No plan is complete without periods of reflection and adjustment. At the end of each quarter or the short-term goal period, middle managers should review whether or not they hit the benchmarks.
- Depending on the outcome of those reviews, your organization may wish to adjust parts of its strategic, tactical, or operational plans. For example, if the sales team didn't meet their quota their manager may decide to make changes to their sales pipeline operational plan.

Computational support for planning

There are four types of computational methods for analysis and preparation of plans. These are:

a. Historical data analysis
b. Forecasting data analysis
c. Internal data analysis
d. Output of result/ Result analysis

a. Historical data analysis:
It is the main technique to analyze and find the patterns and relationship between the various input variables of the planning process. In this technique there are different methods available for computation of historical data. In this technique we analyze past data to find the actual circumstances at present and future.

b. **Forecasting data analysis:** Planning involves future therefore estimating general information regarding the present issues where the plans are preparing. The techniques which are used in this analysis are trend projection technique, regression analysis, interpretation and mid values etc.

c. **Internal data analysis:** This analysis refers to an analysis of the functional performance, financial performance such as sale performance, inventory performance etc. The analysis is done just to measure the performance of the several internal departments.

d. **Output of result:** Result analysis is a planning process referred as format which is suitable to present the data analysis.

Business applications of information technology

Information Technology has just about changed every aspect of business in a big way and this has never happened this fast before in history. To be more specific, here are a few ways in which information technology has affected business:

1- Communication

The use of IT we can simplify the way to communicate through e-mail, video chat rooms or social networking site.

2- Time saving

IT applications can save time in the retrieval of information from a database or website.

With the use of information technology different operations are performed in simple ways such as rapid searches of document, sending a copy of mail to multiple members etc.

3- Customer Relationship improvement

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

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

4- Management Information Systems

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

5- Security

Most businesses of the modern era are subject to security threats and vandalism. Technology can be used to protect financial data, confidential executive decisions and other proprietary information that leads to competitive advantages.

6- Efficiency of operations

Technology also helps a business understand its cash flow needs and preserve precious resources such as time and physical space.

Uses of Information Technology in Business

Uses of information technology in business are discussed briefly from the following head:

Product Development

Information technology helps businesses to identify the changing customer's needs more quickly than the traditional research and react strategy. it ultimately helps the business to respond fast according to the change in the external environment. Information technology can speed up the time of new products to hit the market.

Globalization

Globalization refers to the integration of markets in the global economy. Information technology helps businesses initially to grow locally and then internationally. A business organization can outsource its noncore work to the other small companies globally and use the network technology for reporting.

Facilitate Fast Payment Transfer

Nowadays currency transfer between two or more parties digitally is the fastest to settle out any business transaction. It is far cheaper than the traditional way of sending paper invoices and then settling payment.

Efficient And Effective Storage

Almost every business organization uses computer for data storage of the business. Computer software like excel and office help in keeping the figures at fingertips. Accounting software like tally stores the sales information, tax records, and specialized data for the business.

Ease Of Communication

Communication in the 21st century is done majorly through e-mails. Communication by email is faster and cheaper than sending a letter by post. The biggest advantage of communicating with the help of technology is speed. The speed of communication has increased the speed at which the business can be done.

Competitive Advantage Over Competitors

companies making proper use of information technology can get the first-mover advantage. They can create new products that differentiate them from the existing market. Efficient use of information technology also helps in reducing the cost per unit through increasing productivity.

Internet & electronic commerce and its applications Enterprise Solutions

- Definition: E-commerce is a process of buying and selling of products and services by businesses and consumers through an electronic medium, without using paper documents.
- These business transactions occur either as business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer or consumer-to-business. The terms e-commerce and e-business are often used interchangeably.
- In the last decade, widespread use of e-commerce platforms such as Amazon and eBay have contributed to substantial growth in online business.
- Ecommerce or electronic commerce actually means the use of an electronic medium for commercial transactions, but it is commonly used to refer to selling products and services over the internet to consumers or other businesses.

Application of Ecommerce:

1. Retail and Wholesale

E-retailing or online retailing refers to the transaction of goods and services through online stores from businesses to consumers. It is achieved through means such as virtual shopping carts and e-catalogs. The applications of e-commerce in this sector are numerous.

2. Finance

Finance and e-commerce are more connected today than ever. Banks and stock markets use e-commerce significantly in their operation. Online banking provides provisions such as balance check, bill payment, money transfer, etc. Online stock trading enables people to carry out trading electronically by giving information about stocks such as performance reports, analysis, charts, etc. through websites.

3. Manufacturing

In manufacturing, e-commerce forms a medium for companies to execute the electronic exchange. Combined buying and selling, sharing market status, inventory check information, etc. enables groups of companies to fluidly carry out their operations.

4. Auctioning

Applying e-commerce to auctions takes it to a more significant level where people can participate without any geographical boundaries. That leads to more participation, more negotiation, and helps to make auctions successful.

5. Marketing

Marketing activities such as pricing, product features, and building customer relationships can be strengthened using e-commerce to provide users an enhanced and customized shopping experience. Digital marketing strategies have become a significant way to promote businesses.

6. Online Shopping

The shopping preferences of people have undergone a massive change in the last few years. “Go online” has become a mantra for all businesses to succeed. Online shopping is comfortable, convenient, and at most times, cost effective. The prosperity of online shopping apps such as Flipkart, Amazon are proof of this.

7. Mobile and Web Applications

Popularly called mobile commerce or m-commerce applications, this is a subset of retail e-commerce. Mobile or web application development has become a staple for brands to showcase their business capabilities. The consumer carries out purchases through mobile or web applications that are optimized for the retailer. These applications also ensure payment security through safe e-payment methods.

8. Online Booking

Travel and tourism are a thriving industry today, and online booking is an ecommerce application that is growing as a result of it. Online booking helps people book travel essential services like train/flight tickets, hotel rooms, tourism packages, transportation services, etc. It makes travel very convenient and easy for people as everything can be set from the tip of the fingers.

9. Online Publishing

Digital magazines and e-books are slowly replacing traditional printed books. It has several advantages such as portability, lightweight, accessible from everywhere, etc. They are also environment friendly as they help in reducing paper and saving trees. Due to these reasons, online publishing or e-publishing has been seeing a rise in popularity.

10. E-banking

E-banking or internet banking is an e-commerce application that has simplified time-consuming and complex banking processes for people. It enables bank users to perform transactions easily online without having to wait in long queues in banks. Every major bank has its own online application today to provide virtual banking services to its customers.

Information System for Business Operations (SDLC)

- System design uses the output from system analysis as its input. The main objective of system design is to interpret the system requirements into architectural, logical and physical designs of how the information system to be implemented.
- The system development life cycle refers to the processing of planning, creating, testing, and deploying an information system.
- The main objective of system development life cycle is to produce high-quality information systems that meet or exceed the expectations of the users within the stipulated budget and time frame.

1. Planning

- This is the first phase in the systems development process. It identifies whether or not there is the need for a new system to achieve a business's strategic objectives.
- The purpose of this step is to find out the scope of the problem and determine solutions. Resources, costs, time, benefits and other items should be considered at this stage.

2. Systems Analysis and Requirements

- The second phase is where businesses will work on the source of their problem or the need for a change.
- In the event of a problem, possible solutions are submitted and analyzed to identify the best fit for the ultimate goal(s) of the project. This is where teams consider the functional requirements of the project or solution.

3. Systems Design

- The third phase describes, in detail, the necessary specifications, features and operations that will satisfy the functional requirements of the proposed system which will be in place
- During this phase we will consider the essential components (hardware and/or software) structure (networking capabilities), processing and procedures for the system to accomplish its objectives.

4. Development

- The fourth phase is when the real work begins—in particular, when a programmer, network engineer and/or database developer are brought on to do the major work on the project.
- This work includes using a flow chart to ensure that the process of the system is properly organized. The development phase marks the end of the initial section of the process.
- Additionally, this phase signifies the start of production.

5. Integration and Testing

- The fifth phase involves systems integration and system testing (of programs and procedures)—normally carried out by a Quality Assurance (QA) professional—to determine if the proposed design meets the initial set of business goals.
- Testing may be repeated, specifically to check for errors, bugs and interoperability. This testing will be performed until the end user finds it acceptable. Another part of this phase is verification and validation, both of which will help ensure the program's successful completion.

6. Implementation

- The sixth phase is when the majority of the code for the program is written. Additionally, this phase involves the actual installation of the newly-developed system.

7. Operations and Maintenance

- The seventh and final phase involves maintenance and regular required updates. This step is when end users can fine-tune the system, if they wish, to boost performance, add new capabilities or meet additional user requirements.

Information System for Strategic Advantage

- A strategic information system (SIS) is a business information system (BIS) with the features systematic approach to collecting, storing, and retrieving data; Integration with other systems.
- Strategic Information System involves having a long-term vision, setting goals, and taking steps to reach those goals. Strategic Information System keeps the organization focused on its vision.
- It is essential for our company to have a clear vision, strategy and organization structure.
- It's important that employees are aligned with these strategies, so that everyone has the same goals in mind.

Importance of strategic management system

- Strategic management helps a decision-maker to get equipped with management tools or anticipating changes and directing the organizational activities along the right path.
- Practice of strategic management reduces the risk of operation by helping the enterprise to innovate in time and take an early action.
- Further, strategic management being objective oriented can provide all the employees with clear ideas about what to do, when to do, where to do and how to do.
- Thus, an orientation towards strategic management can assure better performance and greater unity in the enterprise.

Advantage of strategic management system

- Strategic information system provides a connection between demands of organization and latest information technology.
- It helps them evolve their business strategy, helps with knowledge management and operations management.
- Information system strategy is a critical aspect of an organization's management decision for its growth, expansion and supply chain management.
- Information technology and competitive intelligence can work wonders for a business. The integration of the data system and its function within the organization can be handled easily by enabling open access and use of management systems.
- Besides that, it also enables the classification of different opportunities for the use of information systems for different strategies.
- With the System Information Strategy, it ensures that the Information system functions accordingly and supports the business goals and objectives of the organization at the different levels.
- In additional to the reduction in product related cost, it also helps in increasing market share, streamline business process, provide a better business environment, and deliver high quality product and services.

Decision Support Systems and its benefits and characteristics

Characteristics of DSS

- DSS tends to be aimed at the less well structured, underspecified problem that upper-level managers typically face.
- DSS attempts to combine the use of models or analytic techniques with traditional data access and retrieval functions.
- DSS specifically focuses on features which make them easy to use by non-computer people in an interactive mode.
- DSS emphasizes flexibility and adaptability to accommodate changes in the environment and the decision-making approach of the user.

- DSS incorporate both data and models.
- They are designed to assist managers in their decision processes in semi-structured or unstructured tasks.
- They support managerial judgment; rather than replacing it.
- DSS improve the effectiveness of the decisions; not the efficiency with which decisions are being made.

Benefits of DSS

Fast:
DSS is a fast method for taking decisions. Computers give us results fast. The data we need is displayed on the screen within a few minutes. We have to just take decisions over selves after getting data from the computer software.

Automation:
If you want to reward any customer then you don't need to worry. The software will know which consumer buy most of the company products and you will give them a 50% discount on their next purchase. So, it automates the process of decision making.

Efficient:
It is an efficient method. There are fewer chances that computerized data may be wrong. Computers always extract the data that we feed to them. If we feed relevant data then it will output data that is accurate.

Training:
If we have all the data available on our desk then deciding by top management is easy. They make decisions in no time. First, they get data from a single click. For example, the CEO of Samsung want to know how many sales of a specific model of mobile is sold in December, then he will get information from the computer software. If he wants to know which Samsung mobile model has most of the sales in last year then he will know by doing a couple of clicks from the computer. It is noted that the data is only available to the CEO and top management of the company. So, they don't need extra training.

Communication:
The top company authority gets accurate data from the computerized software. The company CEO and managerial staff communicate with each other and make decisions. They have all the statement ready from the software and they have to only say yes or no to the statements.

Low cost:
If we use the old method of organizing and processing the data then it consumes a lot of manpower. We just get data from relevant authorities and input it into our software. We also get data from doing little research in any field. For example, if we want to construct a building then we get information from real estate agents about cost, time, structure, maps and then we input in computer software and get the results about total cost, and time duration.

Satisfaction:
If you make a random decision without any valid data, then you will not be confident in your decision. But if you first see the data and then make a decision then you get satisfaction with your decisions.

Unit-4

Managing Information Technology

- Enterprise & global management
- Security & Ethical challenges
- Planning & implementing changes
- Advanced Concepts in Information Systems
    - Enterprise Resource Planning
    - Supply Chain Management
    - Customer Relationship Management and
    - Procurement Management.

Enterprise & global management

- Enterprise is another word for a for-profit business or company, but it is most often associated with entrepreneurial ventures.
- There are many forms of legal enterprises, with the most common being:
    - **Sole proprietorship** – A company run by a single individual, typically for their benefit, with unlimited liability for any damages that occur as a result of the business' operations.
    - **Partnership** – A business run by two or more individuals or entities who share ownership – not necessarily equal ownership, however.
    - **Corporation** – A for-profit entity created to shield the owner(s) from liability should the enterprise become subject to a lawsuit. There are different forms of corporations, depending on how many owners there are.
- Ultimately, the word enterprise is a synonym for business.

Global management of Information technology

- As companies are transformed into global e- businesses it is important for business managers and professionals to understand how to manage this vital function.
- With the use of information technology more global business activities can be integrated between headquarters and its subsidiaries.
- IT helps companies span across geographic, cultural, other boundaries etc.
- It is single function solution with global presence. (e.g., shipping)
- IT products and services that are built in one country and used in another.
- With the use of IT seamless, instantaneous transfer of data and information around the world is possible.
- IT also provides support for dispersed project teams.

Why Develop Global IT?

- Cost reduction
- Increasing customer satisfaction
- Need for integrated information
- Common business processes or products etc.

Security & Ethical challenges

Security challenges of IT

1. Ransomware attack

- Ransomware attacks have become popular in the last few years and pose one of world's most prominent Cyber Security challenge.
- Ransomware attacks involve hacking into a user's data and preventing them from accessing it until a ransom amount is paid.

2. IOT attacks

- According to IoT Analytics, there are about 11.6 billion IoT devices by 2021.
- Examples of IoT devices include desktops, laptops, mobile phones, smart security devices, etc.
- As the adoption of IoT devices is increasing at an unprecedented rate, so are the challenges of Cyber Security.

3. Cloud attacks

- Most of us today use cloud services for personal and professional needs.
- Also, hacking cloud-platforms to steal user data is one of the challenges in Cyber Security for businesses.

4. Phishing attack

- Phishing is a type of social engineering attack often used to steal user data, including login credentials and credit card numbers.
- Phishing attacks remain one of the major challenges of Cyber Security in, as the demographic here isn't well-versed with handling confidential data.

5. Blockchain and cryptocurrency attack

- While blockchain and cryptocurrency might not mean much to the average internet user, these technologies are a huge deal for businesses. Thus, attacks on these frameworks pose considerable challenges in Cyber Security for businesses as it can compromise the customer data and business operations.

6. Software vulnerability

- Even the most advanced software has some vulnerability that might pose significant challenges to Cyber Security.
- An older software version might contain patches for security vulnerabilities that are fixed by the developers in the newer version. Attacks on unpatched software versions are one of the major challenges of Cyber Security.

7. Machine Learning and AI attack

- While Machine Learning and Artificial Intelligence technologies have proven highly beneficial for massive development in various sectors, it has its vulnerabilities as well.
- These technologies can be exploited by unlawful individuals to carry out cyberattacks and pose threats to businesses.

8. BYOD policies

- Most organizations have a Bring-Your-Own-Device policy for their employees.
- Having such systems poses multiple challenges in Cyber Security.
- If the device is running an outdated or pirated version of the software, it is already an excellent medium for hackers to access.

- Since the method is being used for personal and professional reasons, hackers can easily access confidential business data.

9. Insider attack

- While most challenges of Cyber Security are external for businesses, there can be instances of an inside job.
- Employees with malicious intent can leak or export confidential data to competitors or other individuals.
- This can lead to huge financial and reputational losses for the business.

10. Outdated hardware

- Not all challenges of Cyber Security come in the form of software attacks.
- If the hardware isn't advanced enough to run the latest software versions, this leaves such devices on an older version of the software, making them highly susceptible to cyberattacks.

Ethical challenges of IT

Security:

- With tools like the internet, hackers have found it very easy to hack into any computer or system as long as it is connected on internet.
- Hackers can easily use an IP (Internet Protocol) address to access a user's computer and collect data for selfish reasons.
- Also, the wide spread of internet cookies which collect information whenever we use the internet, has exposed IT users to high risks of fraud and conflicting interests.
- Many big companies use these cookies to determine which products or service they can advertise to us.
- When it comes to online banking, the transfer of money can easily be interrupted by a hacker and all the money will be transferred to their desired accounts, which affects both the bank and the customers who is using online banking technology.

Privacy Issues:

- As much as information technology has enabled us to share and find relevant information online, it has also exploited our freedom of privacy.
- Their so many ways our privacy is exploited, use of internet webcams, experienced computer users can turn on any webcam of any computer online and they will have access to your private life, many celebrities have been victims of these online stalkers.

Copyright Infringement:

- Information technology has made it easy for users to access any information or artifact at any given time.
- With the increased development of music sharing networks and photo bookmarking sites, many original creators of these works are losing the credibility of their works, because users of IT can easily gain access and share that data with friends.
- Free music and file downloading sites are popping up on internet every day, lots of original work like music albums, books, are being downloaded for free.
- In this case one legitimate user will purchase the book, software, web template or music album, and they will submit it to a free download site where others will simply just download that data for free.
- It is good news for the users because it saves them money, but it harms the original creator of these works.

Increased pressure on IT experts:

- Since information technology systems have to run all the time, pressure is mounted on IT experts to ensure the accuracy and availability of these systems.
- Many big organizations which need to operate 24 hours will require a standby IT team to cater for any issues which might arise during the course of operation.
- This pressure results into stress and work overload which sometimes results into Imperfection.

Planning & implementing changes

- Planning is a discipline within the information technology and information systems domain and is concerned with making the planning process for information technology investments and decision-making a quicker, more flexible, and more thoroughly aligned process.
- According to Architecture & Governance Magazine, (Strategic) IT planning has become an overarching discipline within the Strategic Planning domain in which enterprise architecture is now one of several capabilities.
- Organized planning of IT infrastructure and applications portfolios done at various levels of the organization Important for both planners and end-users. Why important for end-users? They often plan IT in their respective units Participate in corporate IT planning.

IT Planning Approaches

Business-led approach

- IT investment plan is defined based on the business strategy.

Method driven approach

- IT needs are identified with the use of techniques and tools (often used or prescribed by consultants).

Technological approach

- Analytical modeling (e.g., computer-aided software engineering, CASE) and other tools are used to execute the IT plans.

Administrative approach

- IT plan is established by the steering committee or management to implement an approved IS initiative.

Organizational approach

- IT investment plan is derived from a business consensus view of all stakeholders in the organization (management and end-users) of how IT/IS fits organization's overall business objectives.

Four-stage Model of IT Planning

1. Strategic IT Planning

- Establishes the relationship between the overall organizational plan and the IT plan.

2. Information Requirement Analysis

- Identifies broad, organizational information requirements to establish a strategic information architecture that can be used to direct specific application development.

3. Resource Allocation

- Allocates both IT application development resources and operational resources.

4. Project Planning

- Develops a plan that outlines schedules and resource requirements for specific information systems project.

Implementing changes in IT

- Change in IT is "the addition, modification or removal of any authorized, planned, or supported service or service component that could have an effect on IT services." Most often, a change is an event that has been approved by the change authority, is evaluated and implemented while minimizing risk, adjusts the status of a configuration item (CI), and adds value to the business and its customers.
- Changes can be brought about in two ways:

1) Change Request or Request for Change (RFC)

- A change request is a formal proposal that can be submitted by a stakeholder in the organization or by a service user via the service desk, utilizing the request fulfillment process to alter a configuration item.

2) Change Proposal

- A change proposal is a high-level description of a potential service introduction or significant change and includes the business case and implementation schedule. These proposals are normally created by the service portfolio management process in Service Strategy and are passed to the change management process.

Types of Changes

1) Emergency Change/Urgent Change

- An emergency change is one that must be assessed and implemented as quickly as possible to resolve a major incident.
- Emergency changes tend to be more disruptive and have a high failure rate, so they should be kept to a minimum.

2) Standard Change

- A standard change is one that occurs frequently, is low risk and has a pre-established procedure with documented tasks for completion.
- Standard changes are subject to pre-approval in order to speed up the change management process.

3) Major Change

- A change that may have significant financial implications and/or be high risk.
- Such a change requires an in-depth change proposal with financial justification and appropriate levels of management approval.

4) Normal Change

- A normal change is one that is not standard and not emergency and typically requires an important change to a service or the IT infrastructure.

additional Change Requests may include:

- Application Changes
- Hardware Changes
- Software Changes
- Network Changes
- Documentation Changes
- Environmental Changes

Enterprise Resource Planning

- Resource Planning is a process of identifying, forecasting, and allocating various types of business resources to the projects at the right time and cost.
- Enterprise resource planning (ERP) is defined as the ability to deliver an integrated suite of business applications.
- ERP tools share a common process and data model, covering broad and deep operational end-to-end processes, such as those found in finance, HR, distribution, manufacturing, service and the supply chain.
- Enterprise resource planning (ERP) is a process used by companies to manage and integrate the important parts of their businesses.

- Many ERP software applications are important to companies because they help them implement resource planning by integrating all of the processes needed to run their companies with a single system.
- An ERP software system can also integrate planning, purchasing inventory, sales, marketing, finance, human resources, and more.

Key features of ERP systems

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

- **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.

- **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.
- **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.
- **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.

Benefits of ERP

- Focused IT Costs
- Total Visibility Across the Organization
- Improved Reporting and Planning
- Improved Efficiency
- Customer Service
- Data Security and Quality
- Improved Collaboration and Workflows
- Standardized Business Processes
- Improved Supply Chain Management
- Superior Scalability

Supply Chain Management (SCM)

- The supply chain includes all the activities, people, organizations, information, and resources required to move a product from inception to the customer.
- For example, in the consumer goods space, this likely spans raw materials, production, packaging, shipping, warehousing, delivery, and retailing.
- The end goal is simple: meet the customer's request. "By balancing supply and demand across all members of the supply chain," Frayer says, "organizations and channels work together to move the product."
- Supply chain management may also include an enterprise software to manage and integrate a network of customers, suppliers, business partners, distributors into organizations internal supply network involved in ultimate provision of product and service packages required by end customers.
- Supply chain management is the management of the flow of goods and services .

Why is Supply Chain Management Important?

- Supply chain management is crucial for any organization because doing it well can introduce several benefits to the organization; however, poor supply chain management can result in very expensive delays, quality issues, or reputation.
- In some cases, poor supply chain management can also cause legal issues if suppliers or processes are not compliant.
- Technology advances have unlocked huge potential for supply chain management, enabling supply chain managers to work closely – and in real time – with members of the supply chain.
- With supply chain management, organizations can:
    - Anticipate problems
    - Dynamically adjust prices
    - Improve inventory and fulfillment

Benefits of supply chain management

Effective supply chain management provides three primary benefits to an organization, according to MSU's online Supply Chain Management I course.

1. Lowered Costs

- By integrating suppliers and applying technology, organizations can lower operating costs by responding more dynamically to customer needs.
- For example, managing based on demand keeps organizations from over-producing, which not only reduces labor and raw materials costs, but also cuts down on inventory management costs and transportation costs.

2. Increased Revenue

- When organizations use technology to stay closer to customer demand and respond more quickly more likely products remain available for customers to purchase.
- When manufacturing is streamlined to produce just enough, labor and materials can be devoted to developing new items to offer the customer and expand the product mix.

3. Asset Utilization

- With effective supply chain management, organizations can use capital assets, like production or transportation equipment, most effectively.
- Supply chain management allows organizations to deliver more quickly, ensure products are available, reduce quality issues, and navigate returns with ease, ultimately improving value, both within the organization and for the customers.

Customer Relationship Management (CRM)

- Customer relationship management (CRM) is a process in which a business or other organization administers its interactions with customers, typically using data analysis to study large amounts of information.
- CRM systems compile data from a range of different communication channels, including a company's website, telephone, email, live chat, marketing materials and more recently, social media.
- They allow businesses to learn more about their target audiences and how to best cater for their needs, thus retaining customers and driving sales growth.
- CRM may be used with past, present or potential customers.
- Customer relationship management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle.

- The goal is to improve customer service relationships and assist in customer retention and drive sales growth.

Why CRM benefits businesses

The use of CRM systems can benefit organizations ranging from small businesses to large corporations, through:

- Having customer information such as past purchases and interaction history easily accessible can help customer support representatives provide better and faster customer service.
- Collection of and access to customer data can help businesses identify trends and insights about their customers through reporting and visualization features.
- Automation of menial, but necessary, sales funnel and customer support tasks.

Business benefits of CRM

Implementing a customer relationship management (CRM) solution might involve considerable time and expense. However, there are many potential benefits.

- A major benefit can be the development of better relations with your existing customers.
- This can lead to better marketing of your products or services by focusing.
- Enhanced customer satisfaction and retention, ensuring that your good reputation in the marketplace continues to grow.
- Improved profitability by focusing on the most profitable customers and dealing with the unprofitable in more cost-effective ways.

Procurement Management.

- Procurement management is the strategic approach to managing and optimizing organizational spend.
- Procurement management involves acquiring quality goods and services from preferred vendors.
- For companies in any industry, smart procurement practices are essential for ensuring efficient operations and an optimal bottom line.
- Put simply, procurement comprises all activities and processes involved in acquiring needed goods and services from external parties.
- This may include everything from office supplies, furniture, and facilities to heavy equipment, consulting services, and testing and training.
- Properly managing all procurement activities not only keeps business operations running smoothly; it also saves money, time, and resources.
- In short, proper procurement management is imperative for avoiding costly delays and errors.

Key Steps for Successful Procurement Management

- Specification and planning — Before anything, companies must put together a cohesive procurement plan and specify what services and goods will be needed, whether internally and externally.
- Identifying and selecting suppliers — Next, potential suppliers must be researched and identified.
- Proposal Requesting, Negotiating, and Contracting — Once potential suppliers have been narrowed down, you can begin requesting proposals and negotiating as needed.
- Control and Delivery — After you enter into a contract with a supplier, it's up to your purchasing department to properly control all deliveries and payments.
- Measurement and analysis — Finally, the entire procurement process must be analyzed using an established system of key performance indicators.

The Importance of Properly Managing Procurement Processes

- Maintaining good relationships with suppliers and staying organized throughout every step of the procurement process are both crucial to ensure the success of all business operations, allowing you to meet your specific goals while easily meeting all stakeholder expectations.
- In establishing smart procurement processes, companies can avoid costly downtime while boosting their bottom lines.
- As technology continues to advance, digital procurement management techniques are becoming increasingly popular, cutting down on delays and errors while helping skilled buyers do their jobs more efficiently.
- Low-cost computing and data storage systems are reshaping the way companies handle purchasing and procurement, allowing for more advanced cloud and mobile capabilities, while the Internet of Things (IoT) is rapidly changing the way all company operations are conducted.

Unit-5
MIS in functional areas of business

- Accounting information systems
- Geographical information systems
- Human resource information systems
- Inventory information systems
- Manufacturing information systems
- Marketing information systems
- Quality information systems

Accounting information systems

- An accounting information system (AIS) is a structure that a business uses to collect, store, manage, process, retrieve, and report its financial data.
- AIS can be used by accountants, consultants, business analysts, managers, chief financial officers (CFOs), auditors, regulators, and tax agencies etc.
- Specially trained accountants work in-depth with AIS to ensure the highest level of accuracy in a company's financial transactions and record-keeping, as well as make financial data easily available to those who legitimately need access to it—all while keeping data intact and secure.

Functions of an Accounting Information System

Accounting information systems have three basic functions:

- The first function of an AIS is the efficient and effective collection and storage of financial data.
- The second function of an AIS is to supply information useful for making decisions, including producing managerial reports and financial statements.
- The third function of an AIS is to make sure controls are in place to accurately record and process data.

Parts of an Accounting Information System

An accounting information system typically has six basic parts:

- **People** who use the system, including accountants, managers, and business analysts
- **Procedure and instructions** are the ways that data are collected, stored, retrieved, and processed
- **Data** including all the information that goes into an AIS
- **Software** consists of computer programs used for processing data
- **Information technology** infrastructure includes all the hardware used to operate the AIS
- **Internal controls** are the security measures used to protect data.

Benefits of Using an Accounting System

1. Saves Time and Costs

- Bookkeeping is known as a very time-consuming task because there are plenty of transactions to record and count.
- However, with an accounting system, all the procedures can be automated so that they can be finished quickly.

2. Increases Financial Visibility

- An accounting system makes it easy for stakeholders to monitor the company's financial position more comprehensively.

3. Minimizes Errors

- Manual calculations have a higher risk of errors, because in order to ensure accuracy you have to depend on the accountant's precision.
- However, with an accounting system, the calculation process is automated. Errors like duplicate data can also be detected.

4. Improves Asset & Inventory Management

- A good accounting system should be connectable with company's asset and inventory management. This means that it must enable to manage your assets and inventory as well.

5. Provides Real Time Data

- Accounting software allows to track company's financial data in real time. We can immediately find out the exact amount of money that goes in and out anytime.

6. Enhances Decision-Making Process

- With complete, accurate, and real-time reports, stakeholders will be able to make better financial decisions for the company. They will be able to find out what processes cost the most, which costs can be reduced, and so on.

7. Gives High Flexibility

- Web-based accounting software gives users the convenience of tracking their company's financial information and performing accounting tasks from anywhere. Users only need an internet connection to be able to use the app through a web browser.

Geographical information systems

- A geographical information system (GIS) is a computer-based system that include digital mapping technology.
- It is used to store and manipulate data that are viewed from a geographical point of reference.
- This system has four main capabilities: data input, data storage and retrieval, data manipulation and analysis, and data output.
- A GIS is one of the powerful and versatile tools as it can create information by integrating different data, sometimes from different sources, and display the data in different ways to the end-user.
- Geography plays an important role in many business decisions, since 85% of corporate data involve a number of business decisions, such as store locations, sales territories, sales promotions, and regulatory compliance rely heavily on geographical data.

Importance/Role of GIS in MIS

- Management Information Systems (MIS) and Geographic Information Systems (GIS) improve decision making. Two of the integration areas of importance for MIS and GIS are user interface and database.
- The MIS allows for understanding and the GIS for up-to-date data transfer.
- MIS is important in the ways of project planning, implementation and monitoring, as it provides strength improves systems and processes. It works in respect to executive and technical functions; it also works towards efficient use of resources. Adding GIS will make it more efficient and easier to understand.

- Integrating MIS and GIS on a user-interface level allows for the usage of one interface with multiple databases attached. This means that MIS and GIS teams will have to cooperate. When integration takes place on a database level, the two systems share one database. Once the common database has been set up the MIS and GIS teams can work independently on their applications unless the database is designed for one application. The ideal integration is on both user-interface and database level.

Human resource information systems

- HRIS stands for Human Resources Information System. The HRIS is a system that is used to collect and store data of an organization's employees.
- In most cases, an HRIS encompasses the basic functionalities needed for end-to-end Human Resources Management (HRM).
- It is a system for recruitment, performance management, learning & development, and more.

Benefits of an HRIS

- **Record-keeping.** An HRIS is a record-keeping system that keeps track of changes to anything related to employees.
- **Compliance**. Some data is collected and stored for compliance reasons. This includes material for the identification of employees in case of theft, fraud, or other misbehaviors, first contact information in case of accidents, citizens identification information for the tax office, and expiration dates for mandatory certification.
- **Efficiency**. Having all this information stored in one place not only benefits accuracy but also saves time.
- **Self-Service HR**. When done right, the HRIS can offer a good employee experience.

Functions of HRIS

- **Time & Attendance**. With the use of HRIS we can automatically keep track of arrival and departure of employee rather than doing it manually.
- **Training**. This module is often referred to as an LMS, or Learning Management System, when it's a stand-alone. An LMS usually includes available e-learning and other courses to be followed by employees.
- **Performance management**. Performance ratings are generated once or multiple times a year by the direct manager or peers of the employee.
- **Employee self-service**. Organizations are focusing increasingly on having employees and their direct supervisors manage their own data. Requests like holidays can be asked for by the employee him/herself. After approval, these are then immediately saved into the system (and registered to track for payroll and benefits purposes).
- **Reporting & Analytics**. A much rarer module in HRIS systems is reporting and analytics. Modern systems enable the creation of automated HR reports on various topics like employee turnover, absence, performance, and more. Analytics involves the analysis of these insights for better-informed decision making.

Inventory information systems

- An inventory information system is the combination of inventory management software and inventory management processes & procedures to connect, track and manage the flow of goods, activities, information and resources across a business.
- Purchasing is a very important component of an inventory information system. Too little inventory results in out of stocks. Too much inventory leads to obsolete inventory and limits cash flow.
- Purchasing includes forecasting, trend analysis, purchasing of goods and/or raw materials, vendor management, special orders and may include other arrangements, such as drop shipping.
- Inventory management & warehousing are at the heart of an inventory information system.

Advantages of Inventory Information System

The following are the advantages of strong inventory information system:

1. **Better Inventory Accuracy**: With solid inventory management, you know what's in stock and order only the amount of inventory you need to meet demand.
2. **Reduced Risk of Overselling:** Inventory management helps track what's in stock and what's on backorder, so you don't oversell products.
3. **Cost Savings:** Stock costs money until it sells. Carrying costs include storage handling and transportation fees, insurance and employee salaries. Inventory is also at risk of theft, loss from natural disasters or obsolescence.
4. **Avoiding Stockouts and Excess Stock:** Better planning and management helps a business minimize the number of days, if any, that an item is out of stock and avoid carrying too much inventory.
5. **Greater Insights:** With inventory tracking and stock control, you can also easily spot sales trends or track recalled products or expiry dates.
6. **More Productivity**: Good inventory management solutions save time that could be spent on other activities.
7. **Increased Profits:** A better understanding of both availability and demand leads to higher inventory turnover, which leads to greater profits.
8. **Better Customer Experience:** Customers that receive what they order on time are more loyal.

Manufacturing information systems

- The manufacturing information system refers to the management information system that is designed for use anywhere manufacturing or production is occurring.
- Generally, nowadays management information systems are computerized and are planned for collecting and presenting the data which managers require for planning and directing functions within the organization.
- It supports the manufacturing functions of purchasing, receiving, quality control, inventory management, material requirements planning, capacity planning, production scheduling, and plant design.

Benefits of MIS implementation might include:

- Reduced costs, waste, and re-work
- Increased efficiency in set-up times
- Assessment of correct order priority
- Assignment and reassignment of inventory as necessary
- Evaluation of optimal times to turn machines on and off
- Scheduling and rescheduling equipment
- Embedding best practices
- Improving reaction time within the supply change management process
- Making and measuring parts
- Assigning personnel

- Managing suppliers
- Increasing total output

Marketing information systems

- A marketing information system (MKIS) is a management information system (MIS) designed to support marketing decision making.
- It as a "system in which marketing data is formally gathered, stored, analyzed and distributed to managers in accordance with their informational needs on a regular basis."
- In addition, the online business dictionary defines Marketing Information System (MKIS) as "a system that analyzes and assesses marketing information, gathered continuously from sources inside and outside an organization or a store."
- Furthermore, "an overall Marketing Information System can be defined as a set structure of procedures and methods for the regular, planned collection, analysis and presentation of information for use in making marketing decisions."

Components of Marketing Information System

1. **Internal Records:** The Company can collect information through its internal records comprising of sales data, customer database, product database, financial data, operations data, etc.

2. **Marketing Intelligence System:** The marketing intelligence system provides the data about the happenings in the market, i.e., data related to the marketing environment which is external to the organization. It includes the information about the changing market trends, competitor's pricing strategy, change in the customer's tastes and preferences, new products launched in the market, promotion strategy of the competitor, etc.

3. **Marketing Research:** The Marketing Research is the systematic collection, organization, analysis and interpretation of the primary or the secondary data to find out the solutions to the marketing problems. Several Companies conduct marketing research to analyze the marketing environment comprising of

changes in the customer's tastes and preferences, competitor's strategies, the scope of new product launch, etc. by applying several statistical tools.

4. **Marketing Decision Support System:** It includes several software programs that can be used by the marketers to analyze the data, collected so far, to take better marketing decisions.

Importance/Benefits of Marketing Information System

1. **Fills up Information Gap:** The purpose is to meet their information needs and being aware of the world-wide scenario.
2. **Facilitates Decision Making:** It is a useful tool for future decision making involving the strategic, operational and control related decisions.
3. **Marketing Planning:** Marketing information system assesses the market demand and prospective sales to ensure effective planning of the marketing operations.
4. **Saves Cost and Time:** Marketing information system targets the problem area and take desired decisions to avoid the wastage of time, cost and efforts on unnecessary activities.
5. **Systematic Recording of Data:** It provides for an orderly arrangement of the gathered data to provide useful information for further marketing planning and decision making.
6. **Better Evaluation and Control:** Marketing information system helps to monitor and evaluate the marketing operations and programs. It also provides for taking corrective actions in case of not acquiring the desired outcomes.

Quality information system

- Quality information systems are standalone system or embedded system that helps an organization to achieve its quality goals.
- The aim of most firms all over the world is to produce high-quality goods and services; information is essential to achieve this goal—accurate, timely, and reliable information.
- Achieving quality also involves being able to develop strategic alliances with suppliers and customers, and information is again essential to this process.

Benefits of quality information system

1. **Timeliness**- The speed at which the information is received. Normally, faster the information better is its quality.
2. **Appropriateness**- is the suitability matching of the receiver and the information, more the suitability of the information to the receiver, better its quality.
3. **Reliability** – the reliability of information is a key attribute of quality. Only if the information is reliable is it of any use. The understanding of reliability comes from past experience, the standing/reliability of the source, the methodology adopted to acquire and process the information and the channel of delivery.
4. **Accuracy** – is the correctness of the information. Normally, the higher the accuracy of the information, the better is its quality.
5. **Completeness** – is the measure of comprehensiveness. It is required to ensure that the information provided gives the complete picture of reality and not a part of the picture.

Unit 6
Knowledge based systems

- Artificial intelligence
- Expert systems
- Neural networks

Knowledge based system:

- A knowledge-based system (KBS) is a computer system which generates and utilizes knowledge from different sources, data and information.
- These systems aid in solving problems, especially complex ones, by utilizing artificial intelligence concepts.
- These systems are mostly used in problem-solving procedures and to support human learning, decision making and actions.
- Knowledge-based systems are considered to be a major branch of artificial intelligence. They are capable of making decisions based on the knowledge residing in them, and can understand the context of the data that is being processed.
- A knowledge-based system is comprised of a knowledge base and an interface engine.
- The knowledge base functions as the knowledge repository, while the interface engine functions as the search engine.
- Learning is a key element to a knowledge-based system, and learning simulation improves the system over time.

Artificial Intelligence

- Artificial intelligence (AI) is a wide-ranging branch of computer science concerned with building smart machines capable of performing tasks that typically require human intelligence.
- IT refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic their actions.
- The term may also be applied to any machine that exhibits traits associated with a human mind such as learning and problem-solving.
- A subset of artificial intelligence is machine learning, which refers to the concept that computer programs can automatically learn from and adapt to new data without being assisted by humans.
- Deep learning techniques enable this automatic learning through the absorption of huge amounts of unstructured data such as text, images, or video.

Application area of Artificial Intelligence

- AI domain is very large and its application spreads in wide areas of business and industry. The figure below shows the major application areas of AI.

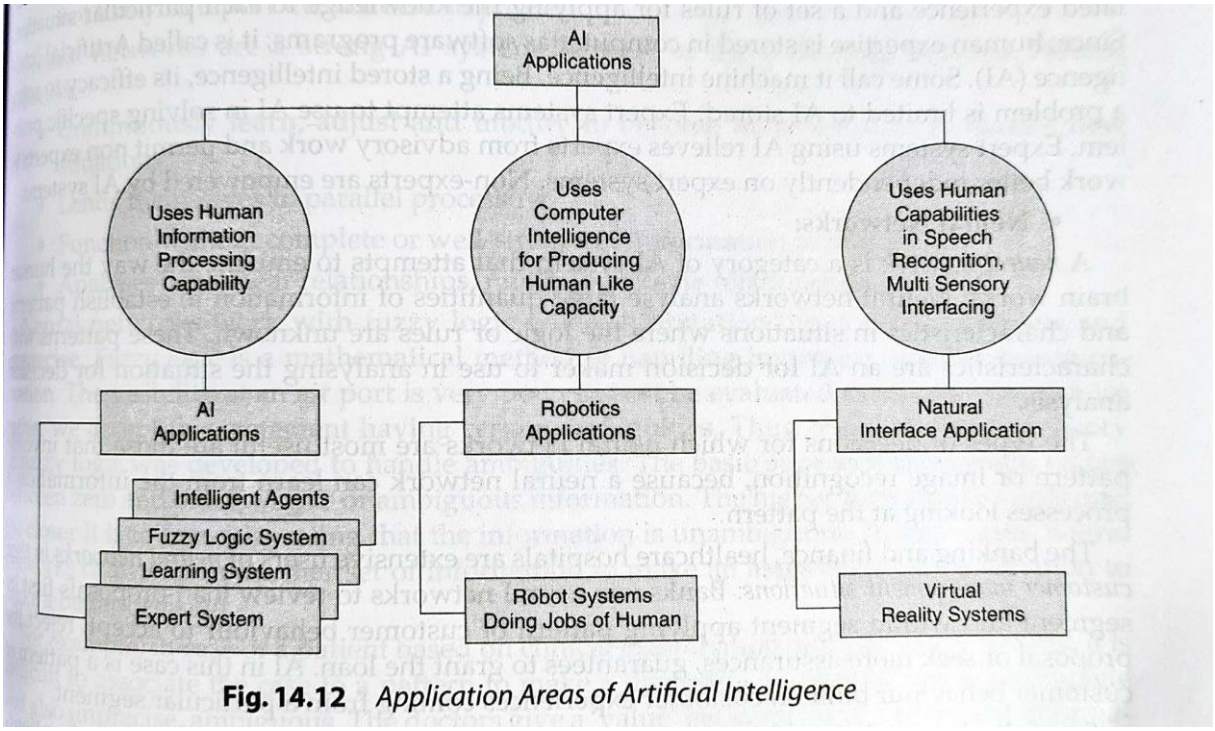


Fig. 14.12 *Application Areas of Artificial Intelligence*

- Cognitive science application uses knowledge and human information processing capabilities to produce major application as expert systems. Expert systems are designed to make humanlike inferences leading to an advice to decision maker. Fuzzy logic is the input information which is incomplete and imprecise.
- Robotics application uses AI, engineering science and physiology to produce computer intelligence to guide a computer driven machine to perform like human being.
- Natural interface application uses AI to build natural, realistic, multi-sensory human computer interface. This interface enables us to build a virtual reality.

Expert Systems

- Expert systems are comprised application systems driven by "Artificial Intelligence".
- It stores human intelligence made out of expert's experience, knowledge and model of solving problem.
- Expert system includes a knowledge base containing various accumulated experience and set of rules for applying the knowledge to each particular situation.
- Since, human expertise is stored in computer as software programs; it is called AI.
- Expert system attempts to use AI in solving specific problems.
- In artificial intelligence, an expert system is a computer system emulating the decision-making ability of a human expert. Expert systems are designed to solve complex problems by reasoning through bodies of knowledge, represented mainly as if–then rules rather than through conventional procedural code.

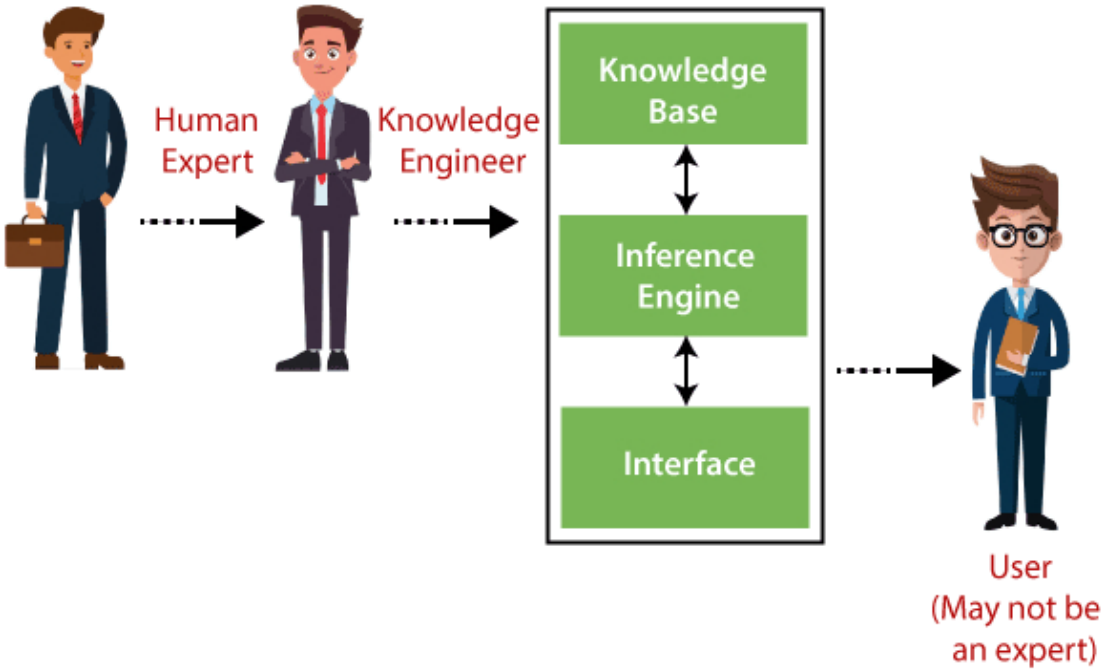
Characteristics of Expert System

- **High Performance:** The expert system provides high performance for solving any type of complex problem of a specific domain with high efficiency and accuracy.
- **Understandable:** It responds in a way that can be easily understandable by the user. It can take input in human language and provides the output in the same way.
- **Reliable:** It is much reliable for generating an efficient and accurate output.
- **Highly responsive:** ES provides the result for any complex query within a very short period of time.

Components of Expert System

An expert system mainly consists of three components:

- User Interface
- Inference Engine
- Knowledge Base



User Interface

- This component takes the user's query in a readable form and passes it to the inference engine.
- After that, it displays the results to the user.
- In other words, it's an interface that helps the user communicate with the expert system.

Inference Engine

- The inference engine is the brain of the expert system.
- Inference engine contains rules to solve a specific problem. It refers the knowledge from the Knowledge Base.
- It selects facts and rules to apply when trying to answer the user's query.
- It provides reasoning about the information in the knowledge base.
- It also helps in deducting the problem to find the solution.

Knowledge Base

- The knowledge base is a repository of facts.
- It stores all the knowledge about the problem domain.
- It is like a large container of knowledge which is obtained from different experts of a specific field.

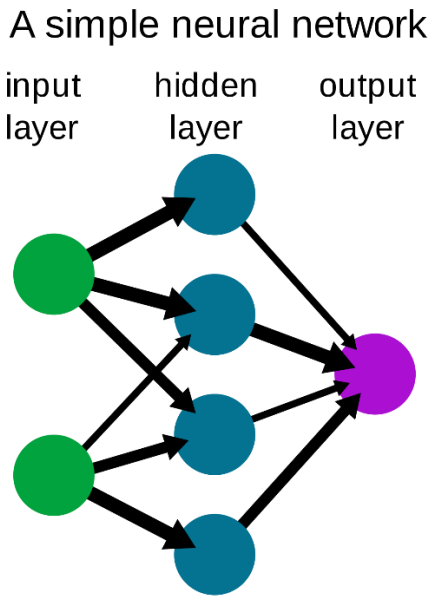
Benefits of Expert Systems

- It improves the decision quality
- Cuts the expense of consulting experts for problem-solving
- It provides fast and efficient solutions to problems in a narrow area of specialization.
- Offers consistent answer for the repetitive problem
- Maintains a significant level of information
- Helps you to get fast and accurate answers
- Ability to solve complex and challenging issues
- Artificial Intelligence Expert Systems can steadily work without getting emotional, tensed or fatigued.

Neural Networks:

- A neural network is a category of AI system that attempts to emulate the way the human brain works.

- Neural networks analyze large quantities of information to establish patterns and characteristics in situations where the logic or rules are unknown.
- A neural network is a series of algorithms that endeavors to recognize underlying relationships in a set of data through a process that mimics the way the human brain operates.
- In this sense, neural networks refer to systems of neurons, either organic or artificial in nature.
- Neural networks can adapt to changing input; so, the network generates the best possible result without needing to redesign the output criteria.
- Neural networks analyze large quantities of information to establish patterns and characteristics in situations where the logic or rules are unknown.
- These patterns with characteristics are an AI for decision maker to use in analyzing the situation for decision analysis.
- The types of decisions for which the neural networks are most useful are those that involve pattern or image recognition, because neural network can learn from the information it processes looking at the pattern.



Use Case/Applications

- Police and investigation agencies use neural networks to judge nature of crime.
- With crime reports as input, neural network system can detect map local crime patterns. The police would judge using the pattern.
- Hospitals use neural networks for patient treatment and medication behaviors.
- Many insurance companies use neural network software to identify fraud also.

Unit-7
Office information system

- Nature of office
- Types of office information systems
- Client server computing

Office information system/ Office Automation System

- The Office Information System (OIS) is an advanced word processing system of the hardware, software and processes that provides the technical support and services for the timely retrieval of accurate information by computerized systems to enable effective planning, operation and monitoring of services.
- It is an information system that uses hardware, software and networks to enhance work flow and facilitate communications among employees.
- With an office information system, also described as office automation; employees perform tasks electronically using computers and other electronic devices, instead of manually.
- An office information system supports a range of business office activities such as creating and distributing graphics and/or documents, sending messages, scheduling, and accounting.
- All levels of users from executive management to no management employees utilize and benefit from the features of an OIS.
- The software an office information system uses to support these activities include word processing, spreadsheets, databases, presentation graphics, e-mail, Web browsers, Web page authoring, personal information management, and groupware. Office information systems use communications technology such as voice mail, facsimile (fax), videoconferencing, and electronic data interchange (EDI) for the electronic exchange of text, graphics, audio, and video.

Nature of office

An office is a place where staff and line professionals, secretaries, and clerk perform management and administrative tasks. The work performed by office workers is often called white collar work.

There are five types Office workers found in the office:

1. Managers – Managers generally spend most of their time in planning, coordinating and controlling the activities of other people. Some examples are examinations controller, chief executive officer, operations manager, head of marketing research, and the principal of the college.

2. Staff professionals – Staff professionals support the activities of manager. These professionals have no direct line responsibility, i.e., their role is mostly one planning analyzing, and informing management of their finding.

3. Line professionals – Line professionals includes sales persons and purchasing agents. They typically interact daily with such outside groups as the organization's customers and suppliers.

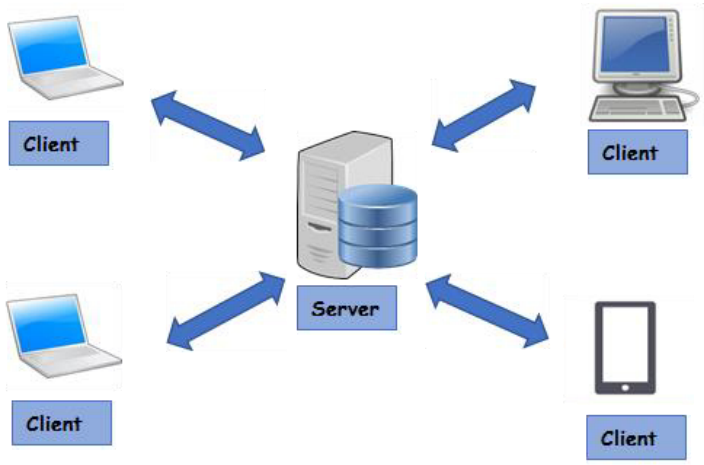
4. Secretaries – Secretaries are normally assigned to one or more knowledge workers in an office. They perform such support tasks as typing, filling, answering phones, and keeping appointment calendars.

5. Clerical personnel- Clerical personnel are usually not assigned to anyone in particular. They support the entire department/section/division. Typical tasks of clerks are filing, typing, and assisting in report preparation.

Client-Server Computing

- In client server computing, the clients request 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.
- This computing model is especially effective when clients and the server each have distinct tasks that they routinely perform.
- In hospital data processing, for example, a client computer can be running an application program for entering patient information while the server computer is running another program that manages the database in which the information is permanently stored.



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 hinder server's ability to respond to authentic client requests by flooding 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 authorization 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 built on similar platforms yet they can easily facilitate the transfer of data.

Disadvantages of Client Server Computing

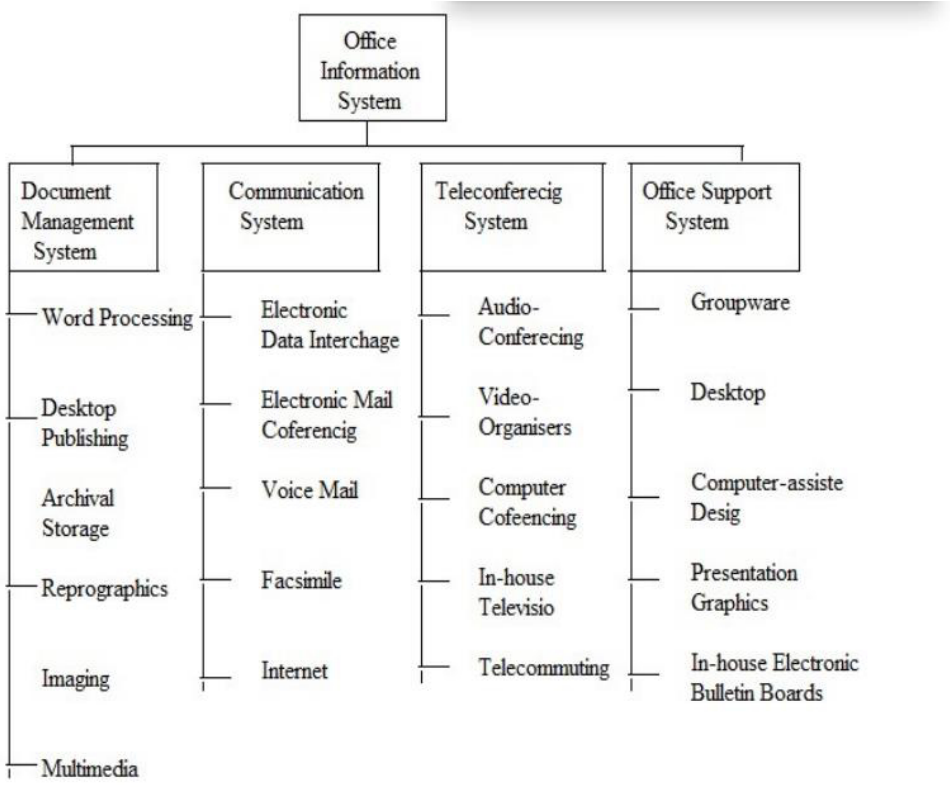
The different disadvantages of client server computing are −

- 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.

Types of office information systems

There are four types of office automation Systems:

1. Document management systems
2. Communication systems
3. Teleconferencing systems
4. Office support systems



1. Document Management Systems

- Document management systems are computer-based tools that provides access to repository of data, regardless of their form or location.
- The retrieved document can be displayed in different format, edited, distributed, and integrated using other communication systems.
- The applications of management systems are:

Word Processing

- The most widely used and recognized office-system technology is word processing.
- It involves hardware and software tools that allow the computer system to become more than a powerful typewriting device.
- The word processor enables documents to be created and edited electronically, with the assistance of the computer system 's processor memory, and display device.
- When the document is finished, it can be stored in secondary storage (typically on disk) or output the systems printer in a variety of formats.
- Today word processing packages that run on general-purpose computers is in the micro computing area, where such packages as word perfect, Microsoft word, WordStar, MS-office are among the current leaders.

Desktop Publishing

- Desktop publishing is the use of a computer to prepare printed output.
- It consists of a microcomputer configuration.
- The configuration includes a high-resolution cathode-ray tube screen and a laser printer, and is driven by DTP software.
- The screen display looks exactly like the hard copy that will be produced by the laser printer.
- The DTP software permits the selection of type fronts and size, hyphenation and write margin justification, the addition of horizontal and vertical lines, and lay out of pages (including graphics).

Archival Storage

- One of the key functions in an office is storage.
- To save the expense associated with storage space, handling, and paper costs, archival data was traditionally placed onto various media and stored off-line.
- Common technologies used to store archival materials are magnetic tape, CD/DVD, flash drives, HDD, SSD etc.

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Reprographics

- Reprographics is the process of reproducing multiple copies document.
- Office personnel are usually responsible for making more than one copy of a report, letter, and other documents are widely distributed, either internally or externally, reprographics often in includes collating, folding, binding, and related tasks.
- Most of the time, however, a photocopier is use for multiple copies.

Imaging

- Imaging is a type of document management system that converts paper, microfilm and electronic data into digital image that can be printed, faxed, or viewed on a computer screen.
- LAN based image-processing system, nowadays common in use, include several servers, each dedicated to a specific function such as database management, scanning or printing.

Multimedia

- Multimedia encompasses a group of computer-based technologies that integrate different types of media, such as text, graphs, animation, audio and video, to generate information.
- Multimedia is made possible by integrating audio and video capabilities into personal computers.
- Besides the usual CPU and peripherals, for a computer to have multimedia capabilities it should also have a CD-ROM drive, stereo speakers, a microphone for voice input, a sound card, a video card, and a video compression card.

2. Communication Systems

Various communication systems being used in office automation systems are:

Electronic Data Interchange: It is the transfer of electronic data from one organization to another. The data being structured in a commonly agreed format so that it is directly usable by the receiving organization's computer system.

Electronic mail: electronic mail is known as E-mail. It is a system that allows a person or a group to electronically communicate with others through a network, in written form, at any time, from anywhere in the world.

Electronic mail services. When an organization decides to implement electronic mail, it has two basic choices. It can acquire its own hardware and software and install an in-house system, or it can subscribe to an electronic mail service that provides the necessary computing and communication facilities for a fee. In the latter case, a subscriber need only furnish the terminals to tie into the network.

Voice mail: Voice mail facilitates oral communication. In this system, the sender dictates a message by speaking them over the telephone rather than typing them. A special device, called a codec, converts the analog signal of the sender's voice into a digital message. The message is transmitted over the network and stored in a server at the receiver's end. A blinking light on the receiver's phone indicates that he/she has a voice message.

Facsimile: Facsimile is known as fax. Systems are commonplace in most organizations today. Fax technology uses telephones, modems, and scanners to transmit text and graphics to an individual or organization anywhere in the world.

Internet: It is a global network of millions of smaller computers networks linked by communications channels. The most significant business promise of the internet lies in the potential for global electronic commerce known as e-commerce. The internet is a relatively inexpensive business resource that permits small organizations to complete with large organization because of the absence of any measure cost or competition constrains of using the web.

3. Teleconferencing Systems

- It consists of tools and techniques of both computer and non-computer-based.
- These techniques allow a group of people, separated by time and distance, to exchange ideas using audio, video and other teleconferencing media.
- The main feature of this system is that they reduce operating costs and increase productivity because decision makers do not have travel to attend face to face meeting.

Audio conferencing

- Audio conferencing is the use if voice communication equipment to establish on audio link between geographical dispersed persons for conducting a conference.
- The conference call allows more than two people to participate telephone conversation.

Video conferencing

- Videoconferencing is another type of teleconferencing systems that uses telephones, TV monitors, computers, and networks to link geographically separated decision makers to hear and see each other.
- A computer digitizes sound and video images, then converts them to analog signals and transmits them over the telephone lines to the receiver's computers, which reconverts the analog signals to digital signals.

Computer Conferencing

- Computer conferencing is the use of a networked computer to allow members of a problem-solving team to exchange information concerning the problem that is being solved.
- In this system, a group can consist of a large number of participants.
- It differs forms audio and video conferencing in that it can be used within a single geographic site.
- A person can use computer conferencing to communicate with someone in the next office.
- Teleconferencing includes all three forms of conferencing-audio, video and computer.

In-house Television

- It is a relatively new technology. In this system, an organization invests in a studio, a period of time on a satellite and a satellite transmitter for broadcasting.

- Company sites or even customers are given satellite dishes so that they can view the broadcast.

Telecommuting

- With telecommuting, people use communications technology to work at home or in a remote city and to avoid the usual physical commute to work.
- Using a remote communications terminal or a microcomputer work station, a person can do his/her work at home instead of at the office.

4. Office Support Systems

In this system some important systems for managing documents, exchange messages and holding meeting are discussed. In addition to these systems, various applications help to coordinate and manage the activities of work groups.

Groupware

- Groupware consists of software packages design to support the collaborative efforts of a group of co-workers.
- Such packages often provide integrated support for many of the typical activities of work groups.
- This includes: word processing services, E-mail, voice mail, fax, computer conferencing, video conferencing, project management, group decision support system, electronic bulletin board systems and electronic calendars and schedulers.

Desktop organizers

- Desktop organizers are software package that provide users with the electronic equivalents of the organizing and coordinating tools found on a typical office desk.
- Among many features, it includes electronic calendar, card file, notepad, clock and calculator.

Computer Aided Design

- Computer aided design (CAD) refers to computer systems that enable designers to work with a display-screen and specifications database to design various products.
- It is widely used in engineering environments.

Electronic Bulletin Boards

- Electronic bulletin boards allow members to post their ideas and elicit responses from other group members.
- Primary benefits are increased responsiveness to market forces and significant improvement in the quality of business processes such as product development, account management, and customer service.