MODULE 1

"An information system is a set of interrelated components that works together to collect, process, store and breakdown the information to support decision making."

Following are the DIMENSIONS of information system:

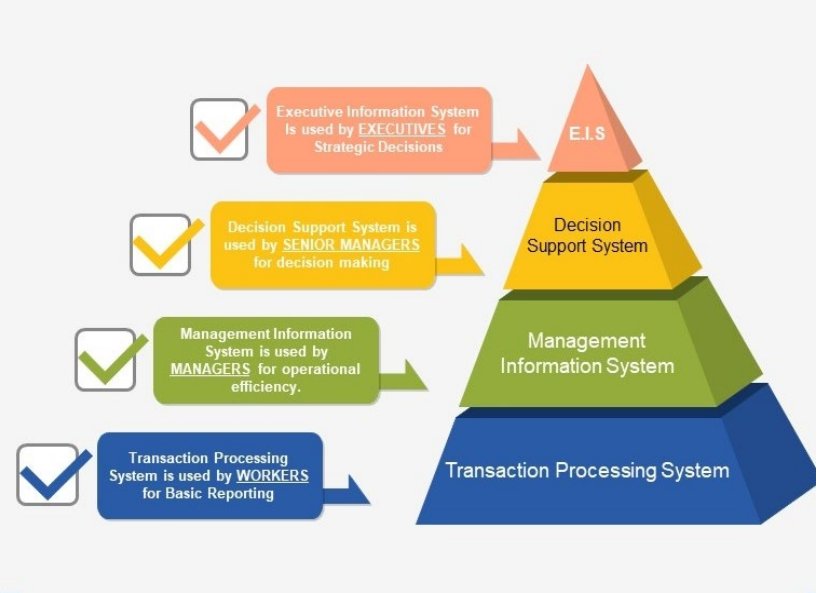
1. Organizational Dimension: Information systems are part of organization. Information system will have the standard operating procedure and culture of an organization embedded within them. This involves: a) Functional specialties b) Business processes c) Culture d) Political interest groups

2. Management Dimension: Managers perceive business challenges in the environment. Information systems supply tools and information needed by the managers to allocate, coordinate and monitor their work, make decision, create new products and services and make long range strategic decision.

3. Technology Dimension: Management uses technology to carry out their functions. It consists of – computer hardware/software, data management technology, networking/telecom technology. It's one of the many tools managers use to cope with the change.

Types of Information System

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



Following are the TYPE of information system:

1. Transaction Processing System (TPS):

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

2. Management Information System (MIS):

- Management Information System is designed to take relatively raw data available through a Transaction Processing System and convert them into a summarized and aggregated form for the manager, usually in a report format. It reports tending to be used by middle management and operational supervisors.
- Many different types of report are produced in MIS. Some of the reports are a summary report, on-demand report, ad-hoc reports and an exception report.
- **Example:** Sales management systems, Human resource management system.

3. Decision Support System (DSS):

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

4. Experts System:

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

Roles of Information System

The information system plays a major role in the organization by satisfying the diverse needs through a variety of systems such as Query systems, Analysis systems, Modelling systems and Decision support systems.

It helps the Clerical personnel in transaction processing and answers their queries on data pertaining to transaction. It helps junior management by providing operational data for planning and control, and helps them in Decision-making. It helps the Middle management in short-term planning, target setting and controlling business functions. It helps Top management in goal setting, planning and evolving business plans and their implementation.

1. OPERATIONAL-LEVEL SYSTEMS

At the operational level are transactions processing systems through which products are designed, marketed, produced, and delivered. These systems accumulate information in databases that form the foundation for higher-level systems.

In today's leading organizations, the information systems that support various functional units-marketing, finance, production, and human resources-are integrated into what is known as an enterprise resource planning (ERP) system. ERP systems support the entire sequence of activities, or value chain, through which a firm may add value to its goods and services. For example, an individual or other business may submit a custom order over the Web that automatically initiates "just-in-time" production to the customer's exact specifications through an approach known as mass customization. This involves sending orders to the firm's warehouses and suppliers to deliver materials just in time for a custom-production run. Finally, financial accounts are updated accordingly, and billing is initiated.

Along with helping to integrate a firm's own value chain, transaction processing systems can also serve to integrate an organization's overall supply chain. This includes all of the various firms involved in designing, marketing, producing, and delivering the goods and services-from raw materials to final delivery. Thus, inter organizational information systems are essential to supply-chain management. For example, purchasing an item at a Wal-Mart store generates more than a cash register receipt; it also automatically sends a restocking order to the appropriate supplier. Suppliers can also access a retailer's inventory database over the Web to schedule efficient and timely deliveries.

Many transaction processing systems support electronic commerce over the Internet. Among these are systems for on-line shopping, banking, and securities trading. Other systems deliver information, educational services, and entertainment on demand. Yet other systems serve to support the search for products with desired attributes, price discovery (for example, via an auction), and delivery of products in an electronic form (software, music, movies, or greeting cards). A growing array of specialized services and information-based products are offered by

various organizations on the Web, as an infrastructure for electronic commerce is emerging on a global scale.

2. KNOWLEDGE-LEVEL SYSTEMS

A large proportion of work in an information society involves manipulating abstract information and knowledge, rather than directly processing, manufacturing, or delivering tangible materials. Such work is called knowledge work. Three general categories of information systems support such knowledge work: professional support systems, office information systems, and knowledge management systems.

Professional Support System

Professional support systems offer the facilities needed to perform tasks specific to a given profession. For example, automotive engineers use computer-aided engineering (CAE) software together with "virtual reality" systems to design and test new models for fuel efficiency, handling, and passenger protection before producing prototypes, and later they use CAE in the design and analysis of physical tests. Biochemists use special three-dimensional modeling software to visualize the molecular structure and probable effect of new drugs before investing in lengthy clinical tests. Investment bankers often employ financial software to calculate the expected rewards and potential risks of various investment strategies. Indeed, specialized support systems are now available for most professions.

Office Information System

The main objectives of office information systems are to facilitate communication and collaboration between the members of an organization and to facilitate them between organizations. Placing an organization's documents and messages in an electronic format-which can be classified, indexed, and stored for easy retrieval - enables individuals to access information on demand. One type of office information system, known as a workflow system, is used to route relevant documents automatically to all appropriate individuals for their contribution. Other types of office information systems handle digital messages in the form of electronic mail, facsimile, and voice mail.

Another category of office information systems allows different individuals to work simultaneously on a shared project by using networked computers. Known as groupware, such systems accomplish this by continually sending updated documents-such as business proposals, new designs, or progress reports-to each collaborator's computer. These individuals and their computers need not be located in the same office or even the same building. Groupware is usually deployed over an intranet, a private network that is closed to the general public, and is often accessed by using software originally developed for the Internet.

Knowledge management systems

Knowledge management systems provide a means to assemble and act on the knowledge accumulated throughout an organization. Such knowledge may include the texts and images contained in patents, design methods, best practices, competitor intelligence, and similar

sources. Organizational knowledge is often tacit, rather than explicit, so these systems must also direct users to members of the organization with special expertise. Access to an organization's knowledge is often provided via an intranet equipped with specialized search software. The next section, Management support, describes how information systems are used to assemble reports and reach executive decisions.

3. MANAGEMENT-LEVEL SYSTEMS

Management reporting systems

A large category of information systems comprises those designed to support the management of an organization. Those systems rely on data obtained by transaction processing systems, as well as data acquired outside the organization (such as business intelligence gleaned on the Internet) and data provided by business partners, suppliers, and customers.

Information systems support all levels of management, from those in charge of short-term schedules and budgets for small work groups to those concerned with long-term plans and budgets for the entire organization. Management reporting systems provide routine, detailed, and voluminous information reports specific to each manager's areas of responsibility. Generally, these reports focus on past and present performance, rather than projecting future performance. To prevent information overload, reports are automatically sent only under exceptional circumstances or at the specific request of a manager.

Decision support systems

All information systems support decision making, however indirectly, but decision support systems are expressly designed for this purpose. The two principal varieties of decision support systems are model-driven and data-driven.

In a model-driven decision support system, a preprogrammed model is applied to a limited data set, such as a sales database for the present quarter. During a typical session, an analyst or sales manager will conduct a dialog with this decision support system by specifying a number of "what-if" scenarios. For example, in order to establish a selling price for a new product, the sales manager may use a marketing decision support system. Such a system contains a preprogrammed model relating various factors-the price of the product, the cost of goods, and the promotion expense-to the projected sales volume over the first five years on the market. By supplying different product prices to the model, the manager can compare predicted results and select the most profitable selling price.

The primary objective of data-driven decision support systems is to analyze large pools of data, accumulated over long periods of time in "data warehouses," in a process known as data mining. Data mining searches for significant patterns, such as sequences (buying a new house, followed by a new dinner table) and clusters (large families and van sales), with which decisions can be made. Data-driven decision support systems include a variety of statistical

models and rely on various artificial intelligence techniques, such as expert systems, neural networks, and intelligent agents.

An important category of decision support systems enables a group of decision makers to work together without necessarily being in the same place at the same time. These group decision systems include software tools for brainstorming and reaching consensus. Another category, geographic information systems, can help analyze and display data by using digitized maps. By looking at a geographic distribution of mortgage loans, for example, one can easily establish a pattern of discrimination.

4. STRATEGIC-LEVEL SYSTEMS

Executive information systems make a variety of critical information readily available in a highly summarized and convenient form. Senior managers characteristically employ many informal sources of information, however, so that formal, computerized information systems are of limited assistance. Nevertheless, this assistance is important for the chief executive officer, senior and executive vice presidents, and the board of directors to monitor the performance of the company, assess the business environment, and develop strategic directions for the future. In particular, these executives need to compare their organization's performance with that of its competitors and investigate general economic trends in regions or countries for potential expansion. Often relying on multiple media, executive information systems give their users an opportunity to "drill down" from summary data to increasingly detailed and focused information.

IMPLEMENTATION OF INFORMATION SYSTEMS

When an information system is executed internally by an organization, one of two methods is used: life-cycle development or rapid application development (RAD).

Large organizational systems, such as transaction processing systems and management reporting systems, are generally developed and maintained through a systematic process, known as a system life cycle that consists of six stages: feasibility study, system analysis, system design, programming and testing, installation, and operation and maintenance. The first five stages concern system development proper; the last stage involves long-term exploitation. Following a period of use (with maintenance as needed), as the figure shows, the information system may be either phased out or upgraded. In the case of a major upgrade, the system enters another development life cycle.

The principal objective of a feasibility study is to determine whether the system is desirable on the basis of long-term plans, strategic initiatives, and a cost-benefit analysis. System analysis provides a detailed answer to the question, what will the new system do? The next stage, system design, results in an extensive blueprint for how the new system will be organized. During the programming and testing stage, the individual software modules of the system are

developed, tested, and integrated into a coherent operational system. Further levels of testing ensure continuing quality control. Installation includes final testing of the system in the work environment and conversion of organizational operations to the new system. The later stages of development include such implementation activities as training users and modifying the organizational processes in which the system will be used.

Life-cycle development is frequently faulted for its long development times and voluminous documentation requirements-and, in some instances, for its failure to fulfill the user's requirements at the end of the long development road. Increasingly, life-cycle development has been replaced by a process known as rapid application development. With RAD a preliminary working version of an application, or prototype, is built quickly and inexpensively, albeit imperfectly. This prototype is turned over to the users, their reactions are collected, suggested modifications are incorporated, and successive prototype versions eventually evolve into the complete system. Sometimes RAD and life-cycle development are combined: a prototype is produced to determine user requirements during the initial system analysis stage, after which life-cycle development takes over.

After an installed system is handed over to its users and operations personnel, it will almost invariably be modified extensively over its useful life in a process known as system maintenance. For instance, if a large system takes 2 years to develop, it will typically be used and maintained for some 5 to 10 years or even longer. Most maintenance is to adjust the system to the organization's changing needs and to new equipment and system software, but inevitably some maintenance involves correcting design errors and exterminating software "bugs" as they are discovered

Managerial challenges of IT

1. Managing cash flow

Cash is king for any type of business, but it plays a particularly important role in the rapid-growth enterprise. The assumption that a rapidly growing business has adequate cash is misguided, since these firms must constantly reinvest in their businesses to fuel their rapid growth. It is therefore more likely that these businesses operate while in a perpetual cash crunch.

Planning to become bigger is the guiding principle of a rapid-growth enterprise. This approach requires that managers remain flexible, something that in turn requires a realistic view of the life cycle of information technology. For example, managers may wish to consider leasing equipment to reduce the firm's cash requirements. Evergreen clauses can be included contracts to stipulate when the supplier will replace outdated equipment with the latest technology. This

minimizes the resources that will be needed to maintain equipment and ensures that appropriate information technologies will always be available. Careful analysis at this point will not only make future purchasing decisions easier but can also lead to partnerships that can produce other benefits in the form of important supplier contacts or access to innovations.

In addition to the financial implications, senior managers should be concerned because of IT's potential to limit the strategic positioning of the firm or lock it into a particular business process. Certain decisions, like the introduction of enterprise-wide applications or the maintenance of legacy systems, have the potential to undermine the firm's survival. Senior managers must remain involved in decisions related to IT, since an investment in a particular information system, even one which is not viewed as strategic, may have a high opportunity cost that can potentially limit management's ability to act on important strategic initiatives.

2. Employee buy-in and fostering an open work environment

An open environment implies obtaining employee input on decisions, which is critical to securing employee support. Nowhere is this perhaps more important than in the introduction of information technology in cash-strapped organizations, when disparities in technology can result in employee discontent and management grief.

It is important to develop a framework for the technology that the organization will use. The framework should take into account the nature of the work that individuals are expected to do and assign appropriate technology configurations that will enable employees to meet their business goals. This framework should also maintain technology within a particular work group at comparable levels, thus reducing intra-departmental disparities while making inter-departmental disparities more manageable.

It should be noted that an open environment does not imply complete or uniform information disclosure. While employees should have access to the information needed to perform their work, they do not have to be able to access all data within the firm. Certain synergies are possible when information is shared throughout the organization and there are numerous information technologies available to support this communication. However, the access that employees have to company data is a decision that should be, but is not often, scrutinized by senior executives. We will revisit this issue when discussing departing employees.

3. Choosing partners and strategic alliances

Choosing alliance partners highlights two major concerns in the context of information technology. First, identifying IT requirements will often give the firm its first indication that it

needs a technology partner. Second, facilitating alliance agreements often requires implementing integrated information systems.

Partnering with technology providers, rather than providing all technology services in-house, is often a relatively low-risk approach for the rapid-growth enterprise. However, partnerships can include long-term strategic alliances with technology vendors, system integrators and/or outsourcers, as well as short-term contracts with consultants. A recurring issue for managers is to determine how these choices will affect the organization. Taking a narrow view of IT, purely as a source of short-term cost savings and efficiencies, tends to flaw this decision-making process. A manager can expect that strategic alliances based on such advantages will be equally short-lived.

If any alliance is to be successful, there must be regular communication between the partners. The organization's systems and information flows should be able to interface smoothly with those of its partners. Many alliances have failed because system incompatibilities have been over looked. Managing the flow of information requires an integrated approach. That is, the systems in an organization must be able to communicate with the systems in the partner firms. To ensure this, most companies will find it necessary to empower an executive such as a Chief Information Officer to provide the leadership to implement and enforce technology policies. Establishing this connectivity can be particularly challenging for rapid-growth firms since the period during which separate systems are integrated can be very short.

To ensure that companies with incompatible systems are aligned, it may be necessary to select one as an enterprise system, which is then implemented by all of the partners. This approach has its own unique challenges, since these initiatives must often be accompanied by re-engineering projects which enable and potentially modify the partner's processes to meet the information system requirements. This is a daunting task since it has always been easier to modify technology rather than the way people work. Management must be aware that integrating systems between partners is not simply about technology. Invariably, the task will require some process re-engineering before the systems can be integrated successfully.

4. Finding the right employees

Employee recruitment is particularly difficult for rapid-growth firms, which tend to need employees who are in high demand. IT can certainly help identify qualified people, as the ability to match specific task requirements to individual skills from a worldwide pool of potential employees is a key factor in the success of on-line recruiting. Unfortunately, identifying the persons with the required skills is not enough. Prospective employees may not be willing to move from their current locations, and there is a risk that the people recruited on-line will not fit the organization's culture. However, IT can be used to further screen qualified applicants with video-conference-enabled interviews and on-line personality tests. As well, the

ability to telecommute can encourage skilled but reluctant individuals to join a company. Virtual working arrangements and telecommuting can provide relief for shortages in job skills while effectively reducing the company's exposure to long-term agreements for skills that may only be needed on a limited basis.

5. Departure of employees with critical knowledge or proprietary information

How can IT help protect the knowledge that departing employees may take with them and how can it ensure that the knowledge stays within the organization after their departure?

Companies can have their employees sign non-disclosure agreements and other legal documents. However, an effective IT-based approach to this problem is to partition and effectively seal the knowledge that exists within the firm. With this approach, sensitive information is compartmentalized electronically so that only those individuals that require certain information have access to it. As pointed out earlier, an open environment does not mean or necessitate that everyone should have access to all the information in the firm. To this end, security measures should be in place to control who can access the information, and access itself should be logged and monitored. Most network operating systems, like Windows 2000, have the capability to restrict access to particular information; however, restricting access must be planned and implemented.

Providing open access to all data without considering the implications for departing employees exposes a business to the risk that these employees will take not only the knowledge that they played a part in creating but other data the company has collected. Designing the network security plan is a senior management responsibility. Too often, however, in rapid-growth enterprises, this duty falls to junior employees since they are often the only people who can implement the plan.

6. The internet and e-commerce

The privacy of data collected on-line and the requirements for enterprise system integration are two areas which the rapid-growth firm must be particularly aware of when dealing with internet and e-commerce initiatives.

Internet initiatives for many rapid-growth firms provide the opportunity to collect customer data on a large-scale basis. The rules governing the collection and use of this data by organizations have often been set solely by company directives. But recent initiatives, like the appointment of a Privacy Commissioner of Canada, are likely to further constrain firm activities. For management, these new regulations will require that the organization demonstrate due diligence when obtaining consent to use personal data on customers and employees. This consent will be required if the data is repurposed.

E-commerce initiatives require the implementation of a significant IT infrastructure, as data within the organization and outside it must be accessed. Management can easily be ill prepared for the scope of work required to implement a successful e-commerce strategy. This issue becomes more critical since it is very difficult to anticipate future system requirements when current requirements are evolving rapidly. This issue can at least be managed if all systems development is coordinated and islands of automation are prevented, even if the immediate requirements do not necessitate such interconnectivity. Assigning this responsibility to a senior level in the organization, early in the company's life, will position the firm well for any future e-commerce initiative.

7. A CEO who can communicate a vision

The ability of a CEO to connect with employees in a fast-paced, rapid- growth environment is often limited. However, the effective use of IT can bridge the gap between senior management and employees. Although some may be cynical about technology's ability to communicate a vision, IT can help by increasing the frequency of contact, improving the clarity of the message, opening multi-way communication channels, and reinforcing the vision in a timely manner at key organizational learning points. Without the technology, senior managers often have no way of contacting all employees directly. However, the use of corporate videos and publications on intranets can enable employees to retrieve and capture the corporate culture on demand. Intranets can be used to disseminate messages from the CEO and other company executives, introduce new personnel, showcase outstanding employees, circulate company news and success stories, support cross-functional teamwork, create important new feedback channels, and facilitate organizational learning. Digitally documenting the corporate culture can be extremely helpful for new employees, who have missed many of the critical events in the company's history.

Management must understand how IT can be used appropriately to convey a message, since the choice of medium can be critical to communicating effectively. For example, e-mail may be suitable for providing message reinforcement, but it may not convey an initial message as strongly as a live presentation or video conference. An individual phone call from the CEO to welcome a new employee is likely to be more effective than an automated voice mail. Therefore, senior managers should understand the limitations of various communication technologies, so that they can employ those that are appropriate.

8. Developing management skills in executives

Information technology can facilitate executive training and the development of specialized management skills.

The first role involves designing and delivering technology-supported training in the form of self-paced interactive CD-ROMs, videos, Web-based courses and video-conference seminars. A training program for executives can be created based upon the future requirements of the company, so executives get the prerequisite training just before, or as soon as, they need it. This just-in-time approach permits them to use new skills immediately. The training program can be adjusted as needed and aligned with the changing requirements of the organization. The rapid growth enterprise's stages-of-growth model can be used to guide the training program. Regular executive training serves to reinforce the learning organization model by making continuing education the norm at all levels of the company.

Secondly, IT can be used to link those with knowledge to those who need it. External mentors serve this role so effectively for high-growth firms that it is not surprising to find that their use is increasing and that the mentoring role is becoming more formalized. In fact, the business of mentoring high-growth firms is itself a high-growth industry. However, even after an appropriate mentor has been identified, there is still the problem of linking the mentor and the entrepreneur. IT, in the form of e-mail, intranets, video conferencing and Web forums, can link these parties in an efficient, cost-effective way.

9. Communicating with customers

Effective communication with customers is linked directly to customer recruitment and retention.

Retaining key customers requires the company to either meet or exceed customer expectations. Web-based tools and other interactive technologies can provide convenient, innovative ways to better meet specific customers' requirements. Similarly, customer service, a key factor in customer satisfaction, can be improved through the use of IT. However these results must be accomplished by focusing on the customer and not the technology. For example, companies that have implemented automated or self-directed, customer-support Web sites have found that they offer only partial solutions, since they do not provide the human contact often required to solve complex problems. However, rather than abandon the technology completely, it would be more effective to integrate IT so that a customer can easily switch from an automated, self-directed system to a human customer-support person, when desired, via a phone or Web-enabled videoconferencing link.

Recruiting new, profitable customers is always challenging, even when a company is able to quantify profitability on an individual customer basis. Data mining can identify clusters of profitable customers that can be targeted or gaps where new segments may exist. These efforts require coordinated planning to ensure that the data needed for quick decision-making are available and of a certain quality. IT can lower the cost of servicing customers. For example, segments that could not be serviced profitably via traditional means may become attractive if

serviced by technology-based channels like automatic, menu-driven, self-service systems that are telephone or web-based. Service companies in particular can benefit by providing expert systems that use technology to deliver their basic services, and then provide links to traditional channels whenever the expert systems cannot meet their customers' rapidly evolving needs.

10. Using technology to add value and reduce costs

IT has long been used to collect, manipulate and disseminate information to senior managers and thus increase the efficiency and organizational processing capacity of the firm. Software vendors offer a wide range of applications that focus on aspects of enterprise management, from Enterprise Resource Planning (ERP) systems to Executive Information Systems.

The ability to make timely decisions is critical to the success of a rapid-growth enterprise, and that ability is intimately connected to the availability of information to support decision-making. IT has often provided the link between the various parts of the company, thus facilitating the collection and organization of the required data. However, connecting departments electronically can result in increased interdependence and more complex decision-making. Fortunately, the processing power provided by IT also permits managers to address this more complex analysis.

11. Outsourcing and the potential loss of control

Any company operating in a high-growth industry is likely to have at least one system that is mission critical. The very basic data processing needs of these companies is so great that they necessitate the use of IT, thus making these systems critical to the successful operation of the business. An enlightening exercise for management is to try to imagine that the various information systems have been turned off. What effect would that have on the organization? What products or services could no longer be offered? What information would no longer be available? The interconnectedness of these systems and their intrinsic worth to the company's business processes should soon become apparent. While management does not need to understand the technical details of company systems, it is critical for senior personnel to understand the exposure that the company faces with respect to information technology.

12. The business life cycle

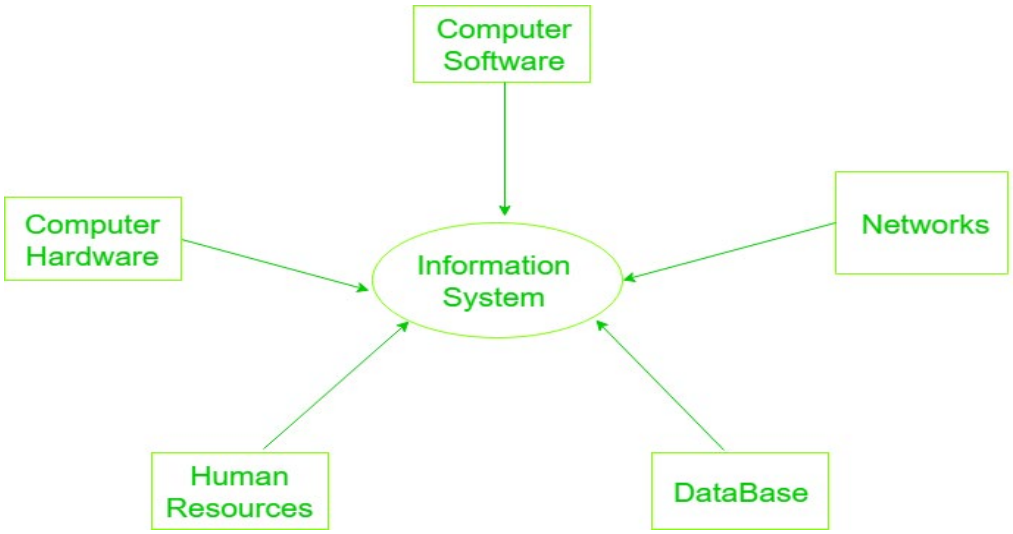
It is difficult to identify exactly which stage of its life cycle a high-growth company is in, since these stages tend to overlap. However, lifecycle information can be used to help management predict the firm's short-term and longer-term needs and the actions that should be taken now. Flexibility is key. Management must keep the firm's growth requirements in mind when

considering information technology needs. Systems that are installed should be able to grow as the firm grows. Difficult management decisions regarding the advisability of building proprietary systems versus buying off-the-shelf solutions, or incorporating essential system functionality versus 'nice but not necessary' features, must be made so that future choices are not significantly constrained by a short-term outlook.

A rapid-growth enterprise faces many unique management challenges. The management environment is constantly changing and the leadership roles rapidly evolving. There is a need to maintain a strong, innovative culture despite a constant influx of new employees and an ever-expanding product line that must be developed in the face of limited resources. Amidst this apparent chaos lies a unique set of information-technology management challenges. These are clustered around the issues of maintaining flexibility, communicating and the need to make key decisions early in the growth of the company. Information technology represents a critical area that demands senior management's attention. Failure to adequately manage this strategic resource can be disastrous.

Components of Information System

An **Information system** is a combination of hardware and software and telecommunication networks that people build to collect, create and distribute useful data, typically in an organisational, It defines the flow of information within the system. The objective of an information system is to provide appropriate information to the user, to gather the data, processing of the data and communicate information to the user of the system.



Components of the information system are as follows:-

1. Computer Hardware

Physical equipment used for input, output and processing. What hardware to use it depends upon the type and size of the organisation. It consists of input, an output device, operating system, processor, and media devices. This also includes computer peripheral devices.

2. **Computer Software**

The programs/ application program used to control and coordinate the hardware components. It is used for analysing and processing of the data. These programs include a set of instruction used for processing information.
Software is further classified into 3 types:

1. System Software
2. Application Software
3. Procedures

3.Databases:

Data are the raw facts and figures that are unorganised that are and later processed to generate information. Softwares are used for organising and serving data to the user, managing physical storage of media and virtual resources. As the hardware can't work without software the same as software needs data for processing. Data are managed using Database management system. Database software is used for efficient access for required data, and to manage knowledge bases.

4. Network:

- Networks resources refer to the telecommunication networks like the intranet, extranet and the internet.
- These resources facilitate the flow of information in the organisation.
- Networks consists of both the physicals devises such as networks cards, routers, hubs and cables and software such as operating systems, web servers, data servers and application servers.
- Telecommunications networks consist of computers, communications processors, and other devices interconnected by communications media and controlled by software.
- Networks include communication media, and Network Support.

5. Human Resources

It is associated with the manpower required to run and manage the system. People are the end user of the information system, end-user use information produced for their own purpose, the

main purpose of the information system is to benefit the end user. The end user can be accountants, engineers, salespersons, customers, clerks, or managers etc. People are also responsible to develop and operate information systems. They include systems analysts, computer operators, programmers, and other clerical IS personnel, and managerial techniques.

Strategic Use of Information Technology

Information technology plays an important role in delivering value for a business and supporting organizational transformation. To achieve that, chief information officers have become key members of board teams developing and delivering strategic solutions for the business. The aim is to make an organization more competitive by aligning business strategy with IT strategy.

Support Innovation

Organizations that want to improve their innovation capabilities and develop new products or services for the market can use cloud computing to speed up the process. Cloud computing enables organizations to rent additional IT resources during the development project on a pay-as-you-go basis, rather than investing in fixed resources. Organizations can use the additional resources to run pilot programs or speed up development. This provides an important strategic advantage by enabling the organization to get new products to market quickly, ahead of the competition.

Improve Responsiveness

Cloud computing enables organizations to scale up their IT resources quickly in response to changing market conditions. Organizations that offer products and services online may find it difficult to handle a surge in traffic, which could result in lost business. Adding resources from the cloud provides a strategic advantage by enabling them to respond to changes in demand, increase revenue and maintain customer satisfaction.

Increase Collaboration

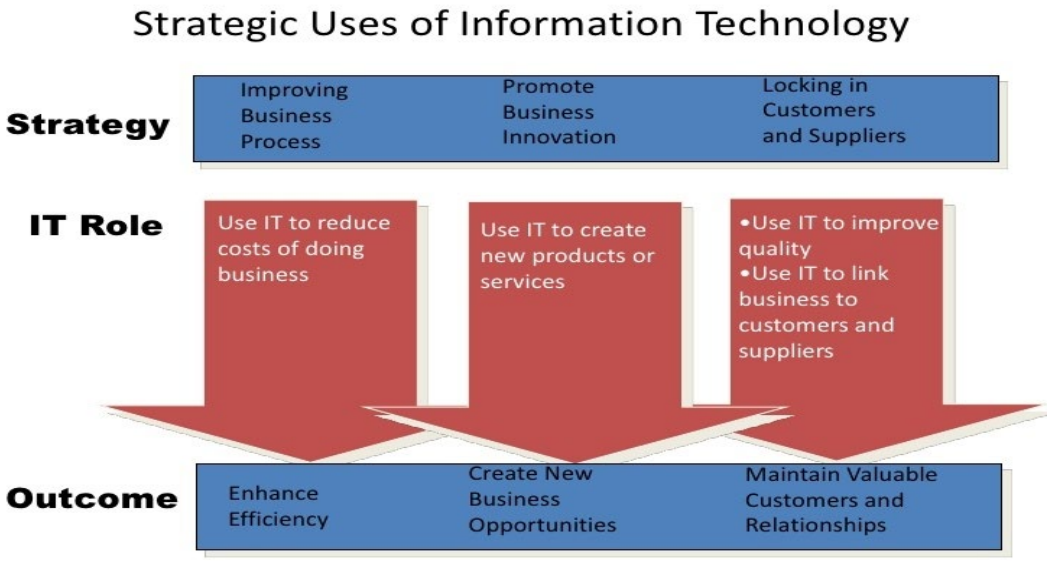
IT solutions that improve collaboration in an organization can provide an important competitive advantage. Issuing field service teams with smartphones, for example, enables service engineers to provide a faster, more efficient service to customers. Engineers working on a customer site can set up voice or video conference calls with product or technical experts at headquarters to discuss and resolve a complex issue, rather than delaying a repair. Offering customer superior service provides a strategic advantage by differentiating an organization from competitors.

Enhance Customer Insight

Collecting and analyzing data to gain greater insight into customers' needs and preferences provides a strategic advantage. By using powerful analytics software, organizations can develop customized offers and personalized communications that help to increase customer satisfaction and foster loyalty.

Introduce New Business Models

Organizations can use IT to make strategic changes to their business models. A company that traditionally sold products through retail outlets might use IT to develop an e-commerce model that enables it to reach a wider market, reduce its distribution costs and offer a more convenient service to customers.

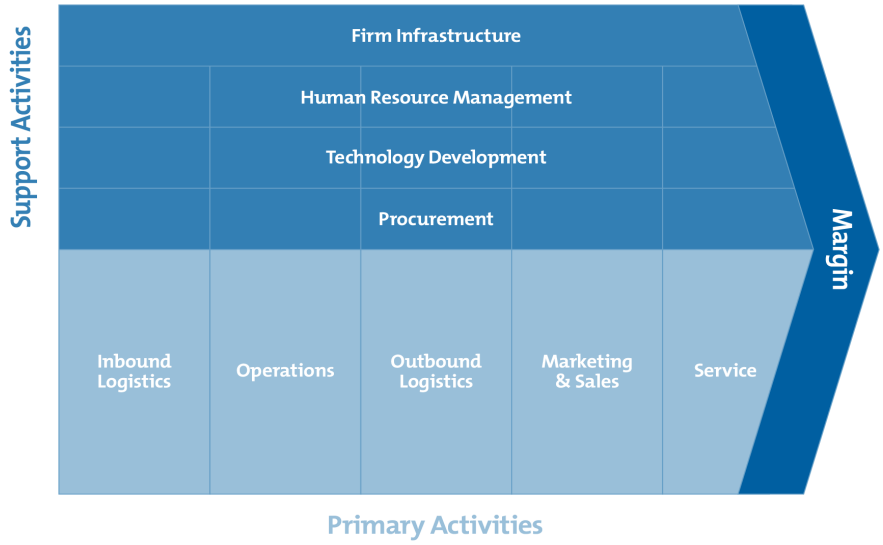


VALUE CHAIN

A value chain is a set of activities that an organization carries out to create value for its customers. Porter proposed a general-purpose value chain that companies can use to examine all of their activities, and see how they're connected. The way in which value chain activities are performed determines costs and affects profits, so this tool can help you understand the sources of value for your organization.

Elements in Porter's Value Chain

Rather than looking at departments or accounting cost types, Porter's Value Chain focuses on systems, and how inputs are changed into the outputs purchased by consumers. Using this viewpoint, Porter described a chain of activities common to all businesses, and he divided them into primary and support activities, as shown below.



Primary Activities

Primary activities relate directly to the physical creation, sale, maintenance and support of a product or service. They consist of the following:

- Inbound logistics – These are all the processes related to receiving, storing, and distributing inputs internally. Your supplier relationships are a key factor in creating value here.
- Operations – These are the transformation activities that change inputs into outputs that are sold to customers. Here, your operational systems create value.

- Outbound logistics – These activities deliver your product or service to your customer. These are things like collection, storage, and distribution systems, and they may be internal or external to your organization.
- **Marketing and sales** – These are the processes you use to persuade clients to purchase from you instead of your competitors. The benefits you offer, and how well you communicate them, are sources of value here.
- **Service** – These are the activities related to maintaining the value of your product or service to your customers, once it's been purchased.

Support Activities

These activities support the primary functions above. In our diagram, the dotted lines show that each support, or secondary, activity can play a role in each primary activity. For example, procurement supports operations with certain activities, but it also supports marketing and sales with other activities.

- **Procurement (purchasing)** – This is what the organization does to get the resources it needs to operate. This includes finding vendors and negotiating best prices.
- **Human resource management** – This is how well a company recruits, hires, trains, motivates, rewards, and retains its workers. People are a significant source of value, so businesses can create a clear advantage with good HR practices.
- **Technological development** – These activities relate to managing and processing information, as well as protecting a company's knowledge base. Minimizing information technology costs, staying current with technological advances, and maintaining technical excellence are sources of value creation.
- **Infrastructure** – These are a company's support systems, and the functions that allow it to maintain daily operations. Accounting, legal, administrative, and general management are examples of necessary infrastructure that businesses can use to their advantage.

Companies use these primary and support activities as "building blocks" to create a valuable product or service.

Strategic Information System

A strategic information system is mainly developed to respond to the corporate world and many business initiatives. Strategic information is used for gaining competitive advantage and formulating business strategies by organizations. It may deliver a service or product that is at a lower price, differentiated and mainly concentrates on a demanding market section, or which is innovative. It help companies frame business strategy, competitive strategy, take management decisions and thus gain competitive advantage and achieve cost reduction.

Information System Strategy is an essential feature in Corporate and Information Technology (IT) world and provide them with better bargaining power. In a nutshell, it helps firms and companies to allocate, store, process data, move the data and information they develop and receive. It also enables and provides various tools and services for aiding the firms to apply metrics and analytical tools in their information repositories. Information systems allow them to recognize the resourceful opportunities for expansion and simple ways to enhance operations and supply efficiency. Thus firms with a better chain management, knowledge management, data management practices along with more effective data presentation and analysis can provide better customer service at reduced or less cost.

Importance and advantages of Strategic information system

Strategic information system provides a connection between demands of organization and latest information technology. This tactic helps an organization to get hold of the market by utilizing Information tech to meet its challenging requirements to the continuous variation in the corporate environment. 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. It gives the surety that only useful resources or the use of resources which are less are allocated to the applications and to use the scarce resources in a sustainable way and have a better impact factor. 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.

There are several instances of strategic planning which have helped the organizations to help create and sustain the resources in this competitive market over the past years and has allocated

several effective benefits and simply continued to provide for the survival of these organizations which have used these systems. These systems are often termed as '**strategic concepts of the organization**.' To give the maximum performance of the firms financially in a fluctuating market, the correlation between Strategic Management and Information System is significant fundamentally. Understanding of management information system is equally helpful & an asset to the organisation.

In additional to the reduction in product related cost, it also helps in increasing market share, streamline business process, provide a better business environment, diversify functional areas, and deliver high quality product and services

Using IT for creating Strategic Advantage for Business

What is competitive strategy?

It is a broad based formula for how a business is going to compete, what its goals should be, and what plans and policies will be required to carry out those goals.

What is strategic role of information systems?

It involves using information technology to develop products, services, and capabilities that give a company major advantages over the competitive forces it faces in the global marketplace. A strategic information system can be any kind of information system (e.g., TPS, MIS, and DSS) that uses information technology to help an organization gain a competitive advantage, reduce a competitive disadvantage, or meet other strategic enterprise objectives.

- There are many strategic initiatives available to firm in addition to the 5 basic strategies of cost leadership, differentiation, innovation, growth, and alliance.

- Locking in customers or suppliers: investments in information technology can allow a business to lock in customers and suppliers (and lock out competitors) by building valuable new relationships with them.

- Building switching costs: it emphasis in strategic information systems has been to find ways to create switching costs in the relationships between a firm and its customers or suppliers.

- Leveraging investment in information technology: investing in information technology enables a firm to build strategic IT capabilities so that they can take advantage of opportunities when they arise.

Trends in MIS

Management information systems (MIS) are complex decision support systems used by companies to enhance and improve their business operations. Historically, an MIS was a management tool to help company management make informed decisions for their business based on information gathered from all business departments. Technology has greatly improved the effectiveness of the MIS.

Enterprise Resource Planning

Enterprise resource planning (ERP) software is a form of MIS that is installed in all departments and locations of businesses to enhance the availability of company information. With the globalization of the economic marketplace, companies have sought ways to improve their ability to collect and report financial information to management for effective decision making. ERPs fill this void by allowing companies to use one computer system to effectively record all company information.

Benefits of Networking

Another trend in MIS is the ability for companies to network with other companies for business purposes. Manufacturing firms can shorten their supply chain using electronic data interchange (EDI) to transfer the necessary information for ordering more products. Networking also allows companies to transfer money through several bank accounts, creating a quicker process for paying bills and purchasing materials. An MIS ensures that management has all the pertinent information for these business operations, allowing them to review the effectiveness of their operations.

Data Mining, a Powerful Tool

An important trend in MIS is the ability for companies to use data mining tools to collect information regarding consumer purchases and other economic trends. This allows management to translate this information into goals and directions for future business operations. Most MIS software also has trending or forecasting models that allow companies to project emerging consumer markets for profitable operations. Companies can use their internal figures in the MIS to measure the effectivess of their external data mining techniques.

Educational Programs

As MIS software becomes more prevalent in businesses, many colleges and universities have developed educational programs to train students on these programs. Most degrees are four-year baccalaureate programs that combine general business courses with a mix of computer

programming and management classes. This helps students to develop a well-rounded education in the development and implantation of MIS software. Advanced degrees are also offered.

Careers in Database Management and Consulting

Computerized MIS programs have led to a new career in database management and consulting. According to the U.S. Bureau of Labor Statistics (BLS), employment of computer and information technology occupations is projected to grow 13 percent from 2016 to 2026, faster than the average for all occupations

E-Business

E-business is short for "**electronic business**." As an **overarching term**, it refers to any method of utilizing digital information and communication technologies to support or streamline business processes – from preparation to implementation. However, it can also refer more specifically to the business processes of online stores or other internet-based companies.

These two slightly different interpretations of the term have led to a problem: a widely accepted, precise definition of e-business does not yet exist. As a result, it's interpreted broadly, and is commonly misunderstood – mainly in relation to e-commerce. Although there is some overlap, **e-commerce refers to trading products and services online,** and so is strictly only speaking of **one aspect of e-business**.

The word e-business became popular **following an IBM advertising campaign** about computerized procedures to automate business processes. **On October 7th, 1997**, the IT and consulting firm published an eight-page essay in the Wall Street Journal and used the term to describe how corporate systems would fundamentally change in the digital era.

At the time, IBM understood e-business as "**redesigning strategic business processes and meeting the challenges of a new market increasingly characterized by globalization, and based on new knowledge**." Although the company wanted to present itself as an expert on this topic, they nevertheless decided against patenting the term in the hope that other companies would engage with the concept and help to form a new industry.

Components of electronic business

The core components of e-business are **information**, **communication**, and **transaction**. Business partners use digital networks (i.e. public or private communication networks) to

conduct business processes using innovative technologies to improve efficiency. Three key areas are particularly important for e-business:

1. E-procurement: the electronic sourcing of products and services by companies, focused on reducing costs and effort.

2. Online stores: the electronic sale of products and services via appropriate platforms, such as online stores.

3. Online marketplaces: electronic commerce via digital networks, connecting the buyers and suppliers of products and services.

There are also two further areas of e-business:

1. Online communities: electronic communication network between individuals and organizations, which supports data and knowledge sharing as well as the preparation of transaction decisions.

2. Online companies: electronic business cooperation for connecting individual company services, resulting in a virtual business with a common transaction offer.

E-Commerce

Ecommerce, also known as electronic commerce or internet commerce, refers to the buying and selling of goods or services using the internet, and the transfer of money and data to execute these transactions. Ecommerce is often used to refer to the sale of physical products online, but it can also describe any kind of commercial transaction that is facilitated through the internet.

E-commerce is a transaction of buying or selling online. Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.

Whereas e-business refers to all aspects of operating an online business, ecommerce refers specifically to the transaction of goods and services.

Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle although it may also use other technologies such as e-mail. Typical ecommerce transactions include the purchase of online books (such as Amazon) and music purchases (music download in the form of digital distribution such as iTunes Store), and to a less extent, customized/personalized online liquor store inventory services.

Features of E-Commerce

1. **E-Commerce is Technology-Enabled**: Traditional commerce is taking place since times immemorial but E-commerce is result of integration of digital technology with business processes and commercial transactions. The technological foundations of E-commerce are internet, www and various protocols.

2. **Technology Mediated**: In E-commerce buyers and sellers meet in cyber space rather than physical place. Hence E-commerce does not involve face to face contact.

3. **Universality**: Buying and selling take place through websites in E-Commerce. The websites can be accessed from anywhere around the globe at any time therefore it possess the feature of universality.

4. **Intercommunication**: E-commerce technology ensures two way communications between buyer and seller. On one hand by using E- commerce firms can communicate with customers through E-commerce enabled websites. On the other end, customers can also fill order forms, feedback forms and can communicate with business operating firms.

5. **Delivery of Information**: E-commerce serves as the best channel of communication. Ecommerce technologies ensure speedy delivery of information at very low cost and considerably increase information density as well.

6. **Electronic Completion of Business Processes**: By using E- commerce we can perform business transactions like accounting and inventory through computers at global level.

7. **Virtual Communities**: Virtual Communities are online communities created by means such as chat rooms and specifically designed sites like, where people can interact with each other having common interest using the internet.

8. **Inter-Disciplinary in Nature**: Implementation of E-Commerce needs a lot of knowledge of managerial, technological, social and legal issues. Besides this, understanding of consumer behaviour, marketing tools and financial aspects is as crucial as designing interactive E-Commerce websites.

9. **Customization**: With the use of E-commerce technology, the world is moving from mass production to mass-customization. Product customization ensures that goods are tailor made as per the requirements and preferences of customers.

Advantages of E-Commerce

1. Advantages to Consumers

- **Wide range of products and services :**Electronic commerce through internet enables the customers to choose a product or service of their choice from any vendor anywhere in the world. Due to space constraint, a vendor can stock only a minimum amount of goods in the physical store.
  A virtual store enables a business organization to stock a lot of goods without considering the inventory cost. Hence, a business also provides a lot of choice to consumers to choose a product of his /her choice.

- **Convenience:** Customers can buy any product from anywhere in the world without moving away from their workplace or home through internet. Due to bad weather, people may restrict their shopping even if necessity arises. E-commerce provides convenience to buy goods or services without causing any physical constraints to the consumers.
- **Saves money:** The cost incurred by the business on the middlemen generally falls on the consumer. Since the middlemen are eliminated, the customer is free from bearing the cost of the middlemen. To attract customers and to combat competitors, several business organizations offer product and services at cheaper price. Certain goods like e-books, music audio clips, software can be purchased and delivered through internet. It saves cost for the buyers.
- **Saves time:** Time saving is one of the prime benefits of online shopping. Time taken for selection, buying and paying for an online product may not take more than 15 minutes; the products are delivered to customers' door steps within a week. It saves delivery time for the buyers.
- **Adequate information:** Internet is used as a main vehicle to conduct transactions in e-business. Internet allows customers to search for product information, compare the prices and benefits and finally evaluate its value before committing purchase. Through internet, customers can get their queries clarified and track their delivery status when the goods are being sent to them. If any doubts arise while handling the products, the customers can easily contact the business through internet.

2. Advantages to Business

- **Decrease in cost:** The cost incurred on advertisement and communication is lower as the business uses e-mail and online advertising channels. The cost incurred on human resources is also low as most of the business processes are automated. Middlemen are eliminated to a considerable extent as there is a direct link between the business and the

consumers. Due to effective supply chain, the cost incurred on maintaining inventories is reduced.

- **Effective customer service:** E-commerce through internet provides up-to-date information about the business and its products to customers. By answering customers' queries quickly and arranging immediate delivery of goods, a business organization is able to win the loyalty of customers. Effective communication and quick delivery of goods lead to total customer satisfaction.
- **Increase in revenues:** Decrease in cost and increase in sales help the business to enjoy greater profits. The business being open 365 x 24 x 7 fetches revenues throughout the year.
- **Transaction efficiency:** Automation of business processes helps the business to streamline its operating processes. Efficient procurement cycles reduce delivery delays. Minimum time taken to complete transactions also results in transaction efficiency.
- **Effective information management:** E-Commerce helps business to create, process, distribute, store and retrieve any information cheaply and quickly. The above benefits enable a business organization to remove any communication gap between the business and consumer, or between business and business associates or between business and its employees. Communication is considered as the lifeblood of any business organization. Good information management enables the top level management to take quick decisions and make use of the business opportunities at the right time. E-Commerce helps at every stage for an effective information management.
- **Global reach:** Business organizations are able to send messages worldwide with the help of electronic medium explore new markets and reach globally at lower cost. E-commerce helps to attract customers and business clients from anywhere in the world due to global reach of the internet.

Disadvantages of E-Commerce

Technical Disadvantages

- There can be lack of system security, reliability or standards owing to poor implementation of e-commerce.
- The software development industry is still evolving and keeps changing rapidly.
- In many countries, network bandwidth might cause an issue.
- Special types of web servers or other software might be required by the vendor, setting the e-commerce environment apart from network servers.
- Sometimes, it becomes difficult to integrate an e-commerce software or website with existing applications or databases.

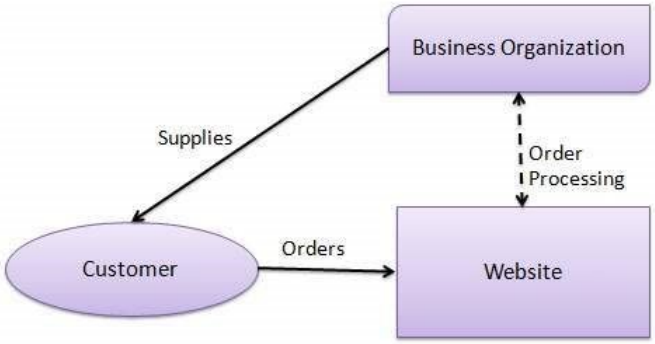
- There could be software/hardware compatibility issues, as some e-commerce software may be incompatible with some operating system or any other component.

Non-Technical Disadvantages

- **Initial cost:** - The cost of creating/building an e-commerce application in-house may be very high. There could be delays in launching an e-Commerce application due to mistakes, and lack of experience.
- **User resistance**: - Users may not trust the site being an unknown faceless seller. Such mistrust makes it difficult to convince traditional users to switch from physical stores to online/virtual stores.
- **Security/ Privacy**: - It is difficult to ensure the security or privacy on online transactions.
- Lack of touch or feel of products during online shopping is a drawback.
- Internet access is still not cheaper and is inconvenient to use for many potential customers, for example, those living in remote villages.

E-Commerce models

1. Business To Consumer (B2C)



Business to consumer is the first type of e-commerce that is also the most common one. It is also known as B2C model. In this type online business selling is offered to individual customers. The B2C model works by retailers and marketers that use clear data in various marketing tools so can sell their products to the internet users.

The internet users can use the shopping cart for everything they need. Payment is mostly done through credit cards or by payment gateways like the PayPal.
Direct interaction with the customers is the main difference with other business model. B2C normally deal with businesses that are related to the customer. The basic concept of this model is to sell the product online to the consumers.

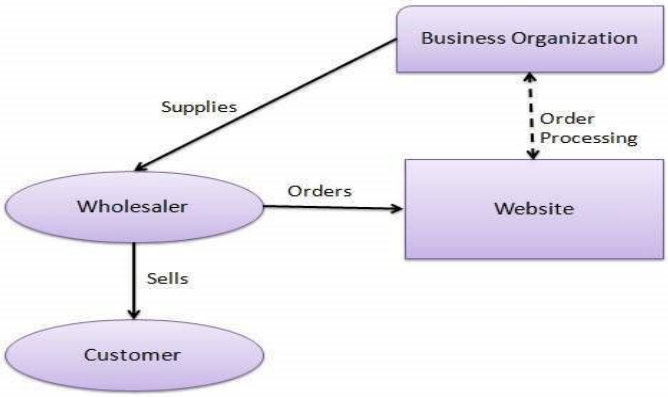
Advantages

- Lower prices
- Shop 24/7
- Anyone with a basic knowledge of the internet can set up and manage a B2C e commerce store under little supervision.
- It involves selling to a wide range of audience with already known purchase patterns and behaviour.
- It allows for flexibility since the platform is the channel for efficiently collating market demand in real-time.
- It is easier to encourage B2C ecommerce shoppers to practice impulse buying since you can run ads targeted towards customers that are not even searching for what to buy.
- The retailer is in charge of discounts and giveaways as opposed to the B2B model.
- Shorter delivery times for digital products
- Sharing of information with other consumers
- Improved customer service
- Easy to scale B2C venture

Disadvantages

- Delay in receiving physical products, plus shipping
- In areas without high-speed Internet service, slow download speeds.
- Inability to touch, feel, or even smell products priorto the purchase.
- Unavailability of micropayments for purchase of small-cost products.
- High Competition
- The B2C space is highly competitive with most firms already boasting a majority of the market share.
- Many buyers still prefer making purchases in-store rather than online.
- The market is continually evolving and requires upgrades more frequently than in other models.

2. Business To Business (B2B)



Business to business, known as B2B model, is the largest e-commerce model that is based on revenue which involves trillions of dollars. In this both the buyers and sellers are business entities. B2B describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer.

The volume of B2B transactions is much higher than the volume of B2C transactions and any other transaction.The primary reason for this is that in a typical supply chain there will be many B2B transactions involving sub components or raw materials, and only one B2C transaction, specifically sale of the finished product to the end customer.

B2B Example

A cyber security firm is offering its online security software that mitigates credit card fraud to an e commerce company.

Advantages

- **Market Predictability**

  Compared to the other business strategies, the B2B E-Commerce business model has more market stability. B2B sectors grow gradually and can adapt to various complex market conditions. This helps to strengthen the online presence and business opportunities and get more potential clients and resellers.
- **Better Sales**

  An improved supply chain management process along with a collaborative approach increase customer loyalty in the B2B E-Commerce business model. This, in turn, leads to improved sales. It helps businesses to showcase product recommendations and unlock effective upselling and cross-selling opportunities.
- **Lower Costs**

  Due to an effective supply chain management process, this online business model leads to lower costs for the businesses. In most cases, the work is done through automation that eradicates chances of errors and undue expenditure.
- **Data Centric Process**

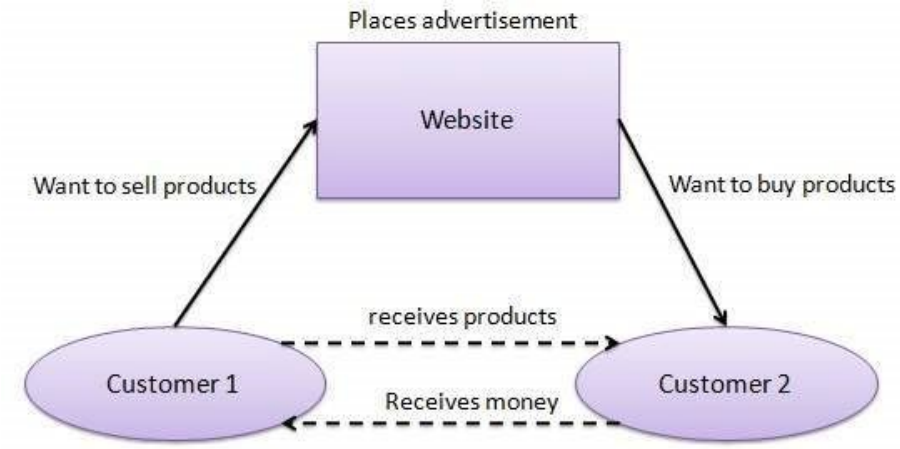
One of the main advantages of the model is that it relies on effective and factual data to streamline the whole process. In this way, errors can be avoided and proper forecasts can be made. With an integrated data-driven approach, you can calculate detailed sales statistics.

Disadvantages

- **Limited Market**
  Compared to the B2C model, this type of business has a limited market base as it deals with transactions between businesses. This makes it a bit of a risky venture for small and medium E-Commerce businesses.

- **Lengthy Decision**
  Here, the majority of the purchase decisions involve a lengthy process as there are two businesses involved. The process may involve dependence on multiple stakeholders and decision makers.
- **Inverted Structure**
  Compared to the other models, consumers have more decision making power than sellers in the B2B business model. They may demand customizations, impose specifications and try to lower price rates.
- There is a smaller pool of customers when compared to other models.
- Where firms ask for huge discounts because of their bulk purchase, it could eat into the profit of the seller.

3. Consumer To Consumer (C2C)



Consumer to consumer (C2C) or citizen-to-citizen electronic commerce involves the electronically facilitated transactions between consumers. A common example is the online auction, in which a consumer posts an item for sale and other consumers bid to purchase it. The

sites are only intermediaries, just there to match consumers. They do not have to check quality of the products being offered.
The C2C model facilitates online transactions of goods and services between the individual net users. But in this both the web users orboth the parties cannot carry out any transaction without the platform that is provided by an online market maker such as the eBay.

C2C Examples

The foremost example of C2C via a third-party website would be an auction platform like eBay which brings seller and buyers together. eBay charges a fee for facilitating each sale while the other parties to the transaction are responsible for settling other matters such as product quality, packaging, shipping, and refunds.

Advantages of C2C E-Commerce

- It is always available so that consumers can have access to whenever they feel like shopping
- There is regular updating of the website
- Consumers selling products to other consumers benefit from the higher profitability that result from selling directly to one another
- There is a low transaction cost; sellers can post their goods over the internet at a cheaper rate far better than higher price of renting a space in a store
- Customer can directly contact sellers and do without an intermediary.
- With C2C, the products gallery is unlimited since different customers are on board and selling various items scattered across different niches.
- C2C facilitates the sale of used items as opposed to B2C where a majority of the products are new.
- C2C often serves as a black market for businesses to purchase items without going through the primary market.
- Any online platform that allows interaction between two or more people can facilitate a C2C trade.

Disadvantages of C2C E-Commerce

- There could be theft as scammers might try to create their website with names of some famous C2C websites such as eBay to attract customers.
- The cost charged for each sale using the C2C e commerce model on a third-party site like eBay may eat into the profit of the merchant.
- C2C poses a high level of risk in terms of product quality than other e commerce business models. Under C2C, most transactions require that both parties trust it each other.
- For auction sites, users may end up buying goods at inflated prices which is not a good economic decision.

4. Consumer to Business - C2B

A consumer-to-business model, or C2B, is a type of commerce where a consumer or end user provides a product or service to an organization. It is a reverse of the B2C model, where businesses produce products and services for consumer consumption. The idea is that the individual/end user provides a product or service that the business can use to complete a business process or gain competitive advantage.

Examples of C2B

- Offering to do trial of products and give review.
- A sports blogger who bills a gaming company to promote their services on his blog or signs up for Google Adsense to display ads that suit his audience in exchange for profits.
- Social media managers, content creators, brand managers, programmers, and many other services providers working online.

Advantages

- C2B provides a channel for companies to source and hire a variety of service talents and products from around the globe.
- It also provides an opportunity for companies to prioritize hiring from regions where the standard of living is low, thus, reducing what figure goes on the pay check.
- It also allows service providers to gain work experience across multiple projects and get paid well for doing so.
- Freelancers also enjoy relative freedom and flexibility in terms of working hours.

Disadvantages

- High level of communication is needed.
- Companies that hire freelancers could face a challenge in sending payment to freelancers in some parts of the world. The possibility of outsourcing means the freelancer paid for the job may not even be the one doing it. This situation could put the
- Employer at a disadvantage as he gets a substandard service than what he originally paid.

5. Business-to-Government (B2G)

Business-to-government (B2G) is a business model that refers to businesses selling products, services or information to governments or government agencies.

B2G networks or models provide a way for businesses to bid on government projects or products that government might purchase or need for their organizations. This can encompass public sector organizations that propose the bids. B2G activities are increasingly being conducted via the Internet through real-time bidding.

Examples of B2G

- A government using virtual workspace software designed by a creative agency.
- The situation in Ohio where the State's tax department hired the service of a third-party to collect and convert tax payments in crypto currencies to fiat.

Advantages

- It features a high-profit margin and longevity than most other e commerce business models.
- B2G businesses can enjoy tax benefits not common to other e commerce merchants.
- It increases flexibility and efficiency in public administration.

Disadvantages

- A change in government could adversely affect a B2G product or service provider
- It often requires huge capital to set up.
- It could also confine a business to operate within a specific geographical location, thus removing the primary purpose of e commerce transactions which is borderless product and service delivery.

6. Consumer –to-Government (C2G)

Consumer to administration or consumer to government e-commerce model enables the consumers to post feedback or request information regarding public sectors directly to the government administration or authorities.

Example of C2G

- When you pay electricity bill through the government website, payment of health insurance, make payment of taxes, etc.

- An electronic voting app for citizens to participate in an election without having to visit the polling unit or filing paperwork.

Advantages

- It makes public administration more flexible and efficient.
- It encourages public knowledge of internet-based technology.
- There is enormous profit potential for third parties contracted to handle C2G transactions.

Disadvantages

- A lack of internet service in some regions could restrict the performance of C2G e commerce.
- Public awareness and education programmes may be needed to introduce the populace to such systems.

Strategies for E-Commerce

1. Increase E-commerce Search Usability

Organize the web store for the two main groups of potential customers:

- Visitors who know what they want to buy. Customers who know exactly what they are looking for want to find the right information as quickly as possible - designing a **high-performing search**.
- Visitors who only want to browse. They are potential customers who just want to browse through the online store and compare items. – design **easy-to-use sections** with navigation menus, product categories and pages.

2. **Good Product Descriptions, Use High-Quality Photographs and descriptive videos.**

Outside the brick and mortar world, customers can't touch the product and are making their buying decisions entirely dependant on product imagery, description and feedback. **Interactive Product Visualization** is one of the best strategies to present products to consumers. It will help them study every detail of a product, which in turn will enable them to make an informed decision without regretting it afterward - helping you to avoid complaints and negative reviews.

3. Advanced Product Filtering

The advanced filter functionality allows your customers to find exactly what they're looking for quickly and easily. It can be even more useful if you are selling a lot of variations of the same types of products with many different options.

4. Personalize.

Site visitors are demanding one-of-a-kind experiences that cater to their needs and interests. Technology is available, even to smaller players, to capture individual shoppers' interests and preferences and generate a product selection and shopping experience led by individualized promotions tailored to them.

Eg.: Amazon is the pioneer of the **user-centric shopping experience through personalization**. Their homepage helps people easily find the right product in the personalized block in the first section when you log in under the "related to items you've viewed" tag.

5. Optimize Shopping Cart Functionality

To prevent customers from abandoning their shopping carts, you should be sure **shopping cart functionality is perfect and easily navigable**. **Clear the checkout page** and remove distractions and/or possible places to exit. This will prevent any confusion during the checkout process.

6. Content Marketing

Proper content marketing can attract more positive attention, interaction, and sustainable conversions in a way no other marketing method can. By creating and promoting original content, you are ensuring that your audience is receiving new information that matters to them on a continual basis.

7. Social Media Marketing

Social media marketing is a very powerful tool. It allows you to communicate with your industry, customers, and market in a personal way. You can utilize social media to generate engagement and interaction, boost traffic to your website, and develop a larger base of customers.

Utilizing different social media platforms for different purposes also creates a rich presence for your company that diversifies your abilities, efforts. This will ultimately help you cater to your customers' needs in a way that grows your business over time.

Benefits of a well-tailored social media campaign:

- Gathering information about your customer's online behavior allows for the creation of **targeted ads**.
- Building **strong relationships** with people – Daily communication with your customers helps any business to answer the buyer's needs and provide a better user experience.
- Unique and high-quality posts on social media expand **brand awareness** and convert people to **brand ambassadors**.
- **Better customer support** – Over 67% of consumers use social media platforms for customer support. If your business answers are timely and really help your customers, they can get viral.
- **Cost-efficiency** – social media is the fastest and cheapest way of connecting with your customers.

- **Higher conversion rates** – In 2019, social networks influenced 74% of shoppers for their purchasing decisions

8. Build Advertising Strategies

E-commerce shop advertisements help to improve your online visibility and boost sales.
Eg.: **Facebook Ads** or **Google Adwords** are the most popular and user-friendly platforms for advertising.
Retargeting is a technique that tracks customers who have visited your website and displays ads to them while they're browsing the internet with the intent of getting them back on your website. When these visitors enter your website again, they are far more likely to make a purchase.To effectively manage a retargeting campaign, make sure your ads are as specific as possible.

9. Artificial Intelligence

E-commerce is another highly appropriate domain where AI can make a significant impact. They enable you to gather as well as investigate data in real-time and track the way potential customers interact with your brand. AI facilitates better efficiency and competence

10. Chatbots

Technically a part of AI, chatbots can be an important weapon for e-commerce companies when it comes to enhancing customer experience. You can use chatbots to instantly communicate with customers and resolve their issues on multiple platforms, such as Facebook or your online store.
A chatbot is basically a computer program that simulates a conversation with a human user with intent to furnish some kind of service. Some chatbots are so advanced; it is really hard to distinguish them from chatting with a real human.

Impact of IT on Business

The rise of information technology has paved the way for various innovations. With the digitization of information, more and more businesses are increasingly leveraging the benefits of digital tools to improve their prospects. Information technology has been crucial in turning this process into a complete success.

Information technology has dramatically transformed the lives of individuals. It provides businesses the scope to analyze data and plan business strategies accordingly. Utilizing information technology means that the data analysis is accurate, thus optimizing profits.

Information technology has had a major impact on various aspects of businesses. Let's take a look at some of these here.

1. **Cloud Computing**

The concept of cloud computing is immensely popular among businesses owing to the efficiency in business operations that it provides. Cloud computing utilizes information technology to capitalize on its ability to provide improved agility and time and resource management for businesses. Increasingly, businesses are shifting to the cloud to leverage its many benefits. It has been predicted that more than $1 trillion will be impacted in IT spending by the transition of businesses to cloud computing by 2020.

"Cloud-first strategies are the foundation for staying relevant in a fast-paced world," Ed Anderson, research VP at the analyst firm, Gartner pointed out, "The market for cloud services has grown to such an extent that it is now a notable percentage of total IT spending, helping to create a new generation of start-ups and "born in the cloud" providers."A good Internet connection and a commendable WiFi connectivity are important to accomplish this.

2. **Automation of Business Processes**

The movement towards increased automation of business processes has gained traction over the years. It improves efficiency and increases workflow considerably.

Information technology helps in developing automated processes for businesses. This not only helps in reducing the cost of operation but also saves time. The time saved can be utilized to focus on other tasks, thus speeding up business processes significantly.

Processes like billing, tracking metrics, collecting customer data, monitoring certain processes etc. can be automated easily. There are numerous automation software that can be utilized for this purpose.

3. **Working Remotely**

Implementation of information technology provides the ability to remotely access your company's network. As a result, it equips employees with the ability to get the work done even if they are not physically present at the workplace.

Such agility has a number of benefits. Therefore, it has gained massive popularity. In fact, according to a U.S. federal government resource, 47% of the employees are eligible to work remotely.

Ian Adams, head of strategic marketing development at the outsourcing company, Mitie pointed out, “We’re seeing greater collaboration between HR, IT, property and facilities management and job titles like ‘workplace director’ making this agile workplace happen.”

4. **Mobile Technology**

Mobile technology has picked up momentum owing to its convenience, efficiency and speed. With the rise in the popularity of information technology, implementation of mobile technology has gained ground quickly.

The trend of BYOD (Bring Your Own Device) is on the rise owing to increased employee satisfaction. As many as 74% of the organizations are already utilizing this trend or plan on doing so in the future. In fact, the BYOD market is estimated to reach $181.39 billion by 2017.

Mobile technology takes business communication to a whole new level. A mobile team can improve the workplace productivity considerably. There are numerous ways to integrate mobile technology in the workplace. In fact, chances are, your employees are already using it.

5. **Protecting Information**

Every organization has a mammoth database comprising various information related to business transactions, client details and so on. Such information is extremely valuable to a business and can cause a host of legal issues if it is lost. This is where information technology becomes relevant. It provides the right resources to store the information in a way that ensures maximum protection.

Virtual storage systems can keep information safe by allowing a limited number of users to access these. Increased protection also ensures that these systems are not hacked and the information is not wiped out owing to some problems. Therefore, information technology helps in upholding business integrity.

6. **Providing Customer Satisfaction**

Customer experience and satisfaction are crucial aspects of all businesses. The key to customer satisfaction is a strong customer support team and its availability to cater to the requirements of the customers.

Information technology provides the best tools for communicating with customers and solving their problems in real time. It has unlocked the facilities like Email, social media and other messaging platforms for this purpose.

A happy customer-base is important for the growth of a business. Various cloud-based communication channels have made customer experience more improved.

7. **Management of Resources**

A business has a variety of resources. These may include financial resources, human resources and so on. For large organizations, managing resources becomes quite difficult. Information technology plays a vital role in managing these resources effortlessly by introducing a wide range of feasible solutions.

For example, the integration of Enterprise Resource Planning (ERP) has improved the efficiency of various business processes. ERP is a business management software that enables an organization to use a series of integrated applications that can manage and automate various business operations. Information technology is at the core of such software. The implementation of ERP is progressing at a rapid rate with more and more businesses implementing this efficient technology to make certain business processes hassle-free.

8**. Open Source Software**

Information technology has paved the way for various open source software that allow free usage of certain tools for various organizations. The primary benefit of open source software is its flexible license. This allows modifications to the source code. This means that you have the facility to customize its functions according to your requirements.

Almost every software that businesses use has open source variants that are widely available on the Internet. Utilizing these could mean multiple benefits at reduced expenses.

Such benefits of the increased implementation of information technology have provided businesses with competitive advantages. What matters most is, how businesses are utilizing this technology to maximize their profits and ensure long-term success. Done right, this can help your business scale new heights.

MODULE 2

DATA AND INFORMATION

Data and information

Data is a raw, unorganized facts that need to be processed. When data is processed, organized, structured in a given context so as to make it useful. It is called information.

Information is a processed data. What is conveyed or represented by a particular arrangement or sequence of things.

Data Vs information

Data is a collection of facts. Information is how you understand those facts in context.

Data is unorganized while information is organized.

Data is not typically useful on its own but information as typically useful on its own

Data generally includes the raw forms of numbers, statements and characters while information does not have to.

Information depends on data.

Need and Importance of Information

Information is an aid in decision making, policy making needed for the policy makers, decision makers, managers etc.

Information will have a reinforcing or transforming effect on human beings on receiving it.

Information generates new information.

Information supports research in order to obtain effective and fruitful results and to avoid duplication.

Information helps in better management of manpower, materials, production, finance, marketing, etc.

Information helps in identifying the gaps needed for research.

Data Management

Data management is an administrative process that includes acquiring, validating, storing, protecting, processing, required data. In the context of organization, Data management is the process of ingesting, storing, organizing, and maintaining the data, created and collected by the organization. The data management helps ensure that data is accurate, available and accessible.

Key Process to Data Management

The following are the key process of data management: -

A data architecture is designed and deployed with database systems and other types of repositories for an organizations data.

Data models are created to map workflows and the relationships in data sees so that information can be organized to meet business needs.

Data is generated, processed and stored in a database, file system, cloud object storage service or other data repository.

Data from different transactions systems and other sources is integrated in a data ware house or data lake for analysis.

Data quality checks are done to identify data errors and inconsistencies so they can be resolved via data cleansing tasks.

Data governance programs create data definitions and wage policies to ensure that data is consistent across systems.

Tools of Data Management

The following are some of the tools used in data management. They are :-

1. Data base management system
2. Big data management
3. Data warehouse and Data lake
4. Master data management
5. Data modelling
6. Data Security

Effective data security is critical for today's digital business is. It refers to the process of protecting data from unauthorized access and data corruption throughout the its life cycle. Effective data management helps companies avoid data breaches, data privacy issues. Data leaks and security breach threaten the ability of customers to trust and business and their products.

Database

A database is an organised collection of data, stored and accessed electronically from a computer system. It is a repository of information needed for running functions in an organization. The DB would permit input, modification, retrieval data and make it possible to search for information to plan, implement and control operations. They are used in transaction processing systems and data warehouses.

Purpose of Data base systems

The DBMS was introduced to overcome to problems of data files. Databases are created to hold accurate data that can be kept private and protected from damage. The data can be employed by diverse applications with different requirements. Different application programmers and various end users have different views upon data.

Database Model

- A Database model defines the logical design and structure of a database.
- It defines how data will be stored, accessed and updated in a database management system.

Database models:

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

Hierarchical Model

This database model organizes data into a tree-like-structure, with a single root, to which all the other data is linked. The hierarchy starts from the root data, and expands like a tree, adding child nodes to the parent nodes (like a family tree).

In this model, a child node will only have a single parent node.

This model can efficiently describe many real-world relationships like index of a book, college databases, etc.

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

Network Model

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

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

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

Entity-relationship Model

In this database model, relationships are created by dividing object of interest into entity and its characteristics into attributes.

Different entities are related using relationships.

E-R Models are defined to represent the relationships into pictorial form to make it easier for different stakeholders to understand.

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

Relational Model

In this model, data is organized in two-dimensional tables and the relationship is maintained by storing a common field.

This model was introduced by E.F Codd in 1970, and since then it has been the most widely used database model, in fact, we can say the only database model used around the world.

Data Warehousing

A Data Warehousing (DW) is process for collecting and managing data from varied sources to provide meaningful business insights. A Data warehouse is typically used to connect and analyze business data from heterogeneous sources. The data warehouse is the core of the business intelligence (BI) system which is built for data analysis and reporting.

It is a blend of technologies and components which aids the strategic use of data. It is electronic storage of a large amount of information by a business which is designed for query and analysis instead of transaction processing. It is a process of transforming data into information and making it available to users in a timely manner to make a difference.

The Data Warehouse is maintained separately from the organization's operational database and it provides a new design which can help to reduce the response time and helps to enhance the performance of queries for reports and analytics.

Data warehouse system is also known as Decision Support System (DSS), Executive Information System, Management Information System, Business Intelligence Solution, Analytic Application, Data Warehouse.

The need to warehouse data evolved as computer systems became more complex and needed to handle increasing amounts of Information. Though the idea of DW existed, the real concept was given by Inmon Bill, who is considered as a father of data warehouse.

How does the Data warehouse work?

A Data Warehouse works as a central repository where information arrives from one or more data sources. Data flows into a data warehouse from the transactional system and other relational databases.

Data may be:

1. Structured
2. Semi-structured
3. Unstructured data

The data is processed, transformed, and ingested so that users can access the processed data in the Data Warehouse through Business Intelligence tools, SQL clients, and spreadsheets. A data warehouse merges information coming from different sources into one comprehensive database.

By merging all of this information in one place, an organization can analyze its customers more holistically. This helps to ensure that it has considered all the information available. Data warehousing makes data mining possible. Data mining is looking for patterns in the data that may lead to higher sales and profits.

Types of Data Warehouse

Three main types of Data Warehouses are:

1. Enterprise Data Warehouse:

Enterprise Data Warehouse is a centralized warehouse. It provides decision support service across the enterprise. It offers a unified approach for organizing and representing data. It also provides the ability to classify data according to the subject and give access according to those divisions.

2. Operational Data Store:

Operational Data Store is required when the Data warehouse doesn't support the organization's reporting needs. In ODS, Data warehouse is refreshed in real time. Hence, it is widely preferred for routine activities like storing records of the Employees.

3. Data Mart:

A data mart is a subset of the data warehouse. It is specially designed for a particular line of business such as sales, finance, etc. In an independent data mart, data can be collected directly from sources.

Components of Data warehouse

Four components of Data Warehouses are:

Load manager: Load manager is also called the front component. It performs with all the operations associated with the extraction and load of data into the warehouse. These operations include transformations to prepare the data for entering into the Data warehouse.

Warehouse Manager: Warehouse manager performs operations associated with the management of the data in the warehouse. It performs operations like analysis of data to ensure consistency, creation of indexes and views, transformation and merging of source data and archiving and baking-up data.

Query Manager: Query manager is also known as backend component. It performs all the operation operations related to the management of user queries. The operations of this

data warehouse components are direct queries to the appropriate tables for scheduling the execution of queries.

End-user access tools:

This is categorized into different groups like Data Reporting, Query Tools, Application development tools, executive information system (EIS) tools, Online Analytical Processing (OLAP) tools and data mining tools.

Use of Data warehouse in various sectors:

Airline:

In the Airline system, it is used for operation purpose like crew assignment, analyses of route profitability, frequent flyer program promotions, etc.

Banking:

It is widely used in the banking sector to manage the resources available on desk effectively. Few banks also used for the market research, performance analysis of the product and operations.

Healthcare:

Healthcare sector also used Data warehouse to strategize and predict outcomes, generate patient's treatment reports, share data with tie-in insurance companies, medical aid services, etc.

Public sector:

In the public sector, data warehouse is used for intelligence gathering. It helps government agencies to maintain and analyze tax records, health policy records, for every individual.

Investment and Insurance sector:

In this sector, the warehouses are primarily used to analyze data patterns, customer trends, and to track market movements.

Retain chain:

In retail chains, Data warehouse is widely used for distribution and marketing. It also helps to track items, customer buying pattern, promotions and also used for determining pricing policy.

Telecommunication:

A data warehouse is used in this sector for product promotions, sales decisions and to make distribution decisions.

Hospitality Industry:

This Industry utilizes warehouse services to design as well as estimate their advertising and promotion campaigns where they want to target clients based on their feedback and travel patterns.

Advantages of Data Warehouse:

- Data warehouse allows business users to quickly access critical data from some sources all in one place.
- Data warehouse provides consistent information on various cross-functional activities. It is also supporting ad-hoc reporting and query.
- Data Warehouse helps to integrate many sources of data to reduce stress on the production system.
- Data warehouse helps to reduce total turnaround time for analysis and reporting.
- Restructuring and Integration make it easier for the user to use for reporting and analysis.
- Data warehouse allows users to access critical data from the number of sources in a single place. Therefore, it saves user's time of retrieving data from multiple sources.
- Data warehouse stores a large amount of historical data. This helps users to analyze different time periods and trends to make future predictions.

Disadvantages of Data Warehouse:

- Not an ideal option for unstructured data.
- Creation and Implementation of Data Warehouse is surely time confusing affair.
- Data Warehouse can be outdated relatively quickly
- Difficult to make changes in data types and ranges, data source schema, indexes, and queries.
- The data warehouse may seem easy, but actually, it is too complex for the average users.
- Despite best efforts at project management, data warehousing project scope will always increase.
- Organizations need to spend lots of their resources for training and Implementation purpose.

Data Warehouse Tools

Prominent Data Warehousing tools available in the market:

1. MarkLogic:

A DW that makes data integration easier and faster and performs very complex search operations.

2. Oracle:

Oracle is the industry-leading database. It offers increased operational efficiency through a wide range of on-premises and cloud DW.

3. Amazon RedShift:

It is a simple and cost-effective tool to analyze all types of data using standard SQL and existing BI tools**.**

Data Mining

Data mining is the process of sorting through large data sets to create models and to identify patterns and establish relationships that provide insights that are revealing, significant, and valuable to solving problems through data analysis.

Data mining is not restricted to solving business problems. In has varied uses, for example, data mining can be used in the life sciences to discover gene and protein targets and to identify leads for new drugs.

To Do: Find out the differences between Datawarehouse and Data Mining.

Examples for use of data mining:

- Predict those customers likely to change service providers.
- Discover the factors involved with a disease.
- Identify fraudulent behavior.

Data mining uses sophisticated mathematical algorithms, machine learning, statistics, and database systems to segment the data and evaluate the probability of future events and to predict future trends.

Eg.: Oracle Data Mining performs data mining in the Oracle Database. Oracle Data Mining does not require data movement between the database and an external mining server, thereby eliminating redundancy, improving efficient data storage and processing, ensuring that up-to-date data is used, and maintaining data security.

To Do: Find out names of other data mining softwares available in the market

Data preprocessing

Data preprocessing describes any type of processing performed on raw data to prepare it for another processing procedure. Commonly used as a preliminary data mining practice, data preprocessing transforms the data into a format that will be more easily and effectively processed for the purpose of the user. There are a number of different tools and methods used for preprocessing, including: sampling, which selects a representative subset from a large population of data; transformation, which manipulates raw data to produce a single input; denoising, which removes noise from data; normalization, which organizes data for

more efficient access; and feature extraction, which pulls out specified data that is significant in some particular context.

Stages of Data Mining

1. Business understanding

- Understand business objectives and find out the needs of the business.
- Next, assess the current situation by finding the resources, assumptions, constraints and other important factors which should be considered.
- Then, from the business objectives and current situations, create data mining goals to achieve the business objectives within the current situation.
- Finally, a good data mining plan has to be established to achieve both business and data mining goals. The plan should be as detailed as possible.

2. Data understanding

•The data understanding phase starts with initial data collection, which is collected from available data sources, to help get familiar with the data. Some important activities must be performed including data load and data integration in order to make the data collection successfully.

*Data Load is the process that involves taking the transformed data and loading it where the users can access it.

*Data integration is the process of combining data from different sources into a single, unified view.

•Then, the data needs to be explored by tackling the data mining questions, which can be addressed using querying, reporting, and visualization.

•Finally, the data quality must be examined by answering some important questions such as “Is the acquired data complete?”, “Is there any missing values in the acquired data?”

. Data preparation

The data preparation typically consumes about 90% of the time of the project. The outcome of the data preparation phase is the final data set. Once available data sources are identified, they need to be selected, cleaned, constructed and formatted into the desired form. The data exploration task at a greater depth may be carried during this phase to notice the patterns based on business understanding.

4. Modeling

•First, modeling techniques have to be selected to be used for the prepared data set.

•Next, the test scenario must be generated to validate the quality and validity of the model.

•Then, one or more models are created on the prepared data set.

•Finally, models need to be assessed carefully involving stakeholders to make sure that created models meet business initiatives.

5. Evaluation

In the evaluation phase, the model results must be evaluated in the context of business objectives in the first phase. In this phase, new business requirements may be raised due to the new patterns that have been discovered in the model results or from other factors. Gaining business understanding is an iterative process in data mining. The go or no-go decision must be made in this step to move to the deployment phase.

6. Deployment

The knowledge or information, which is gained through data mining process, needs to be presented in such a way that stakeholders can use it when they want it. Based on the business requirements, the deployment phase could be as simple as creating a report or as complex as a repeatable data mining process across the organization. In the deployment phase, the plans for deployment, maintenance, and monitoring have to be created for implementation and also future supports. From the project point of view, the final report of the project needs to summary the project experiences and review the project to see what need to improved created learned lessons.

The above 6 steps describe the Cross-industry standard process for data mining (CRISP-DM). It is an open standard process model that describes common approaches used by data mining experts. It is the most widely-used analytics model.

Few Key Data Terminologies:

1.data cleaning (to remove noise or irrelevant data),

2.data integration (where multiple data sources may be combined)

3.data selection (where data relevant to the analysis task are retrieved from the database),

4.data transformation (where data are transformed or consolidated into forms appropriate for mining by performing summary or aggregation operations, for instance)

5. data mining (an essential process where intelligent methods are applied in order to extract data patterns),

6.pattern evaluation (to identify the truly interesting patterns representing knowledge based on some interestingness measures and

7.knowledge presentation (where visualization and knowledge representation techniques are used to present the mined knowledge to the user).

Data Mining Applications

Knowledge is the best asset an enterprise would possess and data mining helps to exploit this resource for sustained advantages. Few important areas where data mining is widely used:

Future Healthcare - Data mining holds great potential to improve health systems. It uses data and analytics to identify best practices that improve care and reduce costs. Researchers use data mining approaches like multi-dimensional databases, machine learning, soft computing, data visualization and statistics. Mining can be used to predict the volume of patients in every category. Processes are developed that make sure that the patients receive appropriate care at the right place and at the right time. Data mining can also help healthcare insurers to detect fraud and abuse.

Bio Informatics - Data Mining approaches seem ideally suited for Bioinformatics, since it is data-rich. Mining biological data helps to extract useful knowledge from massive datasets gathered in biology, and in other related life sciences areas such as medicine and neuroscience. Applications of data mining to bioinformatics include gene finding, protein function inference, disease diagnosis, disease prognosis, disease treatment optimization, protein and gene interaction network reconstruction, data cleansing, and protein sub-cellular location prediction.

Education - There is a new emerging field, called Educational Data Mining, concerns with developing methods that discover knowledge from data originating from educational Environments. The goals of EDM are identified as predicting students' future learning behaviour, studying the effects of educational support, and advancing scientific knowledge about learning. Data mining can be used by an institution to take accurate decisions and also to predict the results of the student. With the results the institution can focus on what to teach and how to teach. Learning pattern of the students can be captured and used to develop techniques to teach them.

Research Analysis - History shows that we have witnessed revolutionary changes in research. Data mining is helpful in data cleaning, data pre-processing and integration of databases. The researchers can find any similar data from the database that might bring any change in the research. Identification of any co-occurring sequences and the correlation between any activities can be known.

Financial Banking - Data mining can contribute to solving business problems in banking and finance by finding patterns, causalities, and correlations in business information and market prices that are not immediately apparent to managers because the volume data is too large or is generated too quickly to screen by experts. The managers may find this information for better segmenting, targeting, acquiring, retaining and maintaining a profitable customer.

Manufacturing Engineering - Data mining tools can be very useful to discover patterns in complex manufacturing process. Data mining can be used in system-level designing to extract the relationships between product architecture, product portfolio, and customer needs data. It can also be used to predict the product development span time, cost, and dependencies among other tasks.

Market Basket Analysis - This technique (may) allow the retailer to understand the purchase behaviour of a buyer. This modelling technique is based upon a theory that if a customer buys a certain group of items, they are more likely to buy another group of items. The data analyst will look at customers' preferences and seek to predict future buying trends based on what has already happened. In addition to keeping track of products and services bought, basket analysis is also useful in monitoring payment options and rewards cards. This information may help the retailer to know the buyer's needs and change the store's layout accordingly. Using differential analysis comparison of results between different stores, between customers in different demographic groups can be done.

CRM - Customer Relationship Management is about acquiring and retaining customers, improving customers' loyalty and implementing customer focused strategies and these are achieved through data collection and analysis. Data mining technologies help with filtered results that help to focus on the right factors for customer retention.

Fraud Detection - Traditional methods of fraud detection are time consuming and complex. Data mining aids in providing meaningful patterns by collecting and analyzing sample records. These records are classified fraudulent or non-fraudulent. A model is built using this data and the algorithm is made to identify whether the record is fraudulent or not.

Intrusion Detection - Any action that will compromise the integrity and confidentiality of a resource is an intrusion. The defensive measures to avoid an intrusion includes user authentication, avoid programming errors, and information protection. Data mining can help improve intrusion detection by adding a level of focus to anomaly detection. It helps an analyst to distinguish an activity from common everyday network activity. Data mining also helps extract data which is more relevant to the problem.

As useful as information and data mining techniques can be, it's essential for a business to handle them ethically. Fair use is one thing, but selling the gathered information to scam artists or fraudsters for a profit crosses the line. By being ethical and intelligent with their uses for data mining, a company can maintain its place in the world market.

Management of information systems

Management of information systems used for decision making, and for the coordinator, control analysis, and visualization of information in an organizations. The task of managing a company's information needs falls to MIS. A MIS is made up of five major components namely people, business process data, hardware and software. Information systems collect and store the company's key data and produce the information that the managers needed for analysis control and decision making. MIS studies about people, processes, and technology in an organizational context. Based on these, the MIS professionals create information systems for data management to meet the various of managers, staff and customers. MIS consists of a transaction processing system, management support system, and an office automation system. The Transaction Processing systems collects operational data on the firm's activities. A firm's integrated information system starts with its Transaction Processing Systems. The Transaction receives raw data from internal and external sources and prepares these data for storage in a database. Management Support System are dynamic systems that allow users to

analyze data to make forecasts, identify business trends, model business strategies and helps managers make better decisions. MSS use the internal master data base to perform high level analyses that help make better decisions. Office automation system improve the following communication throughout the organization. Each types of information serve a particular level of making decision making: - operational, tactical and strategic.

Roles of MIS

MIS satisfies the diverse needs through a variety of needs. It helps in strategic planning management control, operational control, and transactions processing. It helps in clerical transactions processing. MIS helps in Junior Management to help in decision making at a operational level by providing operational data. MIS helps in middle management in short-term planning, target setting and controlling the business functions. MIS for Top-level management for goal setting strategic planning and evolving the business plans.

Decision making and MIS

The essence of all the management activities is making decision. The object of MIS is to keep a continuous supply of information flowing to the management. It gives managers quick access to information. Decision making through automated systems make it routine and free up employee time. MIS explores alternatives and provides support where the manager takes the decision. MIS is useful in the area of decision making as it can monitor by itself disturbances in a system, determine a course of action and take action to get the system in control.

MIS provides information and communication technology for global business.

MIS enables to collect, analyze, and evaluate data and transferred them to from one point to another and cause instant access to information.

Communications of Organizations

Communications of organizations is defined as the sending and receiving of messages among interrelated individuals within a particular environment. Communication is an integral issue in organizational management. To be successful, organizations should have comprehensive policies and strategies for communicating with their constituencies, employee and stakeholders as well as with the community at large. The subject of managing organizational communications encompasses formal and informal throughout an organization. It is highly contextual and culturally dependent.

Types of Communication

There are three types of communication: -

1) Based on organizational structures

Formal communication like meetings, interviews, speeches, etc

Informal communication like grapevine

2) Based on direction

- Downward communication:- Communication that flows from a higher level in an Organization to a lower level.
- Upward communication:- Communication that flows to a higher level in an organization.
- Lateral communication:- Communication that takes place at the same levels of hierarchy in an organization is called lateral communication.

3) Based on expression

- Oral communication:- Communication which is made orally.
- Written communication :- Communication which is in the written format.

Decision making with communication technology

Information and communication technologies(ICT) was very important for supporting decision making processes. In the organizational settings, depending on ICT is growing. ICT broadens the reach and spread of information, allowing for the possibility of better decisions to be made. ICT can help to overcome several limitations like time, information, distance, etc creating impacts on decision making. Communication technology may help in decision making in the following ways.

Within the organization

Decisions making is tedious and time consuming. The information being fermented and longer communication periods etc to this time constraint. A time consuming step in the process of decision making is the quest and collection of information. The use of ICT decreases the time required to gather new information and improves access to new information. Hierarchy ICT helps in appropriate flow of information. ICT also helps in making information available at various level.

With customers

Communication technology gives increased access to information for clients. The sophistication of the client , forces organizations to innovate faster involves decision making at various levels. The information captured can help managers in the process of understanding the behavior of consumers and the solutions available in the market.

Competitor analysis

ICT helps decision makers to understand the competitors strategies. Various vehicles of communication can be explored To identify existing and new competitors in diverse geographical areas. New products and services can quickly be identified and examined by analyzing competitor strategies. Decision making related to product development considering features, prices, and delivery options offered by competitors.

Suppliers and SCM

Managers can identify existing and new suppliers in diverse geographical areas, using ICT platforms. Effective use of communication technologies can help decision makers to gather information about market places, new suppliers, etc. Communication technologies help organizations connect with each other in effective ways. Timely decisions for better management of the supply chain can be facilitated by communication technologies.

Module: 3

Competing and Integrating with IT

Competitive Environment of Business

A competitive environment is the dynamic external system in which a business competes and functions. The more sellers of a similar product or service, the more competitive the environment in which you compete. When other companies provide similar products or services as your company, you are in a competitive business environment. Competition in a business environment is not necessarily bad. Most companies face some extent of competition. Despite it having disadvantages with decreased sales and potential loss of investors, there are some significant advantages. There really is no better way to motivate a company than having competition. Industries with more competition typically have more innovation and product evolution because each company tries to outdo the last. Companies' constantly trying to one-up their offerings (features, price, etc) is a good indication of a competitive environment.

Example: Smart phones**;** there are several examples of competitive business environments.

There are two types of competitors**;** direct competitor and indirect competitor

Direct competitor: Businesses that are selling the same type of product or service as you.

E.g.**:** McDonalds is a direct competitor with Burger King.

Indirect competitor: Businesses that still compete even though they sell a different service or product. The products or services offered by indirect competitors tend to be those that can be substituted for one another.

E.g.**:** Air India and IRCTC

IT Strategy

An IT strategy is a detailed set of documentation that encompasses the company's vision and strategic planning for Information Technology. This would include budgeting, strategy documents, and operating models for the future state of the company's technology architecture. IT strategy helps to unify the organization, increase efficiency, get accurate insights. The strategic planning process should include representatives from every department under the guidance of the Chief Information Officer (CIO) or outsourced to a virtual CIO. A virtual CIO (vCIO) is a dedicated resource who serves as a Chief Information Officer on a flexible basis. Their primary role is to formulate strategic IT goals for your company, and then manage an IT strategy and budget that meets those goals.

Implementation of IT Strategy:

The framework should be designed considering the following**:**

- ✓ Align with business objectives
- ✓ Gathering information from stakeholders
- ✓ Defining IT requirements and scope
- ✓ Auditing current infrastructure
- ✓ Defining overall architecture
- ✓ Defining KPIs(key performance metrics)
- ✓ Obtaining leadership buy-in
- ✓ Identifying the right resources

Information Systems and Competitive Strategy

IT can become a threat to an entire industry, yet it can also be an extremely important tool for gaining strategic advantage for an innovative company. Computer-based information systems of all kinds have been enhancing competitiveness and creating strategic advantage for several decades. Strategic Information Systems have the ability to significantly change the manner in which business is conducted, in order to give the firm strategic advantage. A competitive strategy is a broad-based formula for how a business is going to compete, what its goals should be, and what plans and policies will be required to carry out those goals. The competitive strategy helps an organization to achieve competitive advantage in the industry (an advantage over competitors - cost, quality, speed, etc)

Any information system- EIS, OIS, TPS, KMS- that changes the goals, processes, products, or environmental relationships to help an organization gain a competitive advantage or reduce a competitive disadvantage is a strategic information system. A strategic information system helps an organization to gain a competitive advantage through its contribution to the strategic goals of an organization and/or its ability to significantly increase performance and productivity. Competitive advantage in the digital economy is even more important than in the old economy, though the core business might not have changed. Internet technologies offer powerful tools, which can boost the traditional sources of competitive advantage. The success of companies engaged in global activities depends on the link between their information systems and their business strategy. Strategic Information Systems have to be focused outwardly as well as inwardly.

- **Outward focus:** Focused on direct competition, strategies visible to all.
- **Inward focus:** Focused on enhancing competitive position by working within the organization – need not be visible to all.

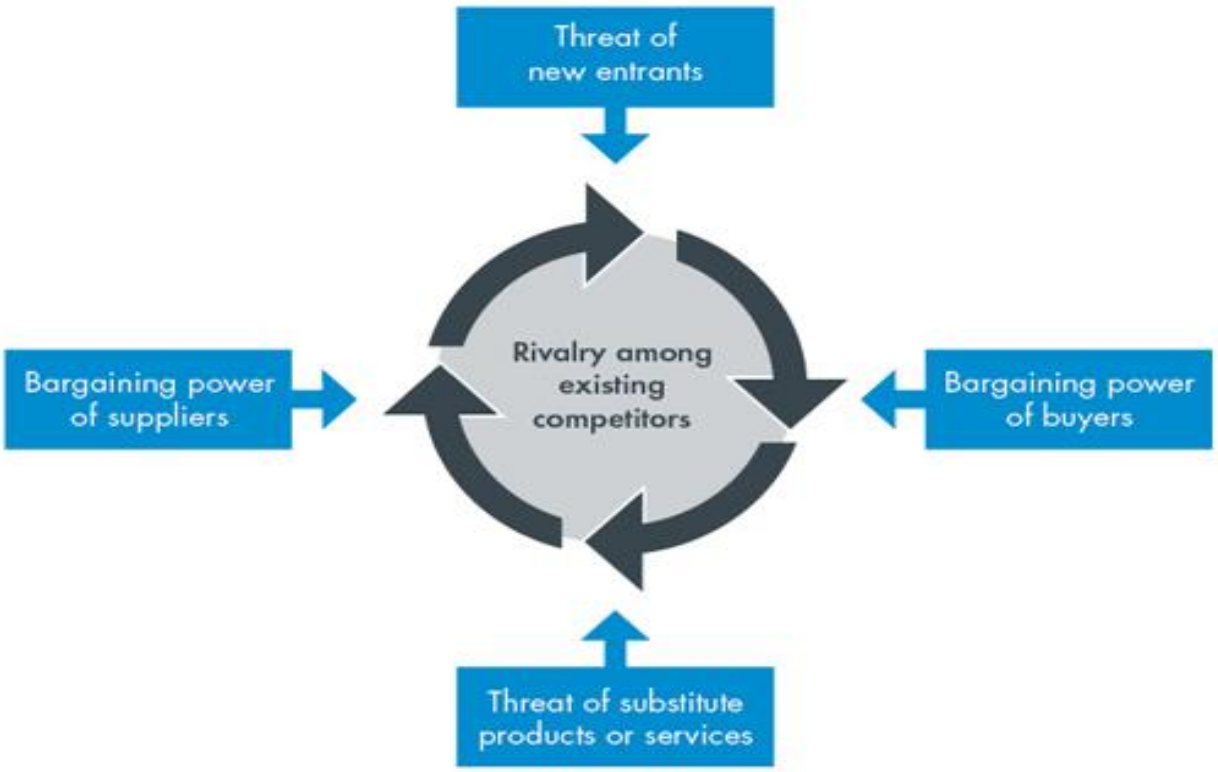
Role of IT in Strategic Management

IT creates innovative applications that provide direct strategic advantage to organizations. IT supports changes in business processes that translate to strategic advantage - better control over remote stores or offices by providing speedy communication tools, streamlined product design time with computer-aided engineering tools, and better decision-making processes by providing managers with timely information reports.

- ✓ Innovative applications
- ✓ Competitive weapons
- ✓ Change in process
- ✓ Links with business partners
- ✓ Cost reductions
- ✓ Relationships with suppliers and customers
- ✓ New products
- ✓ Competitive intelligence

How IT affects competitive environment?

Porter's 5 forces model



1. **Threat of new entrants:** For most firms, the Internet increases the threat of new competitors. First, the Internet sharply reduces traditional barriers to entry, such as the need

for a sales force or a physical storefront to sell goods and services. All a competitor needs to do is set up a Web site. This threat is especially acute in industries that perform an intermediation role as well as industries in which the primary product or service is digital. Second, the geographical reach of the Internet enables distant competitors to bring competition into the local market, or even an indirect competitor to compete more directly with an existing firm.

2. **Bargaining power of suppliers:** The Internet's impact on suppliers is mixed. On the one hand, buyers can find alternative suppliers and compare prices more easily, reducing the supplier's bargaining power. On the other hand, as companies use the Internet to integrate their supply chain and join digital exchanges, participating suppliers will prosper by locking in customers and increasing switching costs.

3. **Bargaining power of customers (buyers):** The Web greatly increases a buyer's access to information about products and suppliers, Internet technologies can reduce customer switching costs, and buyers can more easily buy from downstream suppliers. These factors mean that the Internet greatly increases customers' bargaining power.

4. **Threat of substitute products or services:** Information-based industries are in the greatest danger here. Any industry in which digitalized information can replace material goods (e.g., music, books, software) must view the Internet as a threat.

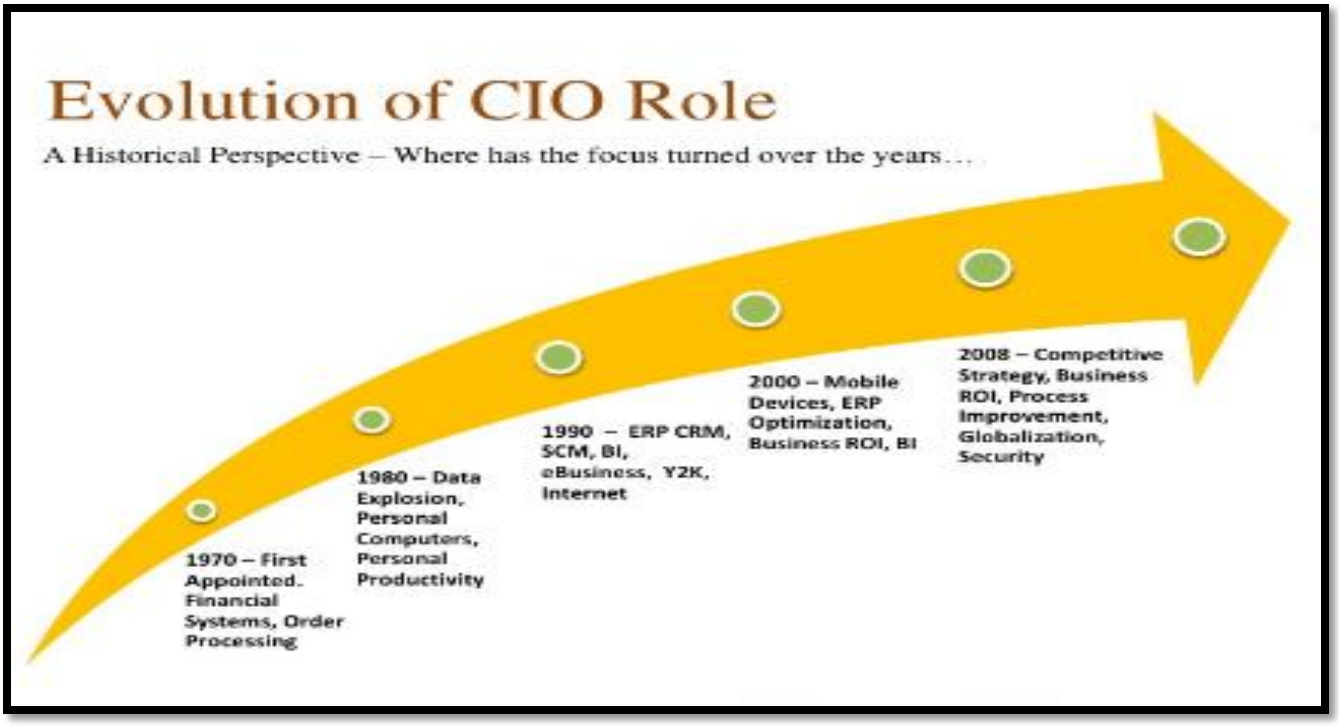
5. **Rivalry among existing firms in the industry:** The visibility of Internet applications on the Web makes proprietary systems more difficult to keep secret, reducing differences among competitors. In most industries, the tendency for the Internet to lower variable costs relative to fixed costs encourages price discounting at the same time that competition migrates to price. Both are forces that encourage destructive price competition in an industry.

What is a CIO?

The CIO or Chief Information Officer emerged as a job title in the 1980's. This highly technical person would oversee the information technology department's resources and staff.

Role of CIO (Chief Information Officer)

The role of the Chief Information Officer (CIO) is one that has seen continuous change over the years, yet we are only just beginning. Next up is the digital revolution, already a train which we all have to jump onto. It is providing our companies with an opportunity to add amazing new capability, and new business opportunities in ways we never planned or could have predicted.



The digital revolution has already changed how we use technology, and how we think about business models. However today we have many new challenges that have to be managed. These changes are only accelerating, and businesses already assume the CIO will be a leader in this change and not just someone who keeps up.

As digital transformation efforts progress, alongside organizational changes like the ones Adobe's Stoddard describes the CIO role continues to evolve. Successful CIOs have become business leaders of digital business units or have empowered IT organizations to create the digital backbone to accelerate the move to hybrid cloud environments and new operating models. The chief information officer of an organization is responsible for several business functions. First and most importantly, the CIO must fulfill the role of a business leader. The CIO makes executive decisions regarding matters such as the purchase of IT equipment from suppliers or the creation of new IT systems. Also as a business leader, the CIO is responsible for leading and directing the workforce of their specific organization. A CIO is typically "required to have strong organizational skills."This is particularly relevant for the chief information officer of an organization who must balance roles and responsibilities in order to gain a competitive advantage, whilst keeping the best interests of the organization's employees in mind. CIOs also have the responsibility of recruiting, so it is important that they work proactively to source and nurture the best employees possible.

Value Chain

- ✓ A value chain is a step-by-step business model for transforming a product or service from idea to reality.
- ✓ Value chains help increase a business's efficiency so the business can deliver the most value for the least possible cost.
- ✓ The end goal of a value chain is to create a competitive advantage for a company by increasing productivity while keeping costs reasonable.
- ✓ The value-chain theory analyzes a firm's five primary activities and four support activities.
- ✓ A company conducts a value-chain analysis by evaluating the detailed procedures involved in each step of its business. The purpose of a value-chain analysis is to increase production efficiency so that a company can deliver maximum value for the least possible cost.

Components of a Value Chain

In his concept of a value chain, Porter splits a business's activities into two categories, "primary" and "support".

1. **Primary activities:**

   It consists of five components, and all are essential for adding value and creating competitive advantage:

   - ✓ **Inbound logistics:** It includes functions like receiving, warehousing, and managing inventory.
   - ✓ **Operations:** It includes procedures for converting raw materials into a finished product.

- ✓ **Outbound logistics:** It includes activities to distribute a final product to a consumer.
- ✓ **Marketing and sales**: It includes strategies to enhance visibility and target appropriate customers—such as advertising, promotion, and pricing.
- ✓ **Service**: It includes programs to maintain products and enhance the consumer experience—like customer service, maintenance, repair, refund, and exchange.

2. **Support Activities:**

The role of support activities is to help make the primary activities more efficient. When you increase the efficiency of any of the four support activities, it benefits at least one of the five primary activities. These support activities are generally denoted as overhead costs on a company's income statement:

- ✓ **Procurement:** It concerns how a company obtains raw materials.
- ✓ **Technological development:** It is used at a firm's research and development (R&D) stage—like designing and developing manufacturing techniques and automating processes.
- ✓ **Human resources (HR) management:** It involves hiring and retaining employees who will fulfill the firm's business strategy and help design, market, and sell the product.
- ✓ **Infrastructure:** It includes company systems and the composition of its management team; such as planning, accounting, finance, and quality control.

Examples of Value Chains

Starbucks Corporation: Starbucks (SBUX) offers one of the most popular examples of a company that understands and successfully implements the value-chain concept. There are numerous articles about how Starbucks incorporates the value chain into its business model.

Information System Planning

Information System Planning (ISP) is a structured approach that assists organizations in establishing a plan to satisfy the short and long term information requirements. Information Systems Planning is critical in developing and executing successful strategic plans. Companies have to adopt effective, pro-active IS strategies; oriented through the objectives of the company and based on a cautious analysis of the company; in order to gain competitive advantage.

Stages of Information System Planning

1) **Strategic planning:** In this planning stage, objectives, goals and strategies are compared with the objectives, goals and strategies of the organization. The MIS mission, MIS policies & strategies are set.

   - ✓ Derivation from the organizational plan.
   - ✓ Strategic fit with organizational culture.
   - ✓ Strategy set transformation.

2) **Information Requirements Analysis:** This stage deals with the current and future needs for IS to support decision-making and operations of the organization. Then the master development plan is assembled.

   - ✓ Define underlying organizational requirements.
   - ✓ Develop sub system matrix.
   - ✓ Define and evaluate information requirements for organizational sub-systems.

3) **Resource Allocation:** After identification of the need for information system applications for entire organization, the relevant resources are allocated. This includes hardware, software, data communication systems, personnel, finance, etc.

   - ✓ Return on investment
   - ✓ Charge out
   - ✓ Portfolio approach
   - ✓ Steering committees.

4) **Project Planning:** The last stage, project planning, provides an overall framework for system development planning, scheduling and controlling. This involves evaluating the project in terms of requirement and difficulty. Time, cost and completion estimates have to be finalized. Tools like Milestones, critical path method (CPM) and Gantt Charts can be utilized.

Technology Updates

- Successful businesses establish technology strategies that help them gain a competitive advantage through cost savings, process improvements, faster time to market, and improved quality and service levels. Companies without a defined strategy make poor buying decisions, adopt ineffective tools, and often experience a high level of frustration. Technology updates can be done fully fledged or by upgrading piece by piece. Technology updates are expensive, but the benefits generally outweigh the cost.

Factors to consider during technology update:

- Can the business achieve an immediate gain from the technology?
- What benefits are possible and how long will it take to achieve success?
- What resources are required to implement and manage the technology?
- Does the hardware or application support a foundation for future growth?

Few reasons for technology updates are:

- Improve security
- Increase productivity
- Reduced errors
- Improved communications
- Old devices become obsolete
- New software incompatible with old devices
- IT/Vendor support (professionals & vendors can't support old tech)
- Reduced costs (old and unstable tech can cost a lot), reduced operation costs
- Employee efficiency / employee health & well being
- Customer satisfaction
- Gain competitive advantage / reduce competitive disadvantage
- Business growth

Business Processes

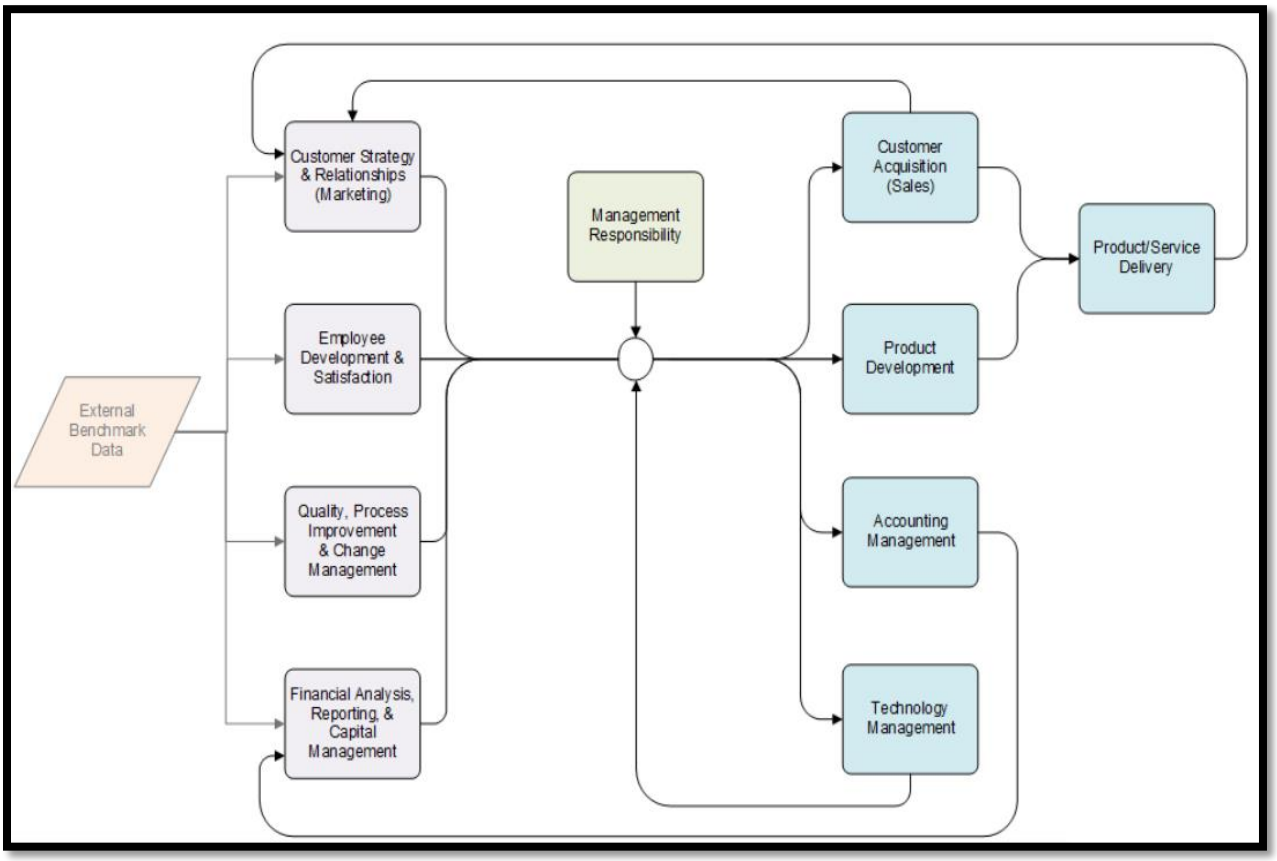
A business process is a collection of linked tasks which find their end in the delivery of a service or product to a client. A business process is defined as a set of activities and tasks that, once completed, will accomplish an organizational goal. The process must involve inputs, value addition and outputs. Processes can be simple or complex, short or long running - based on number of steps, number of systems involved, dependencies and need for documentation.

Process

Core business processes:

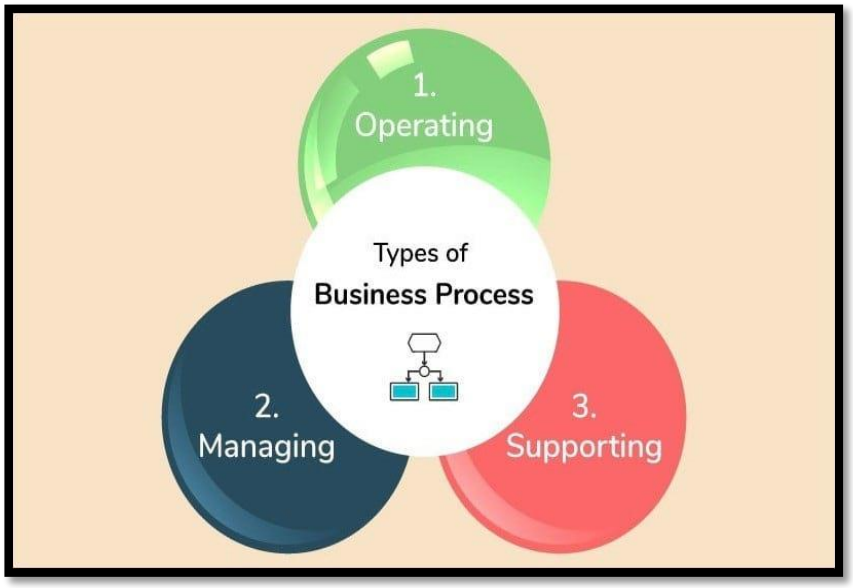
- Sales & Marketing
- Accounting & Technology
- Quality & Product/Service Delivery
- Management, HR & Finance
- Product Development

As an organization grows bigger it will add more sub-processes or perhaps additional core process like supplier management, strategy, or legal & compliance.



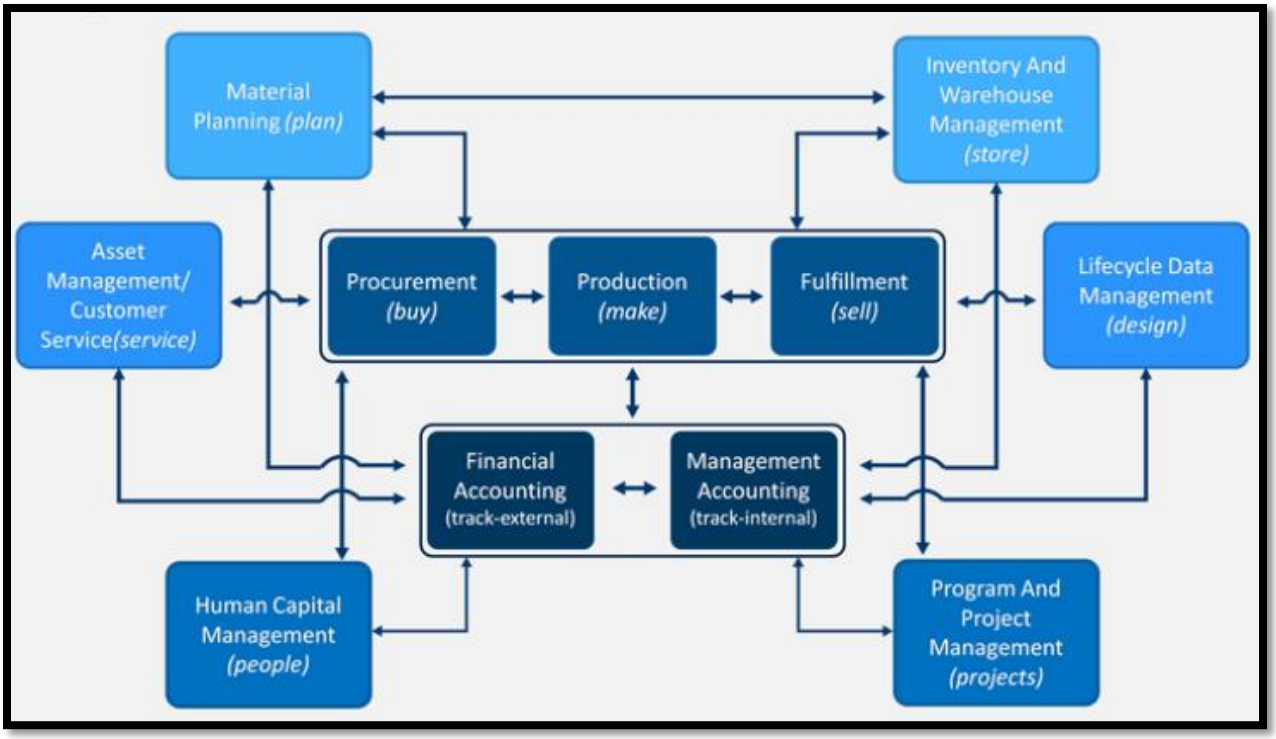
Types of Business Processes

- Operational processes constitute the core business.
- Management processes govern the operation of a particular organization's system of operation.
- Supporting processes such as human resources and accounting are put in place to support the core business processes.



Business Process Integration (BPI)

- ✓ Business process Integration refers to a business model wherein an acceptable business process model is defined through the specifications of events, sequence, hierarchy, logic of execution and the information pathways between systems, within the same enterprise or various interconnected enterprises.
- ✓ BPI allows for automation of business processes, integration of systems and services, and the secure sharing of data across numerous applications.
- ✓ BPI helps enterprises to synchronize the internal processes, overcome integration challenges and bring connectivity to external processes.



Business Process Integration

Steps of BPI

- **Process Identification:** Identify all processes in the organization. Business process management (BPM) tools can help to identify processes and identify the organization's ability to document existing processes and prove that they are effective in achieving the goals of the business. It helps to identify interdependencies, identify possibilities of automation and compliance to regulations.
- **Documenting and Mapping:** Document organization's existing business processes and map interdependencies. Evaluate documentation to ensure that it reflects the real-time activities of the organization. Process mapping helps to pinpoint inefficiencies and areas for improvement within processes, processes to be automated, inter departmental communications, work flow.
- **Planning Through Modeling:** Hypothetically illustrate proposed changes to view possible outcomes. This helps to observe and assess outcomes before actual changes are made.
- **Design, Implementation, and Management:** BPI helps eliminate the need to duplicate data in different systems and increase the comprehensive efficiency of the business's operation, save time and money.

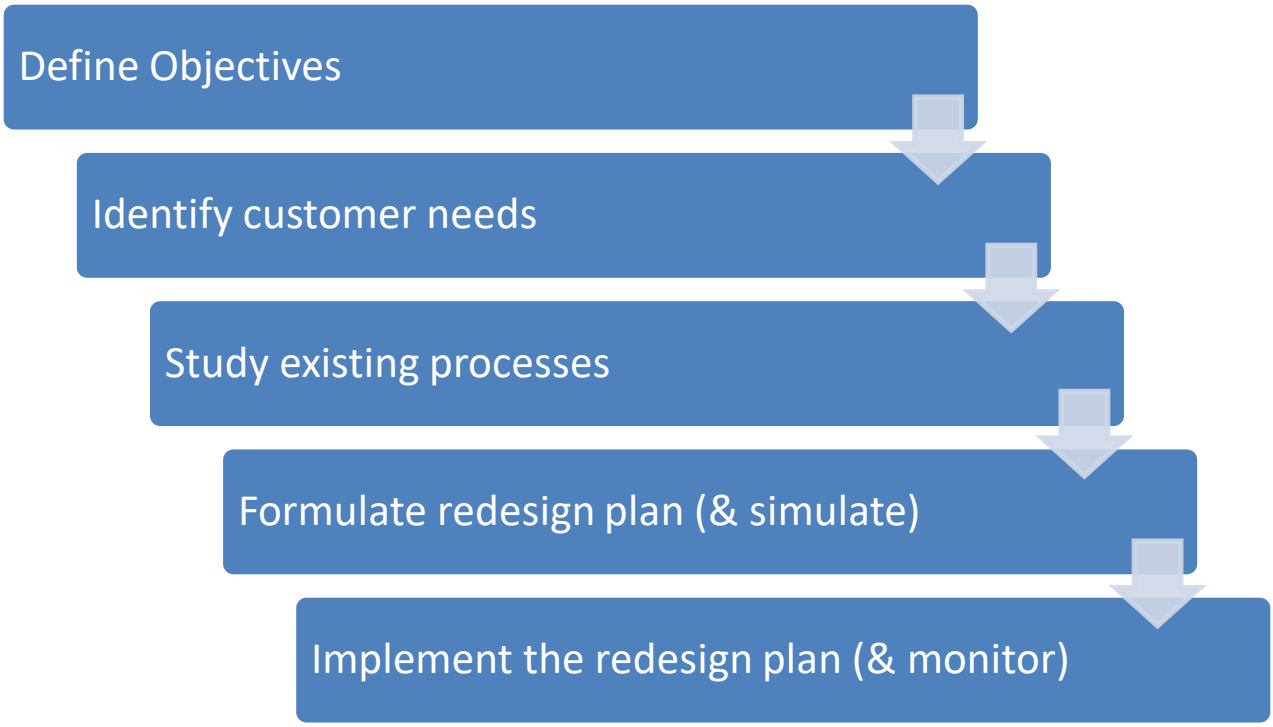
Business Process Reengineering (BPR)

BPR philosophy propounded by Hammer and Champy. The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed. BPR mainly intervenes in the processing part, which is reengineered in order to become less time and money consuming. Companies use business process reengineering to improve performance substantially on key processes that impact customers. BPR involves the insertion of newly-designed processes and structures into working practices, and change management is critical to deal effectively with resistance. s

Business processes are characterized by three elements:

- ✓ The inputs, (raw materials, knowledge, information).
- ✓ The processing (transformations which usually go through several stages and may turn out to be time and money consuming).
- ✓ The outcome (the delivery of the expected result).

Steps of Business Process Reengineering (BPR)



1. **Define objectives:** Define qualitative and quantitative objectives. Objectives define the desired end result. IT should be communicated to the employees to create BPR readiness.
2. **Identify customer needs:** Redesigning should result in added value to the customer. All parameters of customer needs have to be considered – customer expectation, requirement, buying habits, spending habits, etc.
3. **Study existing processes:** Existing processes are the base for the new processes. Analysing them helps to identify strengths that can be retained and weaknesses that need to be overcome.
4. **Formulate redesign plan:** All planned changes / possible alternatives are considered and the best one selected for implementation.
5. **Implement the redesign plan:** The proposed changes are implemented.

Principles of Business Process Reengineering (BPR)

Seven principles that could be used to reengineer and help streamline workflows, thus improving quality, time management and cost (Hammer and Champy).

- ✓ Organize around outcomes not tasks.
- ✓ Identify all the processes in an organization and prioritize them in order of redesigning urgency.
- ✓ Integrate information processing work into the real work that produces the information.
- ✓ Treat geographically dispersed resources as though they were centralized.
- ✓ Link parallel activities in the workflow instead of just integrating their results.
- ✓ Put the decision point where the work is performed, and build control into the process.
- ✓ Capture information once and at the source.

Benefits of Business Process Reengineering (BPR)

- o Increased effectiveness - Identify core functions and inefficient processes.
- o Meaningful work for staff - Greater staff involvement.

- Improved organizational performance - Decreasing new product and process activity time.
- Business growth - Improving the industry position with radical improvements.
- Reduce costs and cycle time - by eliminating unproductive activities/employees. Reorganization by teams decreases the need for management layers, accelerates information flows, and eliminates the errors and rework.
- Improve quality - by reducing the fragmentation of work and establishing clear ownership of processes. Workers gain responsibility for their output and can measure their performance based on prompt feedback.
- Make an organization more flexible, effective, and responsive to its customers, employees, and shareholders

Examples of Business Process Reengineering (BPR)

Example 1: Hallmark used to spend 3 years in bringing new products to the market. Using reengineering, the goal was set to change cycle time to one year. In 1991, a new line of cards was brought to market in 8 months, ahead of schedule, by creating a cross functional team for product development.

Example 2: Big basket uses BPR to deliver products and increase productivity during the lockdown, despite reduced work force.

BPR Vs Continuous Improvement

- ✓ Both these approaches aim for process improvement, but differ in focus.
- ✓ Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measure of performance, such as cost, quality, service and speed.
- ✓ Continuous process improvement seeks incremental improvements that are not drastic.
- ✓ BPI looks into ways to improve the processes in the existing structure whereas BPR strives for dramatic improvements where the organization breaks away from conventional ways.

Factors	BPR	Continuous Improvement
Degree of change	Radical	Incremental, continuous
Goal	Dramatic improvement	Small, cumulative enhancement
Characteristics of change	Abrupt change	Gradual, constant change
Organizational impact	High	Low
Relative risk	High	Low
Implementation	Directive, top down	Empowered, bottom up
Philosophy	Scrap and rebuild	Maintain and improve
Senior management involvement	Intensive throughout	Up-front
Enablers	IT, organizational design	Total Quality Management
Potential use of IT	Very high	Incidental (short)

Enterprise Wide System

Enterprise systems are information systems that allow companies to integrate information across operations on a company-wide basis. Also known as enterprise-wide information systems. Rather than storing information in separate places throughout the organization, enterprise systems provide a central repository common to all corporate users. It provides a common interface and allows personnel to share information seamlessly no matter where the data is located.

Systems that communicate across organizational boundaries are called **inter-organizational systems (IOS).**

- ✓ The key purpose of an IOS is to streamline the flow of information from one company's operations to another's.
- ✓ It provides electronic transmission of information to another company.

- ✓ Competitive advantage can be accomplished here by integrating multiple business processes to meet a wide range of unique customer needs.
- ✓ Sharing information between organizations helps companies to adapt more quickly to changing market conditions.

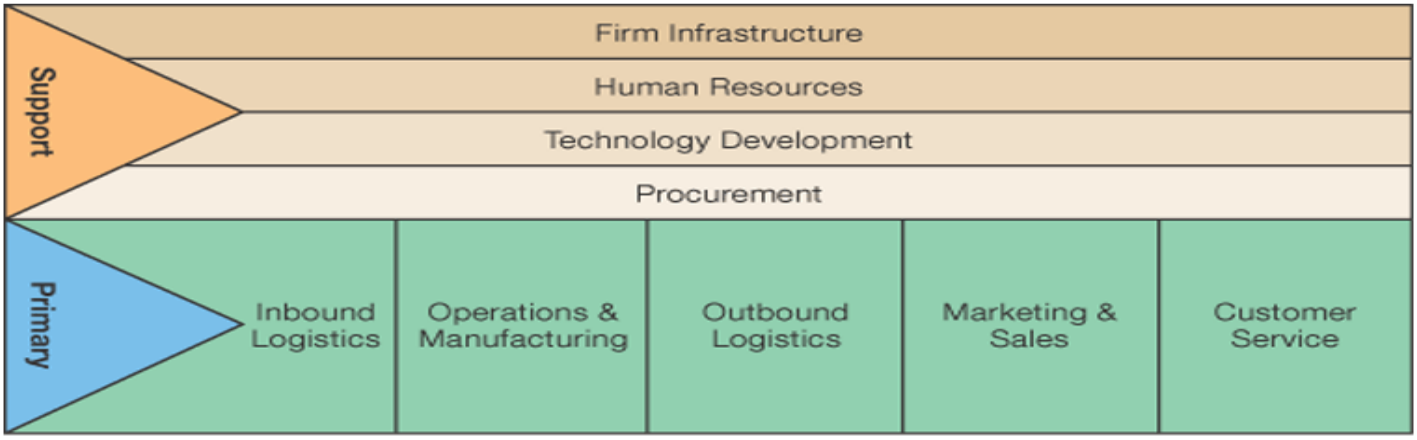
Enterprise Wide Systems can be internally or externally focuses. Internally focussed systems support the functional areas within an organization (primary and support activities – Porter's Value chain). Externally focussed systems support integration with suppliers, partners and customers. Existing software may not be compatible with the business processes of the organization. Software customization or BPR might have to be implemented.

1) **Internally Focused Applications**
   a. Primary activities include:
      - ✓ Inbound logistics
      - ✓ Operations and manufacturing
      - ✓ Outbound logistics
      - ✓ Marketing and sales
      - ✓ Customer service
   b. Support activities include:
      - ✓ Infrastructure (hardware & software)
      - ✓ Human resources (hiring, interview scheduling, payroll, benefits)
      - ✓ Technology development
      - ✓ Procurement (purchasing of goods and services required as inputs primary services)
2) **Externally Focused Applications**
   a. Integrate internal applications with those outside: suppliers, partners, customers
   b. Upstream information

      -Information received from another organization
   c. Downstream information

      -Information sent to another organization

Figure 7.5 Value chain framework.



Porter and Millar, 1985

E-Business Applications

E-business applications are web-based applications that can be implemented to perform tasks for businesses. Common e-business applications provide some way for a company to interact with consumers on the web or to perform tasks related to meeting consumer needs (such as online tracking of postal shipments).

E.g.: Application Server - company builds an e-business application in which users interface with the application only through a web browser. The application server is responsible for returning HTML content (information) to users based on their requests. This server also collects information entered by users in their web browsers. The exchange of information between client and server and server and client always occurs through a web server.

E-Governance

It is the integration of Information and Communication Technology (ICT) in all the government processes, with the aim of enhancing government ability to address the needs of the general public that leads to simple, moral, accountable and transparent governance. Through e-governance, the government tries to raise the coverage and quality of information and services provided to the general public, by the use of ICT in an easy, economical and effective manner.

The process is extremely complicated which requires, the proper arrangement of hardware, software, networking and indeed re-engineering of all the processes to facilitate better delivery of service.

Interactions in e-governance

- G2G
  - G2G Vertical**:** national to state to local authorities and vice versa
  - G2G horizontal**:** with other governments
- G2C
- G2B
- G2E

Purpose

The basic purpose of e-governance is to simplify processes for all, i.e. government, citizens, businesses, etc. at National, State and local levels. In short, it is the use of electronic means, to promote good governance.

Benefits of E-Governance

- ✓ Reduced corruption
- ✓ High transparency
- ✓ Increased convenience
- ✓ Direct participation of constituents
- ✓ Reduction in overall cost.
- ✓ Expanded reach of government

-

MODULE 4-ENTERPRISE SYSTEMS

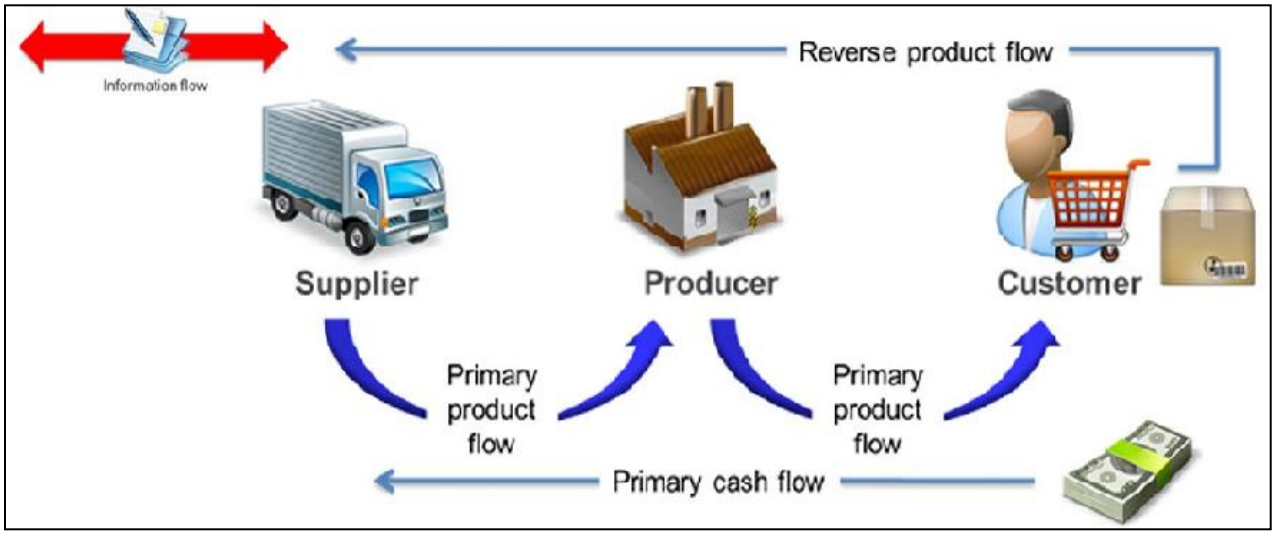
Enterprise Information Systems

Enterprise information system (EIS) is any kind of information system which improves the functions of an enterprise business processes by integration.

Examples of enterprise systems:

- Supply chain management (SCM)
- Customer relationship management (CRM)
- Enterprise resource planning (ERP)

What is Supply Chain Management?



Supply chain management (SCM) systems are inter-organizational systems that enable companies to efficiently handle the flow of good from suppliers to customers. A supply chain is a network of organizations and facilities that transforms raw materials into products delivered to customers.

Supply chain management, then, is the active management of supply chain activities to maximize customer value and achieve a sustainable competitive advantage. It represents a conscious effort by the supply chain firms to develop and run supply chains in the most effective & efficient ways possible. Supply chain activities cover everything from product development, sourcing, production, and logistics, as well as the information systems needed to coordinate these activities.
The organizations that make up the supply chain are “linked” together through physical flows and information flows. Physical flows involve the transformation, movement, and storage of goods and materials. They are the most visible piece of the supply chain. But just as important are information flows. Information flows allow the various supply chain partners to coordinate their long-term plans, and to control the day-to-day flow of goods and material up and down the supply chain. The link talks more about SCM.

The concept of Supply Chain Management (SCM) is based on two core ideas:

- The first is that practically every product that reaches an end user represents the cumulative effort of multiple organizations. These organizations are referred to collectively as the supply chain.
- The second idea is that while supply chains have existed for a long time, most organizations have only paid attention to what was happening within their “four walls.” Few businesses understood, much less managed, the entire chain of activities that ultimately delivered products to the final customer. The result was disjointed and often ineffective supply chains. So SCM brings it all together efficiently.

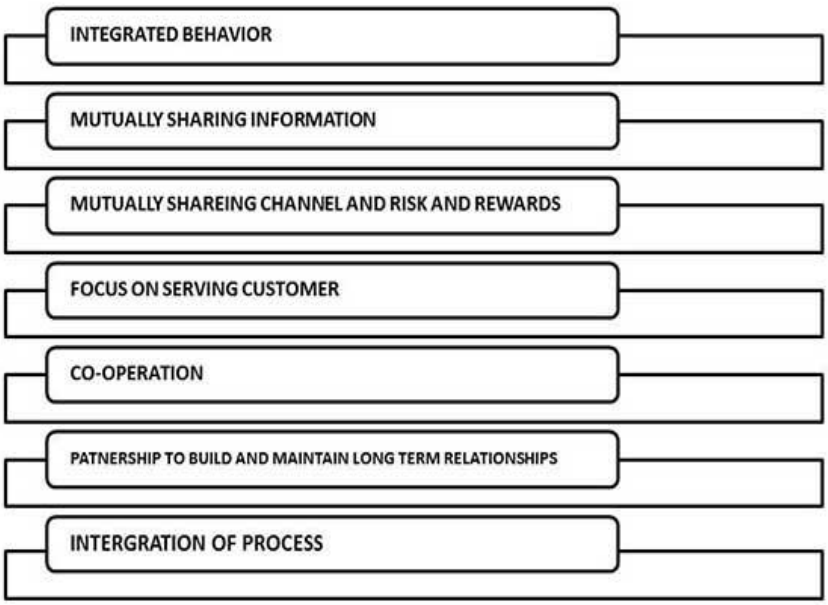
SCM consists of −

- operations management
- logistics
- procurement
- information technology
- integrated business operations

Objectives of SCM

- To decrease inventory cost by more accurately predicting demand and scheduling production to match it.
- To reduce overall production cost by streamlining production and by improving information flow.
- To improve customer satisfaction.

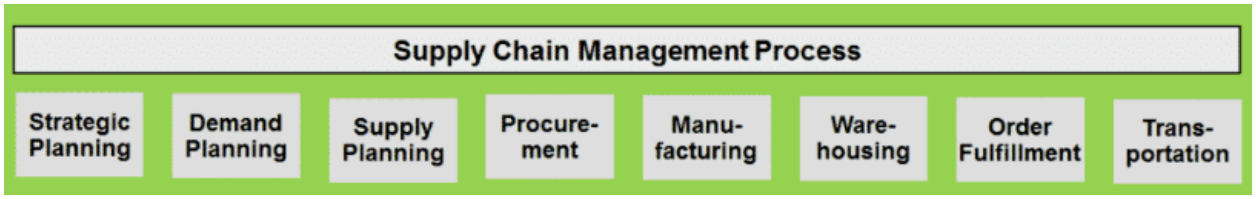
Features of SCM



Scope of SCM

SCM Processes

Supply Chain Management process



The building blocks of SCM are as seen in the above diagram. Let us see a little more in detail:

- Strategic Planning
    - Strategic Supply Chain Design Process
    - Strategic Sourcing Process
- Demand Planning

    - Forecasting
    - Life Cycle Planning
    - Promotion Planning
- Supply Planning
    - Safety stock planning
    - Supply Network planning
    - Outsourcing
    - Distribution
    - Customer collaboration
    - Supplier collaboration
- Procurement
    - Purchase order processing
    - Receipt confirmation processing
    - Invoice verification process
- Manufacturing
    - Production planning/scheduling
    - Manufacturing execution
- Warehousing
    - Inbound processing
    - Outbound processing
    - Cross docking
    - Warehousing and storage
    - Physical inventory
- Order Fulfillment
    - Sales order processing
    - Billing

- Transportation
    - Transportation planning
    - Transportation execution
    - Freight costing

Advantages of SCM

SCM have multi-dimensional advantages −

- To the suppliers −
    - Help in giving clear-cut instruction
    - Online data transfer reduce paper work
- Inventory Economy −
    - Low cost of handling inventory
    - Low cost of stock outage by deciding optimum size of replenishment orders
    - Achieve excellent logistical performance such as just in time
- Distribution Point −
    - Satisfied distributor and whole seller ensure that the right products reach the right place at right time
    - Clear business processes subject to fewer errors
    - Easy accounting of stock and cost of stock
- Channel Management −
    - Reduce total number of transactions required to provide product assortment

    - Organization is logically capable of performing customization requirements
- Financial management −
    - Low cost
    - Realistic analysis
- Operational performance −
    - It involves delivery speed and consistency.
- External customer −
    - Conformance of product and services to their requirements
    - Competitive prices
    - Quality and reliability
    - Delivery
    - After sales services
- To employees and internal customers −
    - Teamwork and cooperation
    - Efficient structure and system
    - Quality work
    - Delivery

A well managed Supply chain helps to have an advantage over competitors as well as maximize the value that is provided to the customers. However with a lot of

activities to be coordinated in perfect timing, there are numerous challenges that have to be overcome for efficient SCM.

Here are a few challenges with regard to SCM:

- Quality Customer Service - The supply chain management is centralized on the needs of the customers - giving the right quantity/quality of the product for the right amount of money at the right time. Achieving this feat is complex.
- Costing - Globally speaking, the costs of raw materials, energy and labor have increased due to economical constraints. In order for operations to continue production and provide customers with good quality items at affordable rates, adjustments have to be made to keep operations running. This requires constant monitoring for cost efficient sources, maintaining warehouse efficiency,etc.
- Risk Management - Due to the constant change in the market, coming from a variety of sources such as consumer demands, political agendas and global sourcing, would cause major issues to the operations. A solid risk management plan should be in place to overcome disruptions. Eg: having back up suppliers for raw materials.
- Supplier Relationship – Any conflicts with suppliers could disrupt the whole process. It is necessary to create and maintain a mutually sound and harmonious relationship with all partners/suppliers to be able to work efficiently and come up with a better output in a short period of time.
- Qualified Personnel – A major challenge is to find efficient and experienced employees who can handle the complexities of the operations.

- Unforeseen Delays - Procurement of materials and products may be easy, but the delivery may not always be 100% on time, especially with time differences and a variety of shipping time frames. When items are sourced from different countries, delays like this are very common. Sufficient buffer stocks can minimize this risk, but will lead to increased warehousing cost.
- Fast-Changing Markets – Innovations, changing technology, changing customer needs and demands build high pressure on the supply chain. Companies would have to be more flexible because change is inevitable.

SAP, Oracle, JDA are leading SCM softwares.

APPLICATION OF SCM

Industry 4.0 and SCM

Today's application of radical new technologies to manufacturing has been dubbed Industry 4.0, or the "fourth industrial revolution." In this latest iteration of industrialization, technologies such as AI, machine learning, the Internet of Things, automation, and sensors are transforming the way companies manufacture, maintain, and distribute new products and services. It can be said that Industry 4.0 is built on the supply chain.

In Industry 4.0, the way enterprises apply technology to the supply chain is fundamentally different from how they applied it in the past. For example, within the maintenance function, enterprises would typically wait until a machine malfunctioned to fix it. Smart technology has changed that. We can now predict failure before it happens, and then take steps to prevent it so that the supply chain can continue uninterrupted. Today's SCM is about using technology to make the supply chain—and the enterprise—smarter.

Industry 4.0 SCM also provides a significant advantage over traditional SCM because it enables aligned planning and execution while at the same time delivering substantial cost savings. For instance, companies that operate under a "plan-to-produce" model—in which product production is linked as closely as possible to customer demand—must create an accurate forecast. That involves juggling numerous inputs to ensure that what is produced will meet market demand without exceeding it, avoiding costly overstocks. Intelligent SCM solutions can help you meet customer demand and financial objectives at the same time.

Intelligent SCM has other advantages, too. For instance, it can free up supply chain employees to contribute to the business in ways that add more value. Better SCM systems that automate mundane tasks can equip supply chain professionals with the tools they need to successfully deliver the products and services the supply chain is designed around.

Today's SCM is all about the customer

SCM has historically been about increasing efficiency and reducing costs. Although those needs haven't changed, what has changed is that the customer is now playing a front-and-center role in setting SCM priorities. It's been said that "customer experiences live and die in the supply chain."

Customer loyalty is predicated on an enterprise being able to quickly and accurately fulfill customer expectations. Raw materials, manufacturing, logistics, and trade and order management must all be coordinated to get a given item to the customer within a reasonable timeframe. To accomplish this, companies must look at their supply chains through their customers' eyes. It's not simply about getting

the order to the customer on time; it's about doing everything at the right time—before, during, and after order delivery.

The future of SCM

The supply chain of the future is all about responsiveness and the customer experience— understood and managed within a network rather than a linear model. Every node of the network must be attuned and flexible to the needs of the consumer while also being capable of addressing factors such as sourcing, trade policies, modes of shipment, and more.

Advanced technology will increasingly be used to improve transparency and visibility throughout this network, as well as to further enable connectivity and SCM utilization. The entire SCM planning function will become more intelligent to take consumer demands into account. The ability to adapt will be a mandate.

In the past, supply chain planning has been a periodic business exercise. Heading into the future, it will be continuous. Future SCM systems will also bring tighter alignment between planning and execution, which is not a current state for most enterprises. The need for speed and accuracy in SCM is only going to increase. Make sure your supply chain is ready for the future by supporting it with an intelligent SCM system.

WHAT IS A CRM?

A Customer Relationship Management (CRM) system helps manage customer data. It supports sales management, delivers actionable insights, integrates with social media and facilitates team **communication**. Cloud-based CRM systems offer complete mobility and access to an ecosystem of bespoke apps.

CRM DEFINITION

CRM stands for **"Customer Relationship Management"** and refers to all strategies, techniques, tools, and technologies used by enterprises for developing, retaining and acquiring customers.

This software ensures that every step of the interaction with consumers goes smoothly and efficiently in order to increase the overall profits. The software gathers customer data from multiple channels. Hence, CRM stores detailed information on overall purchase history, personal info, and even purchasing behavior patterns.

Customer relationship management (CRM) is an approach to managing a company's interaction with current and potential customers.

A CRM tool helps to store customer and prospect contact information, identify sales opportunities, record service issues, and manage marketing campaigns, all in one central location — and make information about every customer interaction available to anyone in the organization, who might need it. It uses data analysis about customers' history with a company to improve business relationships with customers, specifically focusing on customer retention and ultimately driving sales growth.

CRM can 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. Through the CRM approach and the systems used to facilitate it, businesses learn more about their target audiences and how to best cater to their needs.

A CRM system gives everyone (eg.: from sales, customer service, business development, recruiting, marketing, etc) — visibility and easy access to data, making it easier to collaborate, forecast, follow leads, create and maintain customers, etc that ultimately lead to increased productivity.

A CRM platform can integrate with business tools, such as document signing, accounting and billing, and surveys, so that information flows both ways to give a true 360-degree view of the customer. Latest versions of CRM have built-in intelligence that automates administrative tasks, like data entry and lead or service case routing, so that saved time is allotted for more valuable activities. Automatically generated insights help to understand the customers better, even

predicting how they will feel and act so that the team can prepare the right outreach.

Inevitable role of CRM in business:

1. Make improvements to the bottom line - It can produce real results with regard to lead conversion, driving sales, customer satisfaction, faster decision making, revenues, etc
2. Identify and categorize leads - by focusing on the right leads, sales can prioritize the opportunities that will close deals, and marketing can identify leads that need more nurturing and prime them to become quality leads.
3. Increase referrals from existing customers – better understanding and relationship with existing customers converts them to repeat customers and helps to win new business/customers from them.
4. Offer better customer support - Today's customers are demanding and expect fast, personalized support 24/7 even across time zones. Through CRM system, the agents can quickly refer details like customer order, delivery issues, etc so they can give customers the answers they need, fast.
5. Improve products and services - CRM systems gather information from a huge variety of sources and give unprecedented insights into the customer/customer behavior which helps to spot problems early, identify gaps and improve offers.

Cloud-based CRM

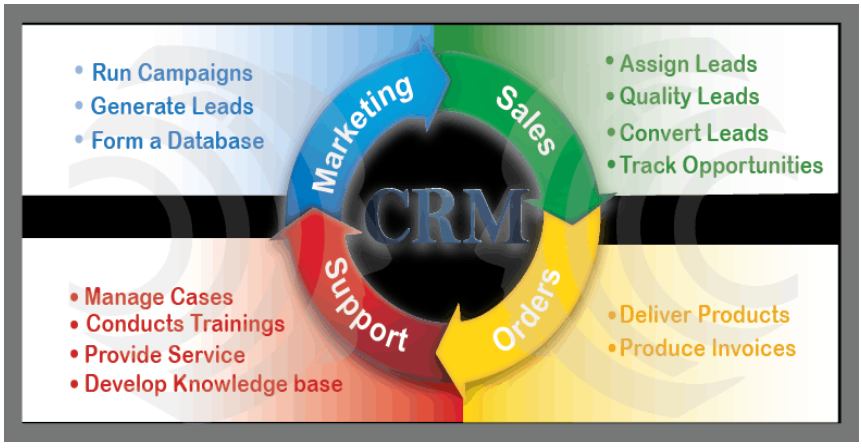
A significant development in CRM systems has been the move into the cloud from on-premises CRM software. Freed from the need to install software on hundreds or thousands of desktop computers and mobile devices, organizations worldwide are

discovering the benefits of moving data, software, and services into a secure online environment.

A cloud-based CRM platform offers:

- Faster deployment
- Automatic software updates
- Cost-effectiveness and scalability - doesn't need special installation, no hardware to set up, no version control and update schedules. It is flexible and can be scaled as the business grows. Payment need to be made only for features that are accessed.
- The ability to work from anywhere, on any device – eg.: helps sales force on the move.
- Increased collaboration

Elements of CRM software



Major components of a CRM system are:

- **Human Resource Management** - helps in adopting an effective people strategy and analyzing their skills to develop and implement strategies for

growth and development.

- **Customer Service** - customer information and data analysis helps to understand customer needs/complaints so as to provide better service.
- **Sales Force Automation** - includes sales forecasting, recording sales processing, and tracking potential interactions; which helps to analyze the sales forecasts and the performances by the workforce.
- **Lead Management** - includes efficient management of campaigns to designing customized forms to finalizing the mailing lists and other things. It also studies the customer purchase patterns to determine potential sales lead.
- **Marketing** - enhancing the effectiveness of the marketing and promotion strategies. There are various sub-elements like List Management, Campaign Management, Activity Management, Document Management, Call Management, Mass Emails, etc.

- **Workflow Automation** - automate and streamline different processes and prevents redundancy and reduces paperwork.
- **Analytics** - analyzing collected data and past trends to facilitate learning and decision making.
- **Reporting** – flexible to create different types of reports which are accurate and precise.

Challenges of CRM

Despite all the advantages, there are challenges, especially with regard to the implementation of CRM:

- **Executive Support:** A CRM system will only be effective if people in the Organization use it diligently. The senior management should always be involved to provide positive support.

- **Proper Planning:** A detailed plan needs to be formulated which reflects the Company values, mission, and vision. All aspects, including a contingency plan should be planned. During the planning stage, stakeholders and exact requirements have to be identified. Flaws in planning will negatively affect implementation and the productivity.

- **Technology Choices:** The right technology is very important for any CRM Implementation. Technological hurdles can be a huge challenge.

- **Right CRM Implementation:** CRM Implementation involves a lot of changes. Often migration from the current state to an automated one becomes tedious and requires planning and training, which could be cumbersome. Employees could also be resistant to change.

- **Extensive Training:** After CRM Implementation, extensive training should be provided for the workforce with regard to both theoretical and practical

aspects. Eg: The sales reps need to understand the system thoroughly and get motivated to use it. Proper training manuals should be provided for later use.

- **Inter-Departmental Integration:** CRM implementation has an organization-wide influence. Different functions and departments need to be integrated and connected to support a smooth, streamlined flow of information. However, integration could be a challenge.

  An API (application programming interface) is a software-to-software interface that allows programs to connect and communicate with each other (two-way flow of information). APIs help to push data from external tools to CRM and also allow CRM to communicate with internal systems.

- **Setting guidelines and CRM strategy:** The internal usage guidelines and the CRM philosophy have to be laid down. People can be the main factor for both the success and failure of a CRM Implementation.

WHAT DOES CRM SOFTWARE STAND FOR?

In most cases, when people talk about CRM, they're referring to a **CRM system** — a tool aimed at helping companies with sales, marketing and service management.

CRM software allows businesses to focus on their company's relationships with customers, colleagues, suppliers, etc. With a professional CRM in place, it becomes much easier to find new customers, win their trust, provide qualified support, and provide additional services throughout the relationship.

Who Can Benefit from CRM?

The best part about a CRM system is that almost any organizational unit can benefit from it — from sales and customer service to recruiting, marketing, and business development. Good CRM software gives a better way to manage external relationships.

Storing all customer information in one place, recording service issues, identifying sales opportunities, managing marketing campaigns — these are just a few capabilities that **CRM features**.

Since CRM provides easy access to data, it also becomes much easier for users to collaborate on different processes and increase productivity. Another strong argument in favor of CRM is that it is suitable for businesses of any size.

Enterprise resource planning (ERP)

ERP software integrates all facets of an operation — including product planning, development, manufacturing, sales and marketing — in a single database, application and user interface.

ERP software typically consists of multiple enterprise software modules that are individually purchased, based on what best meets the specific needs and technical capabilities of the organization. Each ERP module is focused on one area of business processes, such as product development or marketing. (eg.: SAP Sales and Distribution, SAP Product Planning, SAP quality management, SAP human capital management, etc)

A business can use a combination of different modules to manage back-office activities and tasks like:

- Distribution process management
- Supply chain management
- Services knowledge base
- Configure prices
- Improve accuracy of financial data
- Facilitate better project planning
- Automate the employee life-cycle
- Standardize critical business procedures
- Reduce redundant tasks
- Assess business needs
- Accounting and financial applications
- Lower purchasing costs
- Manage human resources and payroll

The 6 main **ERP components** are:

1. **Human Resources** - The HR ERP module in the software solution generally handles employee management tasks such as onboarding, offboarding, timekeeping and benefits administration and most importantly, payroll.

2. **Customer Relationship Management**- The customer relationship management (CRM) component stores and allows you to track generated customer and lead data. This data can help with the development of insights that could improve sales and marketing processes.
   Is CRM part of ERP or a separate business software category? – Both. As a unique category, CRM normally consists of sales force automation, marketing automation and customer support. As part of ERP, CRM is one of the ERP pillars.

3. **Business intelligence (BI)** – This component of ERP collects data and performs analysis that can provide actionable insights about business processes. A good reporting feature is very important in BI and enables the organization to make sense of the data being analyzed. These actionable insights can inform business decisions across departments and processes when you use an integrated solution.

4. **Supply Chain Management** – An effective SCM module will optimize distribution and manufacturing processes to create a more efficient supply chain, which starts by collecting real-time data. Real-time data allows to fix issues, if any, in real time without delay. It helps in predictive analytics to help with demand planning, generation of an accurate production plan,

warehouse layout, etc. SCM coupled with CRM can help keep customers updated as to the status of their purchase within the distribution process and estimate a delivery date.

5. **Inventory Management System** – This component works in collaboration with components like SCM, warehousing and sales. Some of the features of this component include managing order fulfillment, maintaining a warehouse's stocking functions, tracking features that can reduce manual inventory control (like revision level tracking, multi-level serial number tracking and multiple units of measure per product ID or SKU).

6. **Financial Management** - Every business process involves the flow of money, therefore this tool works with all of the other ERP system components. This module analyzes and keeps track of all financial data. Analysis of financial data can reveal trends to help understand the business better, to find means to increase revenues/profit or reduce costs, help with financial forecasts.

Additionally components available are:

- **Risk Management** – This tool can predict and reduce risks in the business. It may also suggest Business Continuity Plans (BCP) for emergencies and unplanned situations.
- **Marketing Resource Management (MRM)** – MRM supports operations such as the alignment of people, processes and technology to support and enhance marketing efforts.

- **Sales-Order Management** – It can assist the company in managing sales orders through their entire lifecycle — from sales order generation to billing/invoicing.
- **Advanced Planning System (APS)** – This tool uses data to track the costs of production for manufactured goods. It might also optimize the allocation of raw materials and capacity to balance consumer demand with the amount of warehouse space available.
- **Event Management** – This solution allows the end-user to run events and hospitality programs from start-to-finish.

Examples of ERP Software:

Depending on the organization's size and needs there are a number of enterprise resources planning software vendors to choose from: SAP, Oracle, Sage, Microsoft, NetSuite, Epicor, Infor, Exact Max, Syspro, etc.

In conclusion, the basic goal of using an enterprise resource planning system is to provide one central repository for all information that is shared by all the various ERP facets to improve the flow of data across the organization.

Common ERP implementation challenges and how to overcome them

Companies of all sizes are investing in ERP systems to help improve processes and move to a paperless environment. However the implementation of ERP is not always simple, it can potentially create a lot of challenges depending on the way its managed. Here are some of the potential ERP implementation challenges and how to overcome them.

1. Finding the perfect software

There are a vast number of ERP systems available, so it is can be confusing choosing which one to invest in or what is best for the business.

The first step is to have a thorough understanding of the needs and challenges of the business and then give this to a selection of ERP providers for a response. The ERP provider chosen should have experience within your industry, take the time to understand the business and be able to help you meet your business goals. Otherwise, you could end up making a very costly mistake. It is important to ensure you gather enough information about your overall requirements and have open conversations with potential providers, so you can find the **right software to meet your business needs** and the right partner to support you in your ERP journey.

2. Commitment from managers

It is imperative that those who lead from the top are fully committed to the ERP implementation. Actively communicate with key personnel and ensure they understand the need for them to be fully involved. Also involving them in the

decision-making process will increase the likelihood of commitment. The better the communication, the more likely you will have complete buy-in from not only your managers but also the rest of the team.

3. System training

The **ERP system will only ever be as good as those who are using it**, so one of the main challenges your business will face is to ensure adequate training is provided. The successful implementation of your ERP system will be much more feasible if you offer your employees full training and ensure they are motivated to use the system.

4. Sufficient testing functional

Even if the ERP system meets all of the business requirements and expectations one of the potential downfalls could be the lack of testing. It is imperative that a **sufficient amount of testing is carried out** in the ERP implementation to ensure it will perform when deployed. Testing will provide the opportunity to highlight any issues, so they are taken care of before the system is fully implemented and live.

5. Lack of budgeting

In the long run, ERP systems can help businesses increase efficiency and productivity, but implemented badly could have the opposite effect, which is something that is not always taken into account. When budgeting you must take into account the financial costs and ERP project team members' time. It is essential for someone within the company to take charge of the project, communicate and work closely with the ERP provider in order to achieve the best results.

What Are the Advantages of Implementing ERP?

1. Reality check: When enterprises consider ERP systems, it forces a reckoning in several ways. First, they must account for the hardware and software systems that are already in place. As many enterprises discover, different business and support units throughout the organization may have circumvented central IT protocol and acquired their own applications and systems. Purchases made in such a disorganized fashion by what is known as shadow IT result in inefficiency and lack of interoperability.

Once enterprises see the weaknesses and the redundancies in their software strategy, they can plot a course to set things right. The best aspect of this reality check is that it affords enterprises the opportunity to better link IT and business units. Some enterprises will go so far as to embed full-time IT workers within the business units so that they better understand how that unit functions and where the inefficiencies are.

2. Lower IT costs: To be clear, these don't come immediately. A new ERP system is a major investment and its implementation is always time consuming. However, one unified ERP system is less costly than disparate systems for human resources, financial management, and supply chain management. Ultimately, you may save on software licenses, training, and support. But your mileage may vary.

3. End-to-end visibility: One of the sexiest features of ERP is that it allows high-level decision makers real-time snapshots of business operations. This includes an integrated view of areas such as inventory, shipping, supply chain management, manufacturing, sales and financials. All this data provides actionable business intelligence. If daily inventory levels are showing a pattern, then the supply chain

can be adjusted so the right levels of the right products are in the right place and at the right time. The availability of this data on a single dashboard can also encourage collaborative efforts and it gives great insight to workflow efficiencies and employee productivity.

4. Planning and reporting: Improved visibility means that accurate reports, reflecting activity across the enterprise, can be generated quickly. Because multiple business units can see the same data, managers are literally on the same page. That reduces communication errors caused by duplicated spreadsheets and emails, as well as pointless finger-pointing. Reporting tools, particularly those for financial reporting, are typically baked into ERP software. Many ERP systems also offer business intelligence applications that let organizations take a deeper dive into their data.

ERP systems, because of their business intelligence and automated reporting capabilities, are also a boon to corporate compliance. Many financial ERP systems have specific compliance features built in to address regulations such as the General Data Protection Regulation (GDPR), the Health Insurance Portability and Accountability Act (HIPAA), the Payment Card Industry Data Security Standard (PCI DSS), Sarbanes-Oxley (SOX), and the draft Secure Software Development Framework (SSDF) put forth by the National Institute of Standards and Technology (NIST) in June 2019.

5. Data security: Data security can be a blessing or a curse. While having a central repository for your data can be nerve-wracking, ERP systems and service providers that host them often have better data security in place than enterprises that host their own on-premise ERP systems.

International Information Systems

Information systems are the combination of people, **information** technology, and business processes to accomplish a business objective. Every **information system** (IS) has people, processes, and **information** technology. In fact, many IS professionals add most of their value working with people and processes.

The major dimensions for developing international information systems architecture are the global environment, the corporate global strategies, the structure of the organization, the management and business processes, and the technology platform.

When building an international system, one must first understand the global environment in which your firm is operating, including the **business drivers** that are pushing your industry toward global competition and management challenges. The structure of the organization, locations, job functions, management issues, technology platforms will all factor in to a successful globalization plan.
The global business drivers can be divided into two groups: general cultural factors and specific business factors.

General cultural factors include:

- Global communication and transportation technologies
- Development of **global culture**
- Emergence of global social norms
- Political stability
- Global knowledge base

Specific business factors include:

- Global markets
- Global production and operations
- Global coordination
- Global workforce
- Global economies of scale

Likewise, challenges and obstacles to global business systems include global and specific business challenges:

Global challenges include:

- **Cultural particularism**: Regionalism, nationalism, language differences
- **Social expectations:** Brand-name expectations, work hours
- **Political laws:** National laws governing **transborder data flow** and privacy, commercial regulations

Specific business challenges include:

- **Standards:** Different standards for EDI, e-mail, telecommunications
- **Reliability:** Phone networks not uniformly reliable
- **Speed:** Different data transfer speeds, many slower than the U.S
- **Personnel:** Shortages of skilled consultants

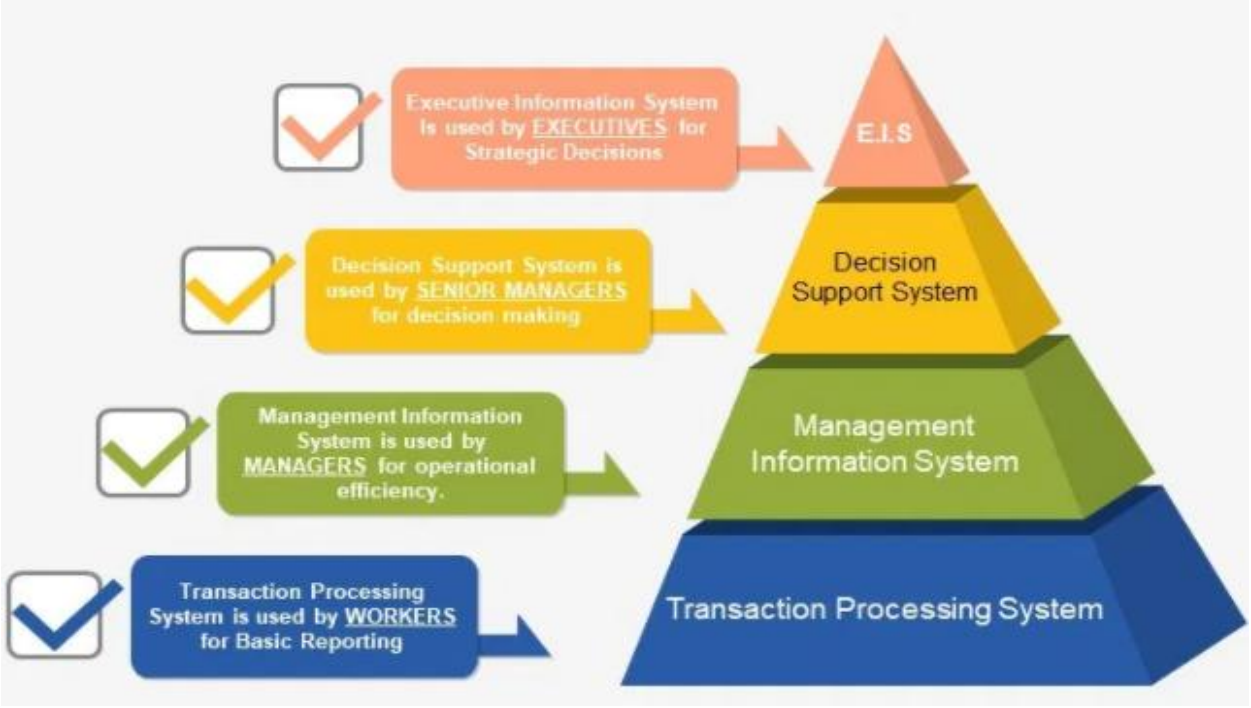
Most companies have inherited patchwork international systems from the distant past with little online control and communication. Corporations in this situation increasingly face powerful competitive challenges in the marketplace from firms that have rationally designed truly international systems.

Outsourcing and Offshoring

	Offshoring	Outsourcing
Definition	Offshoring means getting work done in a different country.	Outsourcing refers to contracting work out to an external organization.
Risks and criticism	Offshoring is often criticized for transferring jobs to other countries. Other risks include geopolitical risk, language differences and poor communication etc.	Risks of outsourcing include misaligned interests of clients and vendors, increased reliance on third parties, lack of in-house knowledge of critical (though not necessarily core) business operations etc.
Benefits	Benefits of offshoring are usually lower costs, better availability of skilled people, and getting work done faster through a global talent pool.	Usually companies outsource to take advantage of specialized skills, cost efficiencies and labor flexibility.

Decision Support Systems

- A decision support system (DSS) is a computerized program used to support determinations, judgments, and courses of action in an organization or a business.
- DSS scrutinizes massive amounts of data, compiling comprehensive information that can be used to solve problems and in decision-making.
- The completely computerized systems analyze information and actually make decisions for the user. At the other end of the spectrum, DSS allow users to make more informed decisions at a quicker pace.
- Decision support systems allow for more informed decision-making, timely problem-solving and improved efficiency in dealing with issues or operations, planning, and even management.



DSS are primarily used by mid- to upper-level management

Example of use of DSS

Decision: Maximize revenue generation

Project a company's revenue over the upcoming six months

There are several factors (assumptions about project sales, present market scenario, current performance of company, performance of competitors, previous sales pattern, etc) that contribute to the projected revenue figures, which makes it complicated.

DSS integrates the multiple variables, generate several alternate outcomes and helps to finalize the course of action for maximum revenue generation.

DSS - Characteristics:

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

DSS - Components

- Database Management System (DBMS) − To manage the data requirements – internal (data generated by a system such as TPS and MIS) or external database (social media, online data services, etc).
- Model Management System − It stores and accesses models that are applied for various needs - analyzing the financial health of an organization, forecasting demand of a product or service, etc – that help managers to make decisions.
- Support Tools − Support tools like online help, user interfaces, graphical analysis, error correction mechanism, etc that facilitates the user interactions with the system.

Types of Decisions

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

- **Programmed decisions** are basically automated processes, general routine work, where these decisions have been taken several times and the decision process follows some guidelines or rules. For example, selecting a reorder level for inventories is a programmed decision.
- **Non-programmed decisions** occur in unusual and non-addressed situations, so the decision would be new, without set rules for the decision process and are based on the manger's discretion, instinct, perception and judgment. For example, investing in a new technology is a non-programmed decision.

OLAP

Stands for "Online Analytical Processing." OLAP allows users to analyze database information from multiple database systems at one time. While relational databases

are considered to be two-dimensional, OLAP data is multidimensional, meaning the information can be compared in many different ways. For example, a company might compare their computer sales in June with sales in July, and then compare those results with the sales from another location, which might be stored in a different database.

In order to process database information using OLAP, an OLAP server is required to organize and compare the information. Clients can analyze different sets of data using functions built into the OLAP server. Some popular OLAP server software programs include Oracle Express Server and Hyperion Solutions Essbase. Because of its powerful data analysis capabilities, OLAP processing is often used for data mining, which aims to discover new relationships between different sets of data.

What is GIS?

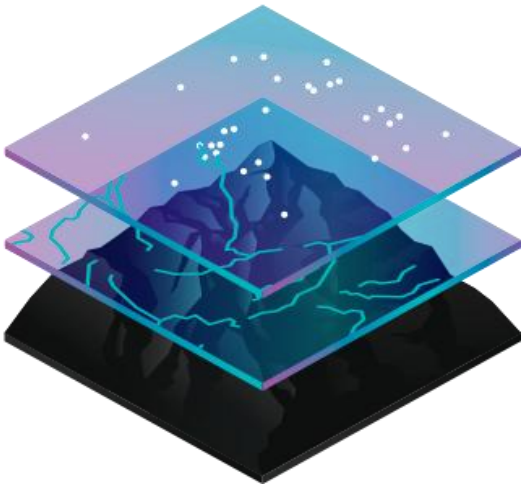
A geographic information system (GIS) is a framework for gathering, managing, and analyzing data. Rooted in the science of geography, GIS integrates many types of data. It analyzes spatial location and organizes layers of information into visualizations using maps and 3D scenes. With this unique capability, GIS reveals deeper insights into data, such as patterns, relationships, and situations—helping users make smarter decisions.

How GIS Works?

GIS technology applies geographic science with tools for understanding and collaboration. It helps people reach a common goal: to gain actionable intelligence from all types of data.

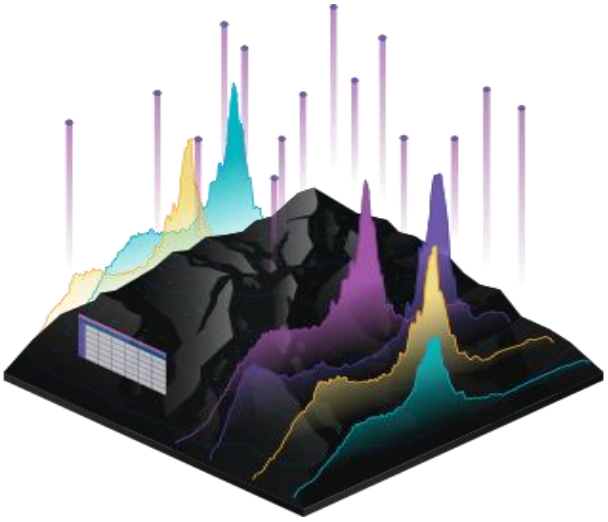
Maps

Maps are the geographic container for the data layers and analytics you want to work with. GIS maps are easily shared and embedded in apps, and accessible by virtually everyone, everywhere.



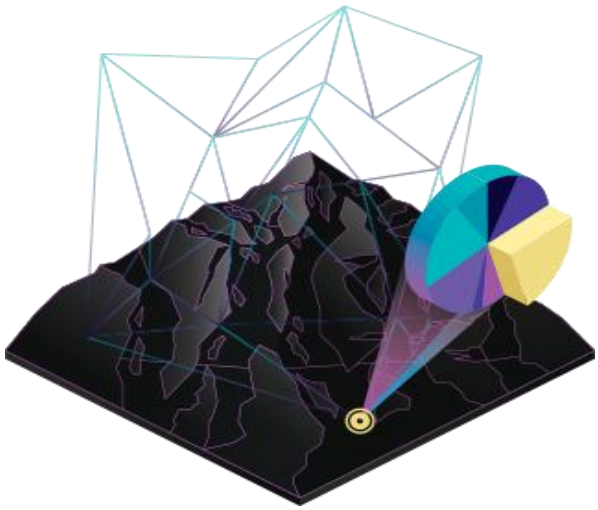
Data

GIS integrates many different kinds of data layers using spatial location. Most data has a geographic component. GIS data includes imagery, features, and basemaps linked to spreadsheets and tables.



Analysis

Spatial analysis lets you evaluate suitability and capability, estimate and predict, interpret and understand and much more, lending new perspectives to your insight and decision-making.



Apps

Apps provide focused user experiences for getting work done and bringing GIS to life for everyone. GIS apps work virtually everywhere: on your mobile phones, tablets, in web browsers, and on desktops.

Data Visualization System

Data visualization is the graphical representation of information and data. By using visual elements like charts, graphs, and maps, data visualization tools provide an accessible way to see and understand trends, outliers, and patterns in data.

Data Visualization Techniques

Depending on these factors, you can choose different data visualization techniques and configure their features. Here are the common types of visualization techniques:

1. Charts

The easiest way to show the development of one or several data sets is a chart. Charts vary from bar and line charts that show the relationship between elements over time to pie charts that demonstrate the components or proportions between the elements of one whole.

2. Plots

Plots allow distributing two or more data sets over a 2D or even 3D space to show the relationship between these sets and the parameters on the plot. Plots also vary. Scatter and bubble plots are some of the most widely-used visualizations. When it comes to big data, analysts often use more complex box plots that help visualize the relationship between large volumes of data.

3. Maps

Maps are popular ways to visualize data used in different industries. They allow to locate elements on relevant objects and areas — geographical maps, building plans, website layouts, etc. Among the most popular map visualizations are heat maps, dot distribution maps, cartograms.

4. Diagrams and matrices

Diagrams are usually used to demonstrate complex data relationships and links and include various types of data on one visualization. They can be hierarchical, multidimensional, tree-like.

Matrix is one of the advanced data visualization techniques that help determine the correlation between multiple constantly updating (steaming) data sets.

What is a Data Dashboard?

A **data dashboard** is an information management tool that visually tracks, analyzes and displays key performance indicators (KPI), metrics and key data points to monitor the health of a business, department or specific process. They are customizable to meet the specific needs of a department and company. Behind the scenes, a dashboard connects to your files, attachments, services and API's, but on the surface displays all this data in the form of tables, line charts, bar charts and gauges. A data dashboard is the most efficient way to track multiple data sources because it provides a central location for businesses to monitor and analyze performance. Real-time monitoring reduces the hours of analyzing and long line of communication that previously challenged businesses.

Management Information System and Decision Support System

The **main difference** between management information system and decision support system is that the **management information system (MIS) supports structured decision making while the decision support system (DSS) provides support for unstructured or semi-structured decisions.**

Management Information System provides information like reports for managers to make required decisions. It helps operational and tactical levels of the

organization. It mainly supports structured decision making. In other words, the decisions are well defined and described in detail.

Decision Support System is a system that provides information for managers in the decision-making process. It provides support for unstructured or semi-structured decisions. In other words, these decisions cannot be described or defined in detail.

Business Intelligence vs Business Analytics

Business Intelligence

In broad terms, business intelligence systems are used to maintain, optimize and streamline current operations. The term refers to technologies, applications and practices for the collection, integration, analysis and presentation of business information. The purpose of business intelligence is to support data-driven business decision making. Business intelligence is sometimes used interchangeably with briefing books, report and query tools, and executive information systems.

BI improves and maintains operational efficiency and helps companies increase organizational productivity. Business intelligence software offers many benefits, including powerful reporting and data analytics capabilities. Using BI's rich data visualization mechanisms like real-time dashboards, managers can generate intuitive, readable reports that contain relevant, actionable data.

Popular business intelligence solutions include: QlikView, SAP BusinessObjects, Microsoft Power BI, IBM Cognos and Microstrategy.

Business Analytics

Like business intelligence, BA collects and analyzes data, employs predictive analytics, and generates richly visualized reports in custom dashboards. The aim of these features is to help identify and address an organization's weak points. This is where the similarities end. Business analytics software is used to explore and analyze historical and current data. It utilizes statistical analysis, data mining and quantitative analysis to identify past business trends.

Once data has been collected and analyzed, Business intelligence analytics systems then use that data for predictive modeling. This can predict and, in most cases, prepare for future business climates. One of the most powerful aspects of BA is ad-hoc reporting, which allows companies to perform analysis of specified data in real-time to answer targeted questions to make quicker business decisions. In effect, business analytics uses predictive analysis to solve problems before they've occurred.

Popular business analytics solutions include: SAP Business Analytics Suite, Pentaho BA, Birst BI and Tableau Big Data Analytics.

ARTIFICIAL INTELLIGENCE (AI) IN BUSINESS

With the increasingly vast amount of data available today and the constantly evolving preferences and complexity of customers, businesses can no longer rely on traditional business methods to drive growth. These radical changes have opened up new realm of possibilities, with AI, to drive business growth through actionable insights generated from customer data.

Artificial intelligence in business simply involves the use of intelligent computer software with human-like capabilities to boost revenue, improve customer experience, increase productivity and efficiency, and drive business growth and transformation.

WHY SHOULD COMPANIES USE AI?

Business processes in the 21st century is characterized by a high level of complexity involving tasks that are stressful and inefficient to be carried out by humans. Business in today's world is dominated by the era of data. Companies can obtain valuable insights on strategies that can radically drive growth from data.
Hence, the need for businesses to uniquely understand the needs and preferences of customers is invaluable in today's business world; to thrive and maintain relevance within the fierce competition. **Using artificial intelligence in business,** companies can now uniquely understand and engage customers, automate business processes and improve productivity and revenue while reducing operational expenses.

BENEFITS OF ARTIFICIAL INTELLIGENCE IN BUSINESS

The benefits businesses stand to gain from the use of AI is endless and includes:

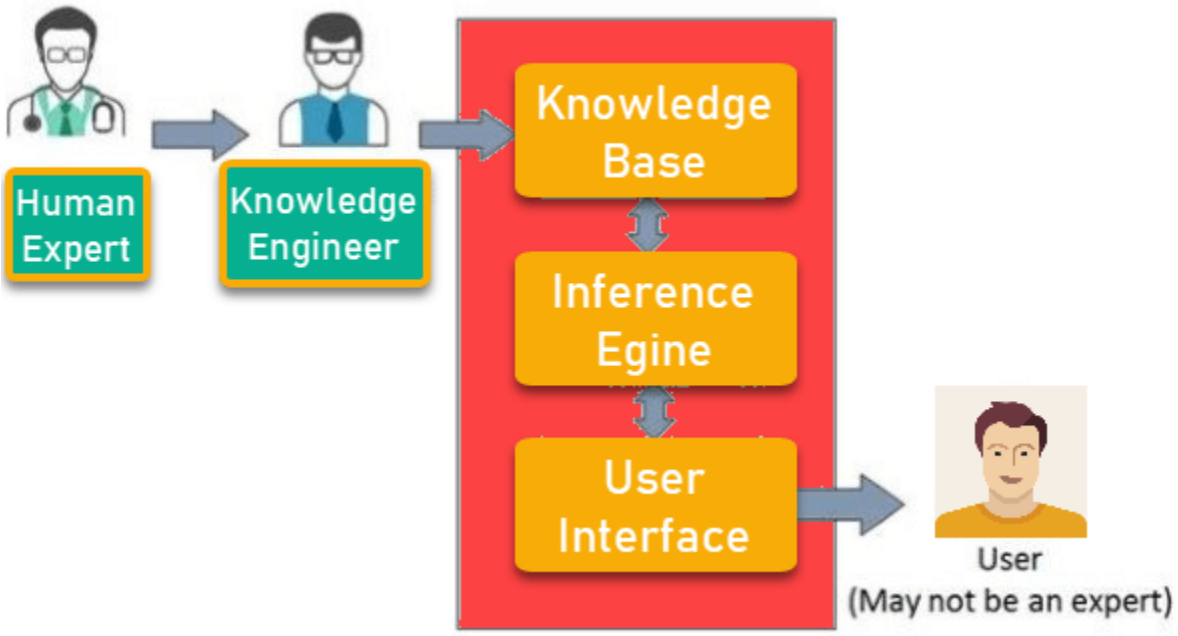
- Automation of processes
- More positive results from marketing activities and increased revenue
- Better understanding of customers and improved experience of services offered
- Fraud detection
- Improved and more reliable customer service

Expert System in AI: What is, Applications & Example

Expert System is an interactive and reliable computer-based decision-making system which uses both facts and heuristics to solve complex decision-making problems. It is considered at the highest level of human intelligence and expertise. The purpose of an expert system is to solve the most complex issues in a specific domain.

The Expert System in AI can resolve many issues which generally would require a human expert. It is based on knowledge acquired from an expert. Artificial Intelligence and Expert Systems are capable of expressing and reasoning about some domain of knowledge. Expert systems were the predecessor of the current day artificial intelligence, deep learning and machine learning systems.

Components of the Expert System



The Expert System in AI consists of the following given components:

1. User Interface

The user interface is the most crucial part of the Expert System Software. 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.

2. 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. This component is also helpful for formulating conclusions.

3. 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.

Thus we can say that the success of the Expert System Software mainly depends on the highly accurate and precise knowledge.

Applications of Expert Systems

Some popular Application of Expert System:

- Information management
- Hospitals and medical facilities
- Help desks management
- Employee performance evaluation
- Loan analysis
- Virus detection
- Useful for repair and maintenance projects
- Warehouse optimization
- Planning and scheduling
- The configuration of manufactured objects
- Financial decision making Knowledge publishing
- Process monitoring and control
- Supervise the operation of the plant and controller
- Stock market trading
- Airline scheduling & cargo schedules

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.
- It can gather scarce expertise and used it efficiently.
- Offers consistent answer for the repetitive problem

- Maintains a significant level of information
- Helps you to get fast and accurate answers
- A proper explanation of decision making
- Ability to solve complex and challenging issues
- Artificial Intelligence Expert Systems can steadily work without getting emotional, tensed or fatigued.

Summary

- An Expert System is an interactive and reliable computer-based decision-making system which uses both facts and heuristics to solve complex decision-making problem
- Key components of an Expert System are 1) User Interface, 2) Inference Engine, 3) Knowledge Base
- Key participants in Artificial Intelligence Expert Systems Development are 1) Domain Expert 2) Knowledge Engineer 3) End User
- Improved decision quality, reduce cost, consistency, reliability, speed are key benefits of an Expert System
- An Expert system can not give creative solutions and can be costly to maintain.
- An Expert System can be used for broad applications like Stock Market, Warehouse, HR, etc

MODULE 5

MANAGING SEACURITY AND ETHICS ISSUES IN IT:

It security, ethic and society, ethics responsibility of business professionals, cybercrime: hacking and cracking , cyber theft, cyber terrorism, unauthorized use, software piracy, theft of IP, computer virus , adware and spyware, privacy issues, health issues, societal issues-cyber security and cryptography: security management tools, cryptographic keys, encryption, firewalls-system controls and audits: information system controls, auditing IT security-Block chain technology: how it works, features, business applications.

SECURITY &ETHICAL CHALLENGS:

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

Criminals gaining access to credit card information can lead to financial loss to the cards or financial institute. Using organization information systems I.e. posting inappropriate content on Facebook or Twitter a company account can lead to lawsuits and loss business.

This tutorial will address such challenges that are posed by information systems and what can be done to minimize or eliminate the risks.

In this tutorials, you will learn-

Cyber- crime
Information system Security
Information system Ethics
Information communication technology (ICT) policy.

IT SECURITY:

It security is a set of cybersecurity strategies that prevents unauthorized access to organizational assets such as computers, networks, and data. It maintains the integrity and confidentiality of sensitive information, blocking the access of sophisticated hackers.

WHAT ARE THE THREATS TO IT SECURITY?

Threats to IT security can come in different forms. A common threat is malware, or malicious software, which may come in different variations to infect network devices, including:

RANSOMWARE
SPYWARE
VIRUSES

These threats make it even more important to have reliable security practices in place. Learn more about malware to stay protected.

ETHICS AND SOCIETY:

Ethics is asset of standards that a society places on itself and which helps in guiding behavior, choices ans actions. Ethics have significant role to play in perpetuation of peaceful society various purposes.

Social behavior of society is guided by ethical standards, which society has opted for. Alignment of ethics with values, moral and attitude strengthen mutual trust and reduce social conflicts. It promotes self discipline among people to behave in a manner commensurable to standards otherwise attract social isolation.

For example: Prevalent honor killing in Indian society in some regions is often justified by citing ethical standards they placed on their community which sometimes results in isolation and sometimes it extreme from resulted in honor killing.

ETHICAL RESPONSIBILITY OF BUSINESS PROFESSIONALS:

The ethical responsibility of a business to stakeholders is that the business should be honest about its sales, revenue and profits. Providing stakeholders with a strategic plan for future initiatives also helps to build in the organization.

Being transparent with customers and prospects is also an ethical choice. If there is something wrong with a product your business is selling, for example, its critical that you inform consumers immediately and recall the product, in addition to offering full refunds. While this may seem like an embarrassing moment for your business, it shows consumers that you value them and their safety and willing to make things right no matter the cost.

CYBERCRIME:

Cybercrime, or computer-oriented crime, is a crime that involves a computer and a network. The computer may have been used in the commission of a crime, or it may be the target. Cybercrime may threaten a person, company or a nations security and financial health.

There are many privacy concerns surrounding cybercrime when confidential information is intercepted or disclosed, lawfully or otherwise. Internationally, both

government and non-state actors engage in cybercrimes, including espionage, financial theft, and other cross-border crimes. Cybercrimes crossing international borders crimes. Cybercrimes crossing international borders and involving the actions of at least one nation-state is sometimes referred to as cyberwarfare.

HACKING AND CRACKING:

Hacking and crackingboth is technical term, where Hackingis The process attempting to gaining , unauthorized access to computer resources. Whereas Crackingis the act of breaking into a computer system, often on a network maliciously, for personal gain.

THE DIFFERENCE BETWEEN HACKING AND CRACKING:

The basic difference is that a hacker uses their extensive knowledge of computer logic and code, while a cracker looks for back doors in programs, and exploits those back doors. Hackers break into the security systems for the sole purpose of checking the holes in the system and works on rectifying these while as the cracker breaks into the security system for criminal and illegal reasons or for personal gains.

CYBER THEFT:

Cyber theftis a part of cybercrime which means theftcarried out by means of computers or the Internet. The most common types of cyber theft include identify theft, password theft, theft of information, internet time thefts etc.

CYBERTERROISM:

Cyberterrorism is the use of the internet to conduct violent acts that result in, or threaten, loss of life or significant bodily harm, in order to achieve political or ideological gains through threat or intimidation. It is also sometimes considered an act of deliberate, large-scale disruption of computer networks, especially of personal computers attached to the internet by means of tools such as computer viruses, computer worms, phishing and other malicious software and hardware methods and programming scripts. Cyberterrorism is a controversial term. Some authors opt for a very narrow definition, relating of development by known terrorist organizations of disruption attacks against information systems for the primary purpose of creating alarm, panic or physical disruption.

UNAUTHORIZED USE:

Generally, unauthorized use is the use of a credit card by a person who does not have the right to use the card. For example, if you lose your card and someone finds it and uses it, that would be an unauthorized use, you have authorized the use.

Unauthorized access is when someone gains access to a website, program, service, or other system using someone else account or other methods. For example, if someone kept guessing a password or username for an account that was not theirs until they gained access, it is considered unauthorized access.

SOFTWARE PIRACY:

Software piracy is the act of stealing software that is legally protected. This stealing includes copying, distributing, modifying or selling the software. Copyright laws were originally put into place so that the people who develop software (programmers, writers, graphic artists, etc.)

Software piracy doesnt require a hacker or skilled coder. Any normal person with a computer can become a software pirate if they dont know about the software laws. With such a widespread impact, its important to understand what software piracy is and the dangers it presents.

THE DANGERS OF SOFTWARE PIRACY

Software piracy may have a cheaper price point, but there are many dangers that software pirates should be aware of.

Consequences of software piracy are:

Increased chances that the software will malfunction or fail
Forfeited access to support for the program such as training, upgrades, customer support and bug fixes
No warranty and the software cant be updated
Increased risk of infecting your PC with malware, viruses or adware
Slowed down PC
Legal repercussions due to copyright infringement

THEFT OF IP

Intellectual property theft(IP theft) refers to the robbing of people or companies of their ideas, inventions, and creative expressions(i.e., their IP). …IP can include everything from proprietary products and parts, to movies, music, web content, business processes, and software.

IP is divided into two categories: Industrial property includes but is not limited to patents for inventions, trademarks, industrial designs and geographical indications. Copyright covers literary works like novels, poems and plays, films, music and artistic works, for example drawings, paintings, photographs, sculptures, web site pages and architectural design. Right related to copyright include those of performing artists in their performances, producers of phonograms in their recordings, and broadcasters in their radio and television programs.

COMPUTER VIRUS:

A computer virus is a type of computer program that, when executed, replicates itself by modifying other computer programs and inserting its own code. If this replication succeeds, the affected areas are then said to be infectedwith a computer virus.

Computer virus generally require a host program. The virus writes its own code into the host program. When the program runs, the written virus program is executed first, causing infection and damage. A computer worm does not need a host program, as it is an independent program, as it is an independent program or code chunk. Therefore, it is not restricted by the host program, but can run independently and actively carry out attacks.

Computer viruses cause billions of dollars worth of economic damage each year.

In 1989 The ADAPSO software Industry Division published dealing with Electronic Vandalism, in which they followed the risk of data loss by the added risk of losing customer confidence.

In response, free, open-source anti-virus tools have been developed, and an industry of antivirus software has cropped up, selling or freely distributing virus protection to users of various operating systems.

ADWARE &SPYWARE:

Adware is malicious software that automatically displays advertisements online to generate revenue for its author. Advertisements may appear in the user interface of the software, onscreen during the installation process, process, or in a browser.

While adware is not always dangerous, in some cases it may be designed to analyse the internet sites visited, present advertising content, install additional

programs, and redirect your browser to unsafe sites. It can even contain Trojan horses and spyware.

Adware can be bundled with software or a game that user wants. In many cases, during installation the bundle will access a third-part server that delivers the most current adware or add-on without ever touching the drive. Additionally, the same adware installers might hijack the delivery mechanism and can be utilized to deliver a much higher-severity malware.

Spyware is malicious software code that runs secretly on a computer, gathers information about the user and their browsing habits, and then transmits that information back to a remote entity. Rather than disrupting a device operation, spyware targets sensitive information and can grant remote access to hackers.

The purpose of spyware is to collect information about a person or organization without their knowledge and transmit that information to another entity for financial gain. That is why spyware is often used to steal financial or personal information. One specific type of spyware is a keylogger, which records the users keystrokes to reveal passwords and other personal information. This makes it a high severity thread.

PRIVACY ISSUES:

Spying and snooping. When you are online, you are spied by a number of trackers for various purposes.
Information Mishandling.
Location Tracking.
Used a VPN.
Conduct Safe Browsing.
Keep Your System Up-to-Date.
Use Anti-Virus.
Adjust Your Settings on Social Media.
HEALTH ISSUES:

Physical Activity and Nutrition
Overweight and Obesity
Tobacco
Substance Abuse
HIV/AIDS
Mental Health
Injury and Violence
Environmental Quality
Immunization

Access to Health

SOCIAL ISSUE:

ASocial issue is a problem that influences many citizens within a society. It is a group of common problems in present-day society and one that many people strive to solve. It is often the consequence of factors extending beyond an individual control. Social issues are the source of a conflicting opinion on the grounds of what is perceived as morally correct or incorrect personal life or interpersonal social life decisions. Social issues are distinguished from economic issues; however, some issues (such as immigration) have both social and economic aspects. There are also issues that do not fall into either category, such as warfare.

What is Cyber Security?

Cyber security is the practice of defending computers, servers, mobile devices, electronic systems, networks, and data from malicious attacks. It's also known as information technology security or electronic information security. The term applies in a variety of contexts, from business to mobile computing, and can be divided into a few common categories.

· Network security is the practice of securing a computer network from intruders, whether targeted attackers or opportunistic malware.

· Application security focuses on keeping software and devices free of threats. A compromised application could provide access to the data its designed to protect. Successful security begins in the design stage, well before a program or device is deployed.

· Information security protects the integrity and privacy of data, both in storage and in transit.

· Operational security includes the processes and decisions for handling and protecting data assets. The permissions users have when accessing a network and the procedures that determine how and where data may be stored or shared all fall under this umbrella.

· Disaster recovery and business continuity define how an organization responds to a cyber-security incident or any other event that causes the loss of operations or data. Disaster recovery policies dictate how the organization restores its operations and information to return to the same operating capacity as before the event. Business continuity is the plan the organization falls back on while trying to operate without certain resources.

· End-user education addresses the most unpredictable cyber-security factor: people. Anyone can accidentally introduce a virus to an otherwise secure system by failing to follow good security practices. Teaching users to delete suspicious email attachments, not plug in unidentified USB drives, and various other important lessons is vital for the security of any organization.

What is Cryptography?

Cryptography is the study of secure communications techniques that allow only the sender and intended recipient of a message to view its contents. The term is derived from the Greek word kryptos, which means hidden. It is closely associated to encryption, which is the act of scrambling ordinary text into what's known as ciphertext and then back again upon arrival. In addition, cryptography also covers the obfuscation of information in images using techniques such as microdots or merging. Ancient Egyptians were known to use these methods in complex hieroglyphics, and Roman Emperor Julius Caesar is credited with using one of the first modern ciphers.

When transmitting electronic data, the most common use of cryptography is to encrypt and decrypt email and other plain-text messages. The simplest method uses the symmetric or "secret key" system. Here, data is encrypted using a secret key, and then both the encoded message and secret key are sent to the recipient for decryption. The problem? If the message is intercepted, a third party has everything they need to decrypt and read the message. To address this issue, cryptologists devised the asymmetric or "public key" system. In this case, every user has two keys: one public and one private. Senders request the public key of their intended recipient, encrypt the message and send it along. When the message arrives, only the recipient's private key will decode it — meaning theft is of no use without the corresponding private key.

Security Management tools

To ensure that the company's online resources are safe and sound, there are many online tools that security managers can and should use. You can find a list of some of them below.

1. MailCleaner
This anti-spam software package provides a number of benefits for the online security of organizations. It is installed between the mail infrastructure and the Internet, and it uses a powerful spam filter to stop malware before it reaches the inbox of corporate users.The viruses are also detected by using the latest online technologies to provide maximum security for various users, from small sole traders to large enterprises. User friendliness of the design, as well as easy installation and control, make MailCleaner a good option for security managers because it optimizes security efforts and uses effective contemporary technologies.

2. Adguard
This is one of the best ad blockers in the game. It helps to get rid of annoying ads, online tracking and protect the computer from malware. It works in all browsers and has great advanced functions, such as HTML code filtering, cosmetic processing of the page, ad filtering in applications, protection from malicious ads, and even 24×7 support. In addition to blocking all types of ads, the tool is useful in protecting personal data by blocking access to online trackers that spy on the Internet all the time.

3. AVDS
This next tool is developed by a reputable company Beyond Security and is capable of improving a corporate network security. It can be used in networks from 50 to 200,000 nodes and provides a comprehensive examination of security weaknesses. AVDS is a great alternative to resource- and time-consuming manual vulnerability assessment, an approach which is largely ineffective and cannot provide the maximum level of security. In addition to discovering security vulnerabilities, the tool automatically generates specific recommendations on how to improve the security of the network

4. Cloudflare

Cloudflare provides a software package that enhances performance and security of online resources. For example, it can dramatically improve website performance and security by using web optimization features and DDoS, WAF and SSL protection tools. Thanks to an incredibly large network and infrastructure, Cloudflare can stop serious malware attacks on DNS systems. The security officers can receive support from the online team to ensure that every page is working properly and that all data is secured.

5. SiteLock
Another great tool for security managers who need to optimize their work. It provides website scanning, malware removal, source code analysis, vulnerability management, DDoS protection, blocking of harmful requests, PCI compliance, and website speed improvement. This package provides comprehensive security for corporate and individual websites and greatly improves the quality of security management with effective solutions

6. The Email Laundry
If you are looking for an ultimate email security management system, The Email Laundry is the tool for you. It provides cloud email management, which includes data loss prevention, backup and disaster recovery, email archiving, safe migration, webmail, simple administration, data reintegration, and many other management tools. It uses the latest security techniques and provides support for all users to ensure client satisfaction and maximum security. Many businesses and government agencies are using this tool to manage emails and prevent spam and malware threats.

7. Pure VPN
Pure VPN is a state-of-the-art technology for encrypting Internet traffic, anonymizing Internet activity, and enhancing online security. It works on all operating systems, uses over 500 servers in 121 countries, and promises the fastest speed possible and greater chances of avoiding hackers.

Cryptographic keys

In cryptography, a key is a string of characters used within an encryption algorithm for altering data so that it appears random. Like a physical key, it locks (encrypts) data so that only someone with the right key can unlock (decrypt) it.

The original data is known as the plaintext, and the data after the key encrypts it is known as the ciphertext.

Encryption

Encryption is a way of scrambling data so that only authorized parties can understand the information. In technical terms, it is the process of converting human-readable plaintext to incomprehensible text, also known as ciphertext. In simpler terms, encryption takes readable data and alters it so that it appears random. Encryption requires the use of a cryptographic key: a set of mathematical values that both the sender and the recipient of an encrypted message agree on.
Although encrypted data appears random, encryption proceeds in a logical, predictable way, allowing a party that receives the encrypted data and possesses the right key to decrypt the data, turning it back into plaintext. Truly secure encryption will use keys complex enough that a third party is highly unlikely to decrypt or break the ciphertext by brute force — in other words, by guessing the key.

Data can be encrypted "at rest," when it is stored, or "in transit," while it is being transmitted somewhere else.

The different types of encryption

The two main kinds of encryption are symmetric encryption and asymmetric encryption. Asymmetric encryption is also known as public key encryption.

In symmetric encryption, there is only one key, and all communicating parties use the same (secret) key for both encryption and decryption. In asymmetric, or public key, encryption, there are two keys: one key is used for encryption, and a different key is used for decryption. The decryption key is kept private (hence the "private key" name), while the encryption key is shared publicly, for anyone to use (hence the "public key" name). Asymmetric encryption is a foundational technology for TLS (often called SSL).

Fire wall

A Firewall is a network security device that monitors and filters incoming and outgoing network traffic based on an organization’s previously established security policies. At its most basic, a firewall is essentially the barrier that sits between a private internal network and the public Internet. A firewall’s main purpose is to allow non-threatening traffic in and to keep dangerous traffic out.

Denial of service attacks

A denial-of-service (DoS) attack is a type of cyber attack in which a malicious actor aims to render a computer or other device unavailable to its intended users by interrupting the device's normal functioning. DoS attacks typically function by overwhelming or flooding a targeted machine with requests until normal traffic is unable to be processed, resulting in denial-of-service to addition users. A DoS attack is characterized by using a single computer to launch the attack.

A distributed denial-of-service (DDoS) attack is a type of DoS attack that comes from many distributed sources, such as a botnet DDoS attack

Email monitoring

Employee Monitoring is the act of employers surveying employee activity through different surveillance methods. Organizations engage in employee monitoring for different reasons such as to track performance, to avoid legal liability, to protect trade secrets, and to address other security concerns. This practice may impact employee satisfaction due to its impact on the employee's privacy. Among organizations, the extent and methods of employee monitoring differ.

Virus defensor

The most common virus defense is the so-called 'scanner', which examines computer. files to detect known viruses. Scanners have several important problems that have a serious. impact on their current and future viability as a defense, most notably:they only detect viruses known to the author.

System control and audit

System Audit

It is an investigation to review the performance of an operational system. The objectives of conducting a system audit are as follows −

- To compare actual and planned performance.
- To verify that the stated objectives of system are still valid in current environment.
- To evaluate the achievement of stated objectives.
- To ensure the reliability of computer based financial and other information.
- To ensure all records included while processing.
- To ensure protection from frauds.

Audit of Computer System Usage
Data processing auditors audits the usage of computer system in order to control it. The auditor need control data which is obtained by computer system itself.

The System Auditor
The role of auditor begins at the initial stage of system development so that resulting system is secure. It describes an idea of utilization of system that can be recorded which helps in load planning and deciding on hardware and software specifications. It gives an indication of wise use of the computer system and possible misuse of the system.

Audit Trial
An audit trial or audit log is a security record which is comprised of who has accessed a computer system and what operations are performed during a given period of time. Audit trials are used to do detailed tracing of how data on the system has changed.

It provides documentary evidence of various control techniques that a transaction is subject to during its processing. Audit trials do not exist independently. They are carried out as a part of accounting for recovering lost transactions.

Audit Methods

Auditing can be done in two different ways −

- Auditing around the Computer

Take sample inputs and manually apply processing rules.
Compare outputs with computer outputs.

- Auditing through the Computer

Establish audit trial which allows examining selected intermediate results.
Control totals provide intermediate checks.

Audit Considerations

Audit considerations examine the results of the analysis by using both the narratives and models to identify the problems caused due to misplaced functions, split processes or functions, broken data flows, missing data, redundant or incomplete processing, and nonaddressed automation opportunities.

The activities under this phase are as follows −

Identification of the current environment problems
Identification of problem causes
Identification of alternative solutions
Evaluation and feasibility analysis of each solution
Selection and recommendation of most practical and appropriate solution
Project cost estimation and cost benefit analysis

Control Measures

There are variety of control measures which can be broadly classified as follows −

1. Backup

- Regular backup of databases daily/weekly depending on the time criticality and size.

- Incremental back up at shorter intervals.

- Backup copies kept in safe remote location particularly necessary for disaster recovery.

- Duplicate systems run and all transactions mirrored if it is a very critical system and cannot tolerate any disruption before storing in disk.

2. Physical Access Control to Facilities
- Physical locks and Biometric authentication. For example, finger print
- ID cards or entry passes being checked by security staff.
- Identification of all persons who read or modify data and logging it in a file.

3. Using Logical or Software Control
- Password system.
- Encrypting sensitive data/programs.
- Training employees on data care/handling and security.
- Antivirus software and Firewall protection while connected to internet.

Information systems audit and control

An information technology audit, or information systems audit, is an examination of the management controls within an Information technology (IT) infrastructure and business applications. The evaluation of evidence obtained determines if the information systems are safeguarding assets, maintaining data integrity, and operating effectively to achieve the organization's goals or objectives. These reviews may be performed in conjunction with a financial statement audit, internal audit, or other form of attestation engagement.

IT audits are also known as automated data processing audits (ADP audits) and computer audits.

They were formerly called electronic data processing audits (EDP audits).

Information system control

In business and accounting, information technology controls (or IT controls) are specific activities performed by persons or systems designed to ensure that business objectives are met. They are a subset of an enterprise's internal control.

IT control objectives relate to the confidentiality, integrity, and availability of data and the overall management of the IT function of the business enterprise. IT controls are often described in two categories: IT general controls (ITGC) and IT application controls. ITGC include controls over the Information Technology (IT) environment, computer operations, access to programs and data, program development and program changes. IT application controls refer to transaction processing controls, sometimes called "input-processing-output" controls

Blockchain technology

Blockchain technology is a structure that stores transactional records, also known as the block, of the public in several databases, known as the “chain,” in a network connected through peer-to-peer nodes. Typically, this storage is referred to as a ‘digital ledger.’

Every transaction in this ledger is authorized by the digital signature of the owner, which authenticates the transaction and safeguards it from tampering. Hence, the information the digital ledger contains is highly secure.

In simpler words, the digital ledger is like a Google spreadsheet shared among numerous computers in a network, in which, the transactional records are stored based on actual purchases. The fascinating angle is that anybody can see the data, but they can’t corrupt it.

How Blockchain works:

1. Hash Encryptions

Blockchain technology uses hash encryption to secure the data, relying mainly on the SHA256 algorithm to secure the information. The address of the sender (public key), the receiver’s address, the transaction, and his/her private key details are transmitted via the SHA256 algorithm. The encrypted information, called hash encryption, is transmitted across the world and added to the Blockchain after verification. The SHA256 algorithm makes it almost impossible to hack the hash encryption, which in turn simplifies the sender and receiver’s authentication.

2. Proof of Work

In a Blockchain, each block consists of 4 main headers.

- Previous Hash: This hash address locates the previous block.
- Transaction Details: Details of all the transactions that need to occur.
- Nonce: An arbitrary number given in cryptography to differentiate the block's hash address.
- Hash Address of the Block: All of the above (i.e., preceding hash, transaction details, and nonce) are transmitted through a hashing algorithm. This gives an output containing a 256-bit, 64 character length value, which is called the unique 'hash address.' Consequently, it is referred to as the hash of the block.

Numerous people around the world try to figure out the right hash value to meet a pre-determined condition using computational algorithms. The transaction completes when the predetermined condition is met. To put it more plainly, Blockchain miners attempt to solve a mathematical puzzle, which is referred to as a proof of work problem. Whoever solves it first gets a reward.
Blockchain Consists of four main headers

3. Mining

In Blockchain technology, the process of adding transactional details to the present digital/public ledger is called 'mining.' Though the term is associated with Bitcoin, it is used to refer to other Blockchain technologies as well. Mining involves generating the hash of a block transaction, which is tough to forge, thereby ensuring the safety of the entire Blockchain without needing a central system

Application of blockchain technology in business application

1. Payments

We all know that blockchains began from cryptocurrency and it is obvious that they work perfectly with payments and money transfers. But why is the use of blockchain so beneficial for small businesses? Fees. It's all about fees that banks charge when you need to pay for something or transfer money to somebody. With the blockchain technology, you don't need to pay to the banks which dramatically cuts your expenses. In the transfer chain, there are no more intermediaries, only you and a person you send your money to. If your business

is located in several countries or you have a remote team of employees, Blockchain based business model implementation is a necessary step

2. Smart contracts

This terms appeared about 25 years ago, however, only after the project Ethereum was launched, the smart contracts system became widely publicized.

To put it shortly, it is a distributed system that manages all smart contracts. The platform excludes the possibility of delays, suppression or any outside influence. The system provides comprehensive financial security, monitors the terms of the contract and is unbreakable. If in your business you deal with lots of contracts (especially, if you need to sign a contract with every client), Smart contracts are the best solution for you. What can we say if the biggest and the most powerful banks in the world take this system into account?

3. Distributed storage in the cloud

Distributed storage in the cloud. To understand how it works, we need to look at Storj, the company which offers cheap and fast cloud storage. Their system is built around blockchains. The platform helps store more data using the same amount of hardware and saves a tidy sum at the same time. So in case your business operates big data, blockchain is a great opportunity to cut down your expenses.

4. Digital Identity

If you still don't understand why this issue is so urgent, then you need to see the fraud statistics of all internet operations. To tell you the truth, the size of your company doesn't matter here because fraud happens just as much in big companies as it does in the small ones.

With the help of blockchain technology, it is much easier to track and monitor digital identities. And the best thing it does is identity authentication, where blockchains are needed to secure the whole procedure. While the usual authentication methods use the system based on passwords, the blockchain system only checks whether there was a correct private key.

5. Notary

You may not believe this fact but blockchain can work as a cheap notary system. Blockchains are able to provide evidence of existence, ownership and validate the identity of sets of data. What blockchain can also do is generate prior art or certify the ownership of any type of data. Believe me, it is a very cheap method, unlike the usual one which will cough up the cash for you. For instance, to certify a document in Europe, you'll have to pay more than 200 euros. With the blockchain platform, you'll spend 0.2 euros. And if you deal with such certificates, this blockchain business idea will help you stay afloat.

6. Gifts and discounts

These steps are inevitable if your business is connected with the e-commerce sphere. Various loyalty programs help you engage customers and show them your care. And, again, blockchains can help us avoid different types of scams and create unique certificates which would be easy to verify.

7. IoT systems

IoT devices collect megatonnes of data to learn how you behave, what you like, how you live and so on. All this information needs to be processed and stored. And blockchains fit these criteria the best. We can explain it with two facts. Firstly, blockchain can communicate with all your devices simultaneously. And secondly, it saves lots of money because it eliminates the central hub and acts as a bridge between all IoT devices.

8. Chain of supply

Blockchain is a real must-have for your business if you work with deliveries of any kind. Usual software that manages supply chains is very fragile and in a case of a crash, you have all chances to go bankrupt. The structure of blockchains is designed to eliminate the human factor and flaws in the system. Blockchains records everything that happens which means that even in case of a failure or crack you can always find out what happened and rehabilitate the system.

These blockchain-based applications show how useful the blockchains could be for your business no matter how big your company is. We advise you to apply blockchain not only because it is a very advanced technology but also because the system has a very bright future. Let's take a look at what financial future the blockchains have.