INTERNET

1.   Introduction

Last decade of the 20th century saw emergence and convergence of number of new technologies, affecting the business in style, culture and process of execution. The four prominent technologies are Networking, Communication, Internet and Computing. These technologies have acted as strong pillars for corporations by way of providing easy access to data, sharing of information, and integrated use of technology irrespective of the physical distances.

The internet has given a new dimension to information sharing and accessibility. Communication, conversation, files transfer and networked technologies in various physical geographies are possible due to the World Wide Web. Internet, Extranet and Intranet (Figure 1) are such derivates that use networking protocols to function and give a competitive edge in business.
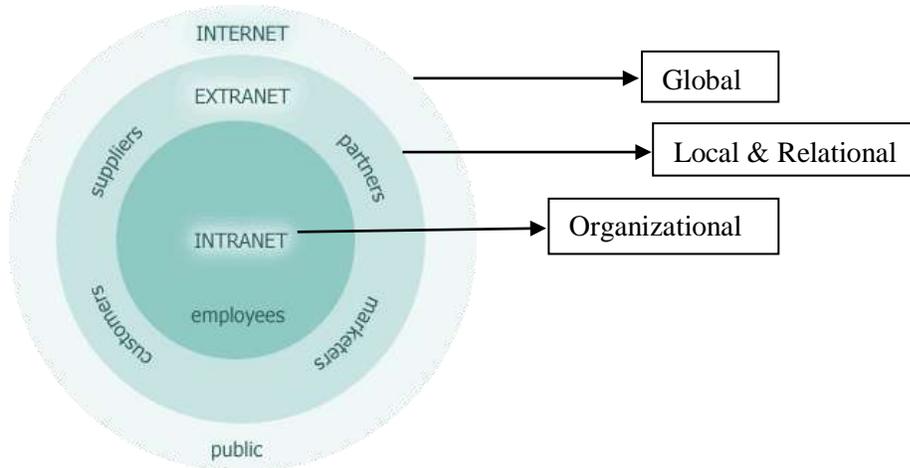
Figure 1: E-Business Infrastructure
Source: Waman Jawadekar, "MIS, A Global Digital Enterprise Perspective".

Internet

The internet is the world's largest computer network. It is a worldwide network of computers that use common communication standards and interfaces to provide the physical backbone for a number of interesting applications. Department of Defense, United States of America holds credit for the creation of the Advanced Research Projects Agency Network (ARPANET). Established in the periphery of the National Aeronautics and Space Administration it was thought to be restricted for academic and research purposes only. Exhibit 1 highlights the statement by Joshua Lederberg, an American molecular biologist regarding the use of internet for research purposes only in the early years of internet inception. But today, the internet is a public, cooperative and self-sustaining facility accessible to hundreds of millions of people worldwide.
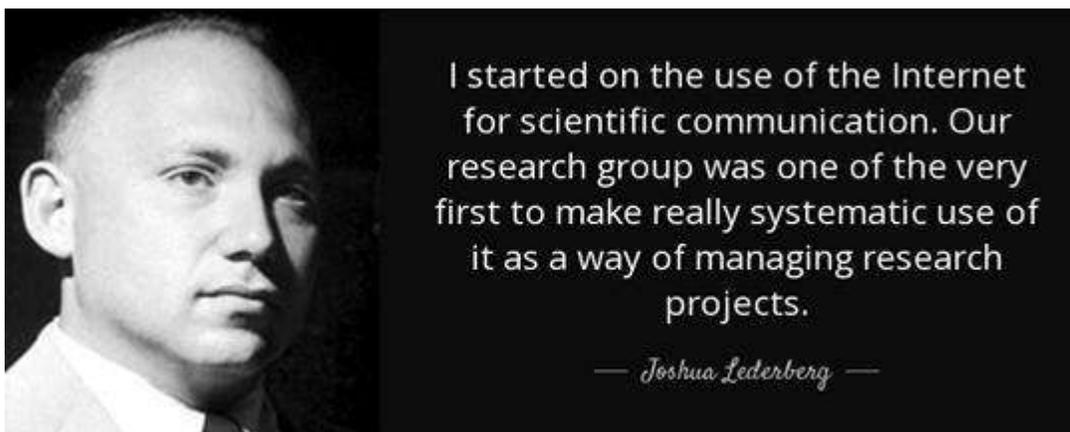

I started on the use of the Internet for scientific communication. Our research group was one of the very first to make really systematic use of it as a way of managing research projects.

— *Joshua Lederberg* —

Exhibit 1: Advent of the Internet
Image Source: http://azquotes.com

Features of the Internet:

1. Internet today has made it possible for the corporations to exchange data, news and opinions on web servers. It is estimated that roughly more than 100 countries are connected through internet.

2. The internet uses a portion of the total resources of the currently existing public telecommunication networks. What distinguishes the internet is its use of a set of protocols called Transmission Control Protocol (TCP) Internet Protocol (IP). Two recent adaptations of internet technology, the intranet and the extranet, also make use of the TCP/IP protocol.

3. The internet is decentralized by design unlike other online services which are centrally controlled.

4. Each internet computer or host is independent.

5. Internet was commercially used once the understanding of the HTML (Hyper Text Markup Language) commenced in 1990's where multiple file types such as audio, video, text, images could be hyperlinked to other documents.

6. Various files and documents can be located by a user on World Wide Web by simply clicking a mouse on a given link or locating them using a search engine.

7. Variety of hardware and software is used to make the internet functional as demonstrated in Exhibit 2 and listed below:
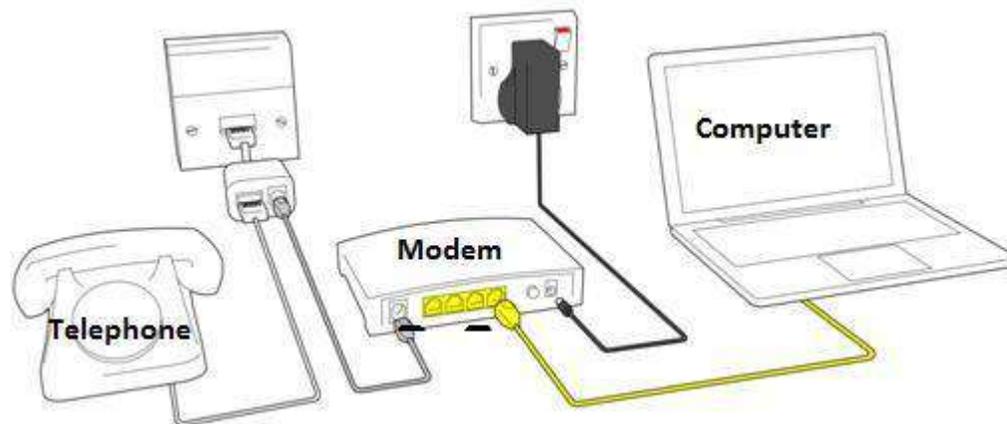

Exhibit 2: Installing an Internet Connection
Image Source: https://support.zen.co.uk

- ❖ *Modem* – It is hardware equipment that enables data transmission over a telephone line. In this case a modem performs the function of modulation – demodulation. The information stored is in a digital format whereas the information when transmitted is analog.
- ❖ *Computer* – An electronic device which receives information and processes a set of instructions to produce an output.
- ❖ *Web TV* – It is a terminal to be attached to the users TV which enables to display and navigate internet through a keyboard.

❖ *Software* - Two types of software are needed to enable the Personal Computer (PC) as an Internet PC. Communication software to establish TCP/IP connection to the server and Client software for each activity such as browsing e-mails, news etc (Exhibit 3).

Exhibit 3: Browser Software – Mozilla Firefox, Google Chrome, Safari, Internet Explorer are the most popular available in the market.
Image Source: https://bd23.https.cdn.softlayer.net/80BD23/142.4.51.106/blog/wp-content/uploads/2006/08/browsers-main.png

Applications of the Internet –

Internet is a powerful tool and its major applications are:
- ❖ Help searching the web addresses for access through search engines.
- ❖ Downloading programs and files which can be saved or stored on ones local personal computer for use.
- ❖ *Email* – One can send and receive emails from an address book which is a built in feature to store addresses that are used frequently.
- ❖ *Mailing list* – It allows to join a mailing list to receive and send messages to interested members of the groups.
- ❖ *Voice & video conferencing* – Voice & video conferencing allows one to conduct meetings through a remote location without being physically present. Exhibit 4 depicts the image of an ongoing voice and video conference.

Exhibit 4: Voice & Video Conferencing
Image Source: http://www.fishervideoconferencing.com

- *Chatting* – Chatting enables an individual to speak to an expert in real time from the comfort of his/her own destination. A chat allows transmission of static images or text between two individual at different locations.
- *Buying and selling on the net (e-Commerce)* – Search engines allows consumer to find suitable items and vendors to place order, pay the bills online and have it delivered at the doorsteps. Exhibit 5 illustrates a graphical representations that how consumers can shop online.
- *Webpage Publishing* – One can publish about self or an organization through web pages on the net. The viewers can visit homepage to get information.

Exhibit 5: e-Commerce Platforms
Image Source: http://uploads.ecbilla.com/articles/how-to-enhance-e-commerce-platforms.png

Limitations of the Internet

The technology of the internet is not at all error-free. Though internet has many advantages but it has its own limitations which are as follows:

1. Internet connects millions of computers with no guarantee on timely transfer of data or even loss of transmission.
2. Temporary internet files are created which can map user's activity during a session such as login details or transaction data.
3. Systems if not installed with anti-virus software are vulnerable to internet viruses. Hence, the network is not reliable and offers little security.

3.   Intranet

New age business demands a network platform which is seamless and permits smooth flow of data and information in any form from one location to another within an enterprise. Such a need of an enterprise is met by a local network called Intranet. The intranet is a local network of set of computers or servers connected via the TCP/IP protocol that stores and accesses data at various locations within the organization, as demonstrated in Exhibit 6.
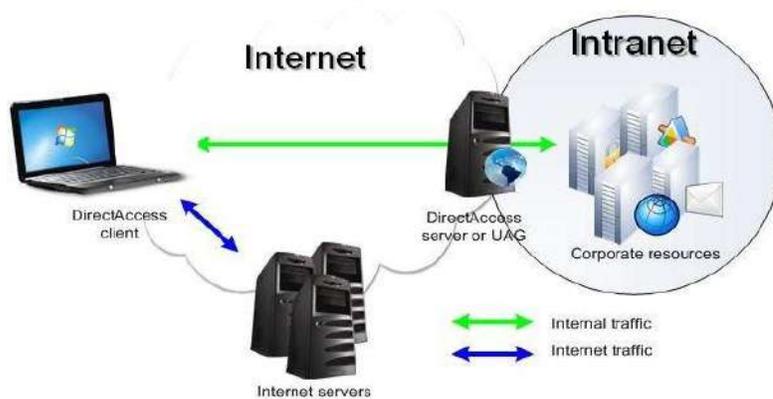
Exhibit 6: Intranet Network
Image Source: http://jhigh.co.uk

Features of the Intranet:

1. Intranet deals with internal information needs of people in an organization without giving access to the outside world.
2. Intranet is local to the organization or institution for its own use whereas internet is rendered for general public use.
3. The intranet uses internet standards such as
   - ❖ HTML – Hyper Text Mark Up Language
   - ❖ HTTP – Hyper Text Transfer Protocol
   - ❖ TCP/IP - Transmission Control Protocol/ Internet Protocol

   The Local Area Network (LAN) / Wide Area Network (WAN) when loaded with these standards and supported by web server and web browser becomes intranet for the organization.
4. The normal network LAN/WAN is able to handle applications in client server architecture; the same network when converted to intranet can handle text and multimedia applications.
5. To establish an intranet the following software and hardware requirements are essential:
   - ❖ One or more server
   - ❖ Client workstation
   - ❖ A network connecting servers and clients with TCP/IP software on the servers and clients. Transmission Control Protocol helps to send data from one location to another. TCP breaks the message into packets of information and puts them into envelopes and sends at the receiving end where it gets reassembled into the original message.
   Internet Protocol specifies the format of the packets. It is like a postal system which allows addressing a package and dropping it in the system without direct linkage with the sender and recipient.
   - ❖ Web server software on the server processes the request from the client and acts as a host to add products. It also maintains logs for all transactions.
   - ❖ Web browser software on the clients sends the process request to server and interprets the HTML codes and converts into display containing text and graphics.
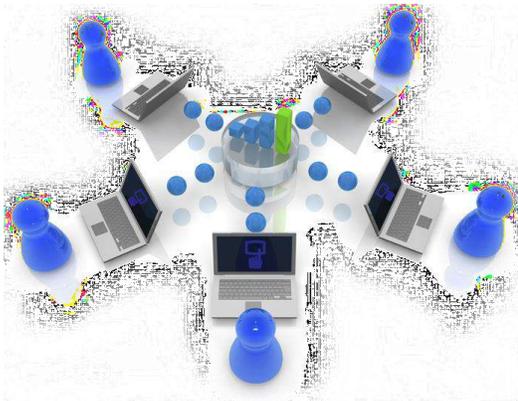
Exhibit 7: Intranet Connectivity
Image Source: https://xenlife.com.au/wp-content/uploads/intranet-2.png

Applications of the Intranet –

Intranet has wide range of applications for any organization, some of these are:

❖ Intranet allows an enterprise to create an internal restricted network of computers which uses secure network applications in project management, supply chain management, sales and customer relation management etc.

❖ Intranet help save on the cost of information sharing for the organization. As information is accessible and shared electronically, a huge sum can be saved on printing and distribution of the same. Eventually a lot of time too is saved by way of implementing intranet.

❖ Many companies have intranet portals, which can be accessed by the employees e.g. employee management portals (Exhibit 8). These portals allow human resource department to monitor leaves, salaries, and grading of the work force.


Exhibit 8: Human Resource Portal
Image Source:https://static1.clutch.co/sites/default/files/portfolio/%5Buid%5D/hr_dept_portal.png

- ❖ Intranet can be used to create online reports by taking predefined set of reports converting them to HTML documents and storing on web server.
- ❖ Intranet applications are further used in online publishing of manuals, directories, circulars, notifications, online training material etc.
- ❖ Information sharing via messaging applications for common interest groups may also be used via intranet platform. For example: IP messenger, File Transfer Protocol (FTP), internal blogs.
- ❖ Intranet facilitates the process of handling database queries, queries on status of order, balance, value etc from the various stakeholders.
- ❖ Connecting intranet to corporate data by providing links helps the users to gain access to data for checking, verification and use in web application.

Business Case: Technical Innovation at FedEx
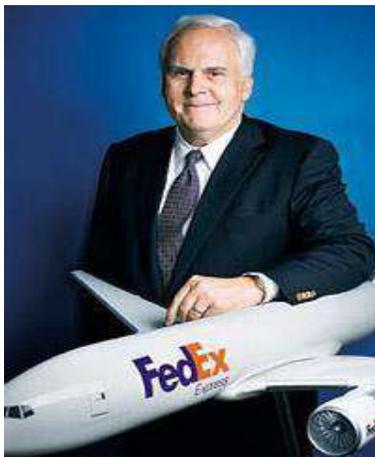
Information Technology has greatly transformed the business climate at FedEx. Fredrick Smith, the Founder, Chairman, President and CEO of FedEx (Exhibit 9) had foreseen way ahead that how information technology (IT) could be the forerunner of a technology platform at FedEx and could be vital in building speed, accuracy of information, validation and reliability within the organization. This vision of his later proved to be a benchmark in the transportation industries worldwide.

Exhibit 9: Fredrick Smith, the Founder, Chairman, President and CEO of FedEx
Image Source: https://thefredsociety.com/wpcontent/uploads/2013/10/FF_i_Smith.jpg

The widespread use of the internet from the early 1990s threw open significant opportunities for FedEx. Since, the company already had an Electronic Data Interchange (EDI) based system on which it had invested heavily, FedEx decided to use a combination of internet and the EDI. Ariba was the company that was employed to implement the product procurement system and housed it on the FedEx intranet. The system was set up so that the suppliers could maintain a database of product catalogs that could be assessed by any FedEx employee and assisted them while making a purchase requisition. Information access now became easier for both the client as well as the vendor.

Image Source:
http://www.fedex.com/ma/about/overview/innovation.html

FedEx implemented the computerized online tracking system - COSMOS (Customer Operations Service Master On – Line System). Use of these hand held super trackers enabled FedEx to update each of the consignment at five access points. It scanned the bar coding on airway bills and enabled updates at multiple stages of delivery cycle.

These systems have helped FedEx to keep full control over various stages of the dispatch cycle. Such accuracy of information has empowered FedEx to promise its customer deliver within one minute of the delivery schedule commitment else the company extends a refund to its customer. Secondly, the unique proposition on offer from FedEx was that if a package cannot be tracked within 30 minutes of enquiry, FedEx bears all the transportation cost.

Further, FedEx shares to its credit, a tariff database www.apectariff.org, the only source of consolidated tariff and customs-related information related to the Asia-Pacific Economic Cooperation helps its clients to expedite and enhance business globally.

4.   Extranet

Extranet refers to a private network that connects various stake holders such as vendors, clients, suppliers on a common networked platform to exchange business related information. When the intranet is configured over a geographic boundary beyond the organization it is termed as an extranet (Exhibit 10). The extranet facilitates information sharing with authorized users over a secure network. This reduces time to seek information which otherwise is both time consuming and cumbersome. Extranet is also termed as extended intranet.
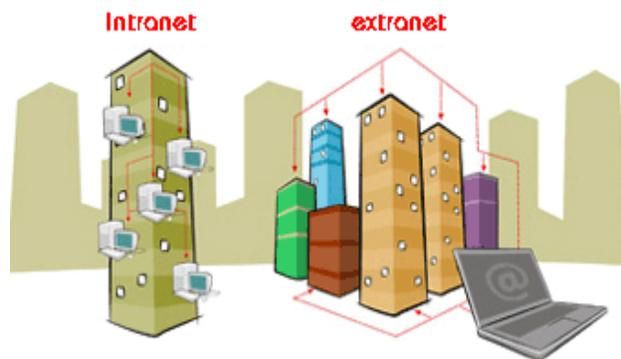

Exhibit 10: An Extranet Network
Image Source**:** http://2.bp.blogspot.com

Features of the Extranet:

The different features of extranet are:
1.   Extranet allows limited, controlled, secure access between a company's intranet and designated, authenticated users from remote locations.
2.   Dealers/distributors have access to product files such as catalogues, products specifications, pictures, images to answer queries of the customer.
3.   The security of extranet depends upon organization's policy on information management.
4.   If trusted partners are to be treated like outsiders to the organization, firewalls between outside users and intranet will stop unlawful and unauthorized access to information.

5. If trusted partners are treated like any other normal user of the organization, then security can be ensured through access rights, authentication and certification procedure.
6. The accessibility is based on a unique Internet Protocol address assigned to every unique user. This helps in user identification (a unique set of numbers such as 225.22.05.100).
7. Requirements for an extranet include firewall server management, the issuance and use of digital certificates or similar means of user authentication, encryption of messages, and the use of virtual private networks (VPNs) that tunnel through the public network.
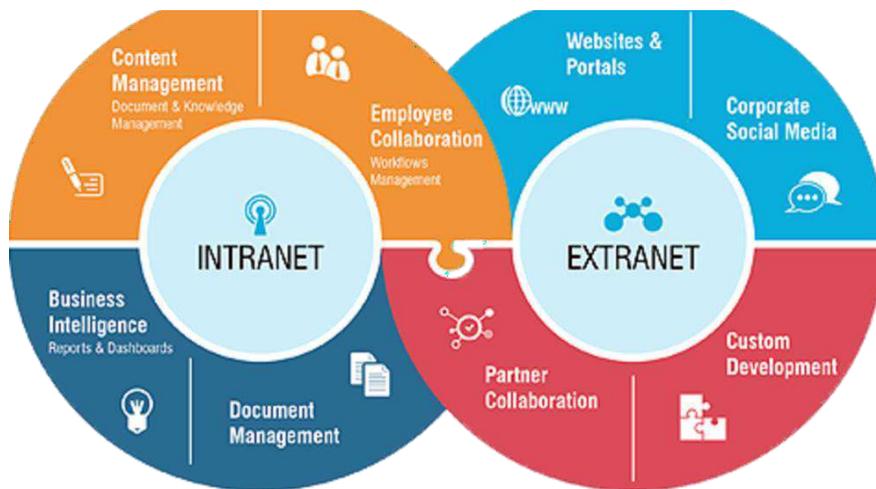

Exhibit 11: Applications of Intranet, Extranet
Image Source: http://bsi-erp.com/images/intranet_55426d8fa7fc9.png.

Applications of Extranet –

- *Integrated supply chains* – Extranet enable the establishment of smooth supply chains using online ordering, order tracking and inventory management in an organization.
- *Cost reduction* - Helps in reducing the cost of information sharing by making manuals and technical documentation available online to the trading partners and customers.
- *Single user interface* – Extranet facilitates single user interface between business partners. Business stakeholders can get access to common business portals to view project updates and get information about functional departments and tasks allocated.
- *Shared news of product development* – Extranet helps share any product development news exclusively with its partner companies. Version updates and upgrades become easier to implement. Such detailed information on newer version and its installation can be accessed with deployment sites.
- *Round-the-clock access* - Making information available online ensures round-the-clock accessibility of the information to meet the needs of various stakeholders. It also creates a repository to store and maintain business critical information which is documented.
- *Ensures security* – Communication and interaction can be monitored as it occurs over a secure network. Access can be granted to only those who are authorized to view.

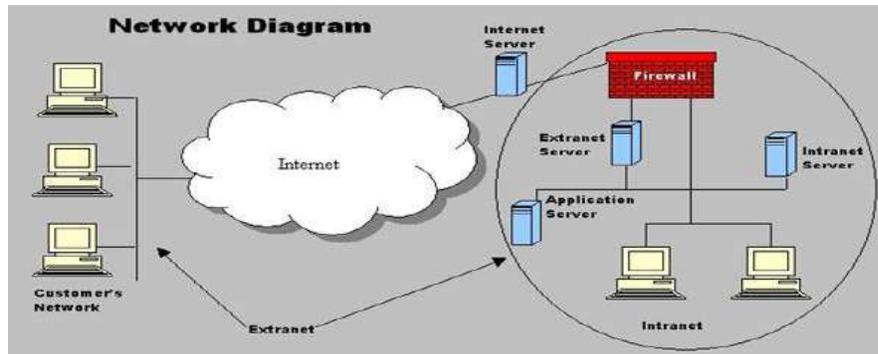**4.1 Differences between Internet, Intranet and Extranet**

Exhibit 12 showcases the differences between the internet, intranet and extranet both in tabular and graphical form.

Parameter	Internet	Intranet	Extranet
Type of Network	Public	Private	Private/Virtual Private Network
Size	Large Number of connected devices.	Limited number of connected devices.	Limited number of connected devices over the internet.
Security	Depends on the software application connected to the device.	Firewall Protected.	Firewall separates internet and extranet.
Information	Information can be accessed across the world.	Information can be shared securely within the organization.	Information can be shared between employees and external people.
Accessibility	Anyone	Authorized Users	Authorized Users
Owner	Not owned by anyone	Owned by a particular organization.	Owned by one or more organization.
Policy	Internet communication protocols	Organizational Policies	Organizational Policies, Contractual Policies, Internet Policies
Example	World wide web, Email	Internal operations network of an organization	Network of collaboration between two corporations.

Exhibit 12: Internet, Intranet and Extranet
Source: http://www.conceptsimplified.com/compare/difference-between-internet-intranet-and-extranet

5. Management Information Systems

MIS is an automated platform of information access that supports business and operational activities at multiple levels of management. This platform includes multiple systems which could be a decision support system, transaction processing, and executive information system etc. These systems have

applications across various industries and can be utilized for both academic as well as business processes. It integrates people and processes using technology that is interoperable and scalable as per user needs.

Features of a Management Information System (MIS):

1. *Relevance* – An effective MIS organizes information in such a form that is readily accessed, analyzed and is relevant as per business needs.
2. *Accuracy* – The effectiveness of information depends on the accuracy of the data it uses. If the information being fed is from validated resources, it shall yield meaningful and accurate results.
3. *Completeness* – An effective MIS provides most recent and effective information. If certain information is unavailable because of missing data, an effective MIS detects such gaps and displays possible outcomes for the management to take corrective decisions.
4. *Management Oriented* - The focus of an efficient system is to satisfy the information needs of management. A qualifying system is structured as per directions factored by management.
5. *Integration* – This is an important characteristic for a system to qualify as MIS. MIS helps integrate different functional departments as well as levels of management for easy retrieval of information that not only assists in decision making at operational, functional but also at strategic levels.
6. *Timeliness* – Nearly every enterprise invests in capturing critical business data. Henceforth, an effective system ensures the availability of data as per business needs within the required time frame.
7. *Components* - An MIS system utilizes computer hardware and software; it requires manual procedures and models for analysis, planning, control and decision making and a database.

Applications of an effective MIS -

An effective MIS solution are multifaceted and enable to automate processes faster, accurately and at an optimum cost while delivering results efficiently at the click of a button. Over a period of time, various types of MIS solutions have evolved. These are:

❖ *Transaction Processing System:* This system fundamentally calculates the user count on the system. It helps to store, modify, accumulate and retrieve information as per business needs. It can handle queries in bulk or one by one on a real time basis. It largely helps in running queries and finds utility at the operational management level.

❖ *Decision Support System:* This system facilitates decision making and is useful at the functional level of management. It can handle large volumes of information and helps in generating reports and analysis that help to make timely decisions.

❖ *Executive Support System:* It facilitates decision making for executives across different departments. The utility lies in a robust and strong reporting engine which offers an exhaustive analysis using programmed mathematical and statistical tools and drill down capabilities. This system has an easy to use graphic user interface and is largely used at strategic level of the management hierarchy.

❖ *Office Automation System:* It refers to the convergence of people, processes and technology to simplify day to day office functions and maintenance of official communication tasks.

6. Enterprise Network

It refers to the interconnection of various sites across functional departments and businesses with the aim to facilitate data access and information sharing. It enables compatibility and interoperability between different technologies to able information generation and retrieval easily.

Features of an Enterprise Network:

The different features of an enterprise network are:

1. The key purpose of an enterprise network is to eliminate isolated users and workgroups and enhance communication and provide information.

2. Physical systems and devices should be able to maintain and provide satisfactory performance, reliability and security.

3. The Enterprise Network may span the Local Area Network or the Wide Area Network depending on business needs and utility.

4. The aim is end to end integration of multiple technology protocols, platforms and operating systems with original equipment manufacturers (OEMs) to ensure that their connectivity yields productive business critical results.

5. The objective of an enterprise network is identifying the organization's business processes and mapping them to the processes in the enterprise network. Leading enterprise software vendors like SAP, Oracle, Microsoft have versions of enterprise software packages designed for small and on demand versions custom made for organizations over the web.

Applications of Enterprise Networks

Enterprise applications make use of databases and other organizational assets across a heterogeneous network. Some of the services provided by an enterprise application include customer relationship management, content management, human resource information systems, accounting information systems etc

7. Summary

Information and communication are two of the most important strategic issues for the success of every enterprise. Organizations have a number of computer terminal and communication tools, however they are isolated. To overcome these obstacles in an effective usage of information technology, computer networks are necessary. Hence, the need to integrate computers with communication arises. The computer

networks are classified in different ways depending on the distance covered hardware configuration or functionality. The different types of network are LAN, WAN, MAN, VAN and further, the internet, intranet, extranet and enterprise. Major reasons for an organization to have the networking technology are cost reduction by sharing of hardware and software resources, establishing reliability by way of having multiple sources of supply and to facilitate flexibility because of possibility to connect devices from various vendors.