

LECTURE NOTES
ON
E-COMMERCE
TECHNOLOGIES

SYLLABUS:

Module – I

Electronic Commerce: Overview, Definitions, Advantages & Disadvantages of E Commerce, Threats of E-Commerce, Cyber Laws. Technologies: Relationship between E-Commerce and Networking, Different Types of Networking for E-Commerce, internet, intranet, EDI Systems. Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce. Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E Commerce. Business Models of E-Commerce; Model Based on Transaction Type, Model Based on Transaction Party – B2B, B2C, C2B, C2C, E-Governance.

Module – II

Convergence: Technological Advances in Convergence – Types, Convergence and its implications, Convergence and Electronic Commerce. Collaborative Computing: Collaborative product development, Content Management: Definition of content, Authoring Tools and Content Management, Content – partnership, repositories, convergence, providers Web Traffic & Traffic management: Content Marketing. Call Centre: Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weaknesses of Call Centre, Customer Premises Equipment (CPE). Supply Chain Management: E-logistics, Supply Chain Portal, Supply Chain planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE – Framework, Internet's effect on Supply Chain Power.

Module – III

E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections, E-Marketing: Home – shopping, E-Marketing, Tele-Marketing Electronic Data Interchange (EDI): Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSIX – 12 Risk of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures

Module – IV

Enterprise Resource Planning (ERP): Features, capabilities and Overview of Commercial Software, re-engineering work processes for IT applications, Business Process Redesign, Knowledge Engineering and Data Warehouse. Business Modules: Finance, Manufacturing (Production), Human Resources, Plant Maintenance, Materials, Management, Quality Management Sales & Distribution ERP Package ERP Market: ERP Market Place, SAP AG, People Soft, BAAN, JD Edwards, Oracle Corporation. EAI(Enterprise application integration)

Electronic Commerce:

- Electronic commerce, commonly known as E-commerce is trading in products or services using computer networks, such as the Internet.
- Electronic commerce draws on technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems.
- Modern electronic commerce typically uses the World Wide Web for at least one part of the transaction's life cycle, although it may also use other technologies such as e-mail.

Definition of E-commerce:

Sharing business information, maintaining business relationships and conducting business transactions using computers connected to telecommunication network is called E-Commerce.

E-Commerce Categories:

1. Electronic Markets

Present a range of offerings available in a market segment so that the purchaser can compare the prices of the offerings and make a purchase decision.

Example: Airline Booking System

2. Electronic Data Interchange (EDI)

- It provides a standardized system
- Coding trade transactions
- Communicated from one computer to another without the need for printed orders and invoices & delays & errors in paper handling
- It is used by organizations that make a large no. of regular transactions

Example: EDI is used in the large market chains for transactions with their suppliers

3. Internet Commerce

- It is used to advertise & make sales of wide range of goods & services.
- This application is for both business to business & business to consumer transactions.

Example: The purchase of goods that are then delivered by post or the booking of tickets that can be picked up by the clients when they arrive at the event.

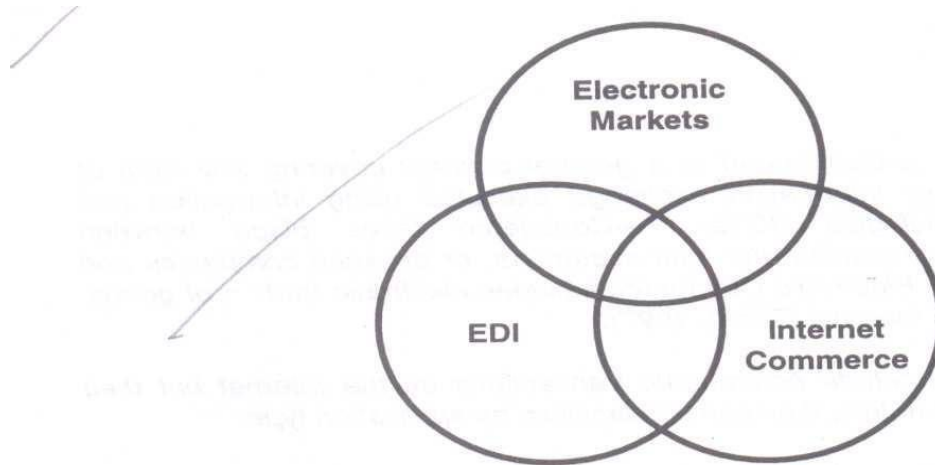


Fig. 1.1 The three categories of e-Commerce.

Advantages of E-commerce:

- Buying/selling a variety of goods and services from one's home or business
- Anywhere, anytime transaction
- Can look for lowest cost for specific goods or service
- Businesses can reach out to worldwide clients - can establish business partnerships
- Order processing cost reduced
- Electronic funds transfer faster
- Supply chain management is simpler, faster, and cheaper using ecommerce
 - Can order from several vendors and monitor supplies.
 - Production schedule and inventory of an organization can be inspected by cooperating supplier who can in-turn schedule their work

Disadvantages of E-commerce:

- Electronic data interchange using EDI is expensive for small businesses
- Security of internet is not very good - viruses, hacker attacks can paralyze e-commerce
- Privacy of e-transactions is not guaranteed
- E-commerce de-personalizes shopping

Threats of E-commerce:

- Hackers attempting to steal customer information or disrupt the site
- A server containing customer information is stolen.

- Imposters can mirror your ecommerce site to steal customer money
- Authorized administrators/users of an ecommerce website downloading hidden active content that attacks the ecommerce system.
- A disaffected employee disrupting the ecommerce system.
- It is also worth considering where potential threats to your ecommerce site might come from, as identifying potential threats will help you to protect your site. Consider:
- Who may want to access your ecommerce site to cause disruption or steal data; for example competitors, ex-employees, etc.
- What level of expertise a potential hacker may possess; if you are a small company that would not be likely to be considered a target for hackers then expensive, complex security may not be needed.

Features of E-commerce:

➤ **Ubiquity**

Internet/Web technology is the marketplace is extended beyond traditional available everywhere: at work, at home, and boundaries and is removed from a temporal and elsewhere via mobile devices, anytime. Geographic location. -Market space is created; shopping can take place anywhere. Customer convenience is enhanced, and shopping costs are reduced.

➤ **Global reach**

The technology reaches Commerce is enabled across cultural and across national boundaries, around the earth.

➤ **Universal standards**

There is one set of There is one set of technical media standards technology standards, namely Internet across the globe.

➤ **Richness**

Video, audio, and text messages Video, audio, and text marketing messages are possible. Integrated into a single marketing message and consuming experience.

➤ **Interactivity**

The technology works Consumers are engaged in a dialog that through interaction with the user. Dynamically adjusts the experience to the individual, and makes the consumer a co-

participant in the process of delivering goods to the market.

➤ **Information density**

The technology Information processing, storage, and reduces information costs and raises quality. Communication costs drop dramatically, while currency, accuracy, and timeliness improve greatly. Information becomes plentiful, cheap, and accurate.

➤ **Personalization/Customization**

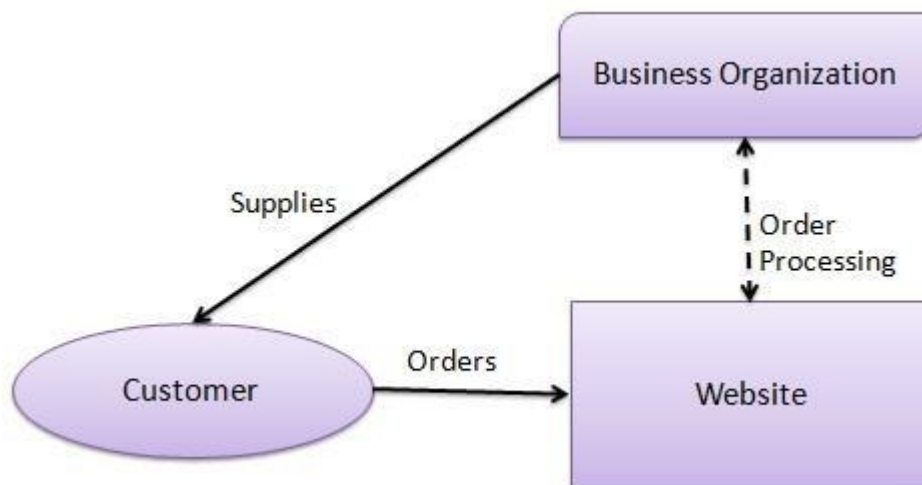
The Personalization of marketing messages and technology allows personalized messages to customization of products and services are be delivered to individuals as well as groups.

Business models of E-commerce:

There are mainly 4 types of business models based on transaction party.

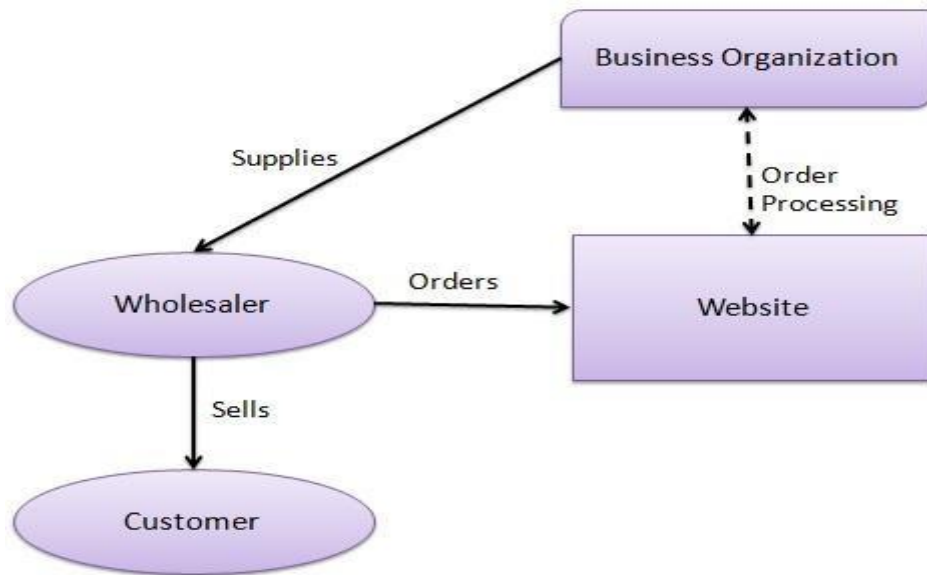
Business-to-Consumer (B2C)

In a Business-to-Consumer E-commerce environment, companies sell their online goods to consumers who are the end users of their products or services. Usually, B2C E-commerce web shops have an open access for any visitor, meaning that there is no need for a person to login in order to make any product related inquiry.



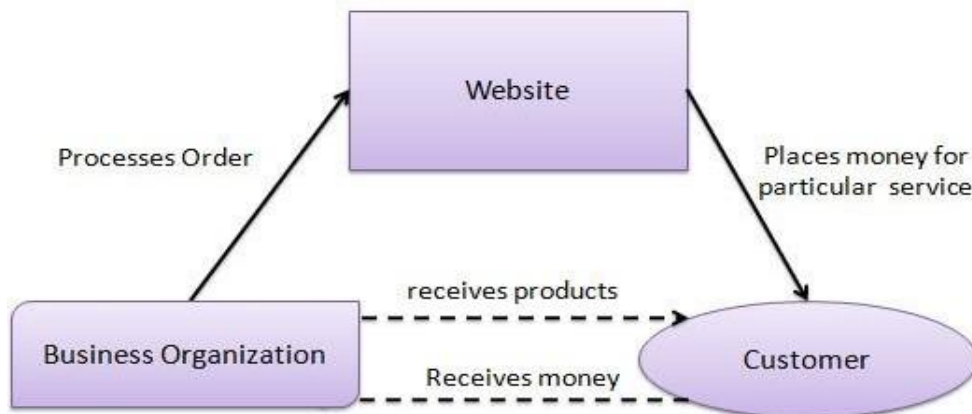
Business-to-Business (B2B)

In a Business-to-Business E-commerce environment, companies sell their online goods to other companies without being engaged in sales to consumers. In most B2B E-commerce environments entering the web shop will require a log in. B2B web shop usually contains customer-specific pricing, customer-specific assortments and customer-specific discounts.



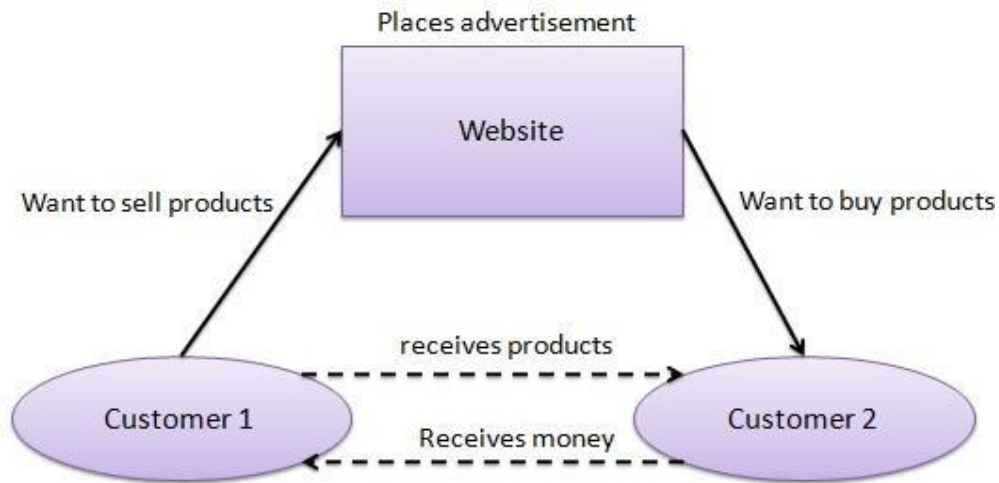
Consumer-to-Business (C2B)

In a Consumer-to-Business E-commerce environment, consumers usually post their products or services online on which companies can post their bids. A consumer reviews the bids and selects the company that meets his price expectations.



Consumer-to-Consumer (C2C)

In a Consumer-to-Consumer E-commerce environment consumers sell their online goods to other consumers. A well-known example is eBay.



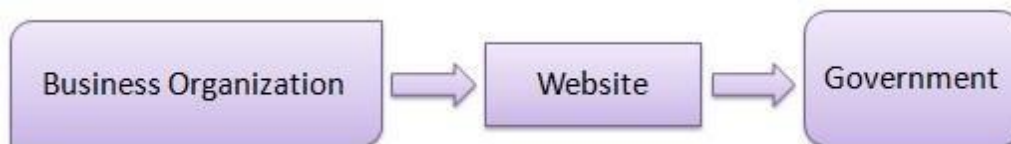
E-Governance:

E-governance is the application of information and communication technology (ICT) for delivering government services, exchange of information communication transactions, integration of various stand-alone systems and services between government-to-customer (G2C), government-to-business (G2B), government-to-government (G2G) as well as back office processes and interactions within the entire government framework.

Through e-governance, government services will be made available to citizens in a convenient, efficient and transparent manner. The three main target groups that can be distinguished in governance concepts are government, citizens and businesses/interest groups. In e-governance there are no distinct boundaries.

Business - to - Government (B2G)

B2G model is a variant of B2B model. Such websites are used by government to trade and exchange information with various business organizations. Such websites are accredited by the government and provide a medium to businesses to submit application forms to the government.



Government - to - Business (G2B)

Government uses B2G model website to approach business organizations. Such websites support

auctions, tenders and application submission functionalities.



Government - to - Citizen (G2C)

Government uses G2C model website to approach citizen in general. Such websites support auctions of vehicles, machinery or any other material. Such website also provides services like registration for birth, marriage or death certificates. Main objectives of G2C website are to reduce average time for fulfilling people requests for various government services.



Different Types of Networking for E-Commerce:

Internet:

The Internet is a global network of computers that allows people to send email, view web sites, download files such as mp3 and images, chat, post messages on newsgroups and forums and much more.

The Internet was created by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1960's and was first known as the ARPANet. At this stage the Internet's first computers were at academic and government institutions and were mainly used for accessing files and to send emails. From 1983 onwards the Internet as we know it today started to form with the introduction of the communication protocol TCP/IP to ARPANet. Since 1983 the Internet has accommodated a lot of changes and continues to keep developing.

The last two decades has seen the Internet accommodate such things as network LANs and ATM and frame switched services. The Internet continues to evolve with it becoming available on mobile phones and pagers and possibly on televisions in the future.

Advantages of internet:

There many advantages to using the internet such as:

E-mail

Email is now an essential communication tool in business. It is also excellent for keeping in touch

with family and friends. The advantage to email is that it is free (no charge per use) when compared to telephone, fax and postal services.

Information

There is a huge amount of information available on the internet for just about every subject known to man, ranging from government law and services, trade fairs and conferences, market information, new ideas and technical support.

Services

Many services are now provided on the internet such as online banking, job seeking and applications, and hotel reservations. Often these services are not available off-line or cost more.

Buy or sell products.

The internet is a very effective way to buy and sell products all over the world.

Communities of all types have sprung up on the internet. Its a great way to meet up with people of similar interest and discuss common issues.

A Leading-Edge Image

Presenting your company or organization as leading-edge shows your customers and prospective customers that you are financially strong, technologically savvy, and ready for the 21st century. And that you care enough about your customers to take advantage of new technologies for their benefit. And finally that you have the resources to support your clients in the most beneficial manner possible.

More and more advertisers on television, radio, magazines, and newspapers are including a Web address. Now is the time to avoid playing catch-up later.

Improved Customer Service

The companies are available to their customers 24 hours a day, 7 days a week. The Internet never sleeps. Whenever customer needs information about any company, products or services, they can access the company's Web Page.

Market Expansion

The Internet is a global system. Latest estimates are that there are about 40 million people with access to the Internet, and this number is growing every day. By simply posting a Web Page you are also addressing International markets.

Low Cost Marketing

Imagine developing a full color brochure without having to incur the costs of proofs, printers, wasted paper, long lead times between revisions, and more. Then imagine a full color product or

services brochure that is interactive and which incorporates text, graphics, audio, and/or video. One that can be immediately updated without incurring the usual costs of product material updates.

Low Cost Selling

Without the cost of direct selling potential customers can get detailed information about your products or services at any time. And they can easily order your products over the Internet, or request additional information be sent to them via a request form on your Web page.

Lower Communication Costs

Your time, and your employees time, is valuable. Most businesses and organizations spend time answering the same questions over and over again. With a Web page you can make the answers available to everyone immediately. You can also update your Web page with new information quickly and easily.

Intranet:

- An intranet is a computer network that uses Internet Protocol technology to share information, operational systems, or computing services within an organization. This term is used in contrast to extranet, a network between organizations, and instead refers to a network within an organization.
- The objective is to organize each individual's desktop with minimal cost, time and effort to be more productive, cost efficient, timely, and competitive.
- An intranet may host multiple private websites and constitute an important component and focal point of internal communication and collaboration.
- Any of the well known Internet protocols may be found in an intranet, such as HTTP (web services), SMTP (e-mail), and FTP (file transfer protocol). Internet technologies are often deployed to provide modern interfaces to legacy information systems hosting corporate data.

Uses of Intranet:

- Increasingly, intranets are being used to deliver tools, e.g. collaboration (to facilitate working in groups and teleconferencing) or sophisticated corporate directories, sales and customer relationship management tools, project management etc., to advance productivity.
- Intranets are also being used as corporate culture-change platforms. For example, large

numbers of employees discussing key issues in an intranet forum application could lead to new ideas in management, productivity, quality, and other corporate issues.

- In large intranets, website traffic is often similar to public website traffic and can be better understood by using web metrics software to track overall activity. User surveys also improve intranet website effectiveness. Larger businesses allow users within their intranet to access public internet through firewall servers. They have the ability to screen messages coming and going keeping security intact.
- When part of an intranet is made accessible to customers and others outside the business, that part becomes part of an extranet. Businesses can send private messages through the public network, using special encryption/decryption and other security safeguards to connect one part of their intranet to another.
- Intranet user-experience, editorial, and technology teams work together to produce in-house sites. Most commonly, intranets are managed by the communications, HR or CIO departments of large organizations, or some combination of these.
- Because of the scope and variety of content and the number of system interfaces, intranets of many organizations are much more complex than their respective public websites. Intranets and their use are growing rapidly.

Advantages:

- **Workforce productivity:** Intranets can help users to locate and view information faster and use applications relevant to their roles and responsibilities. With the help of a web browser interface, users can access data held in any database the organization wants to make available, anytime and — subject to security provisions — from anywhere within the company workstations, increasing employees' ability to perform their jobs faster, more accurately, and with confidence that they have the right information.
- **Time:** Intranets allow organizations to distribute information to employees on an *as-needed* basis; Employees may link to relevant information at their convenience, rather than being distracted indiscriminately by email.
- **Communication:** Intranets can serve as powerful tools for communication within an organization, vertically strategic initiatives that have a global reach throughout the organization. By providing this information on the intranet, staff have the opportunity to keep

up-to-date with the strategic focus of the organization. Some examples of communication would be chat, email, and/or blogs. A great real world example of where an intranet helped a company communicate is when Nestle had a number of food processing plants in Scandinavia. Their central support system had to deal with a number of queries every day.

- **Web publishing:** allows cumbersome corporate knowledge to be maintained and easily accessed throughout the company using hypermedia and Web technologies. Examples include: employee manuals, benefits documents, company policies, business standards, news feeds, and even training, can be accessed using common Internet standards (Acrobat files, Flash files, CGI applications). Because each business unit can update the online copy of a document, the most recent version is usually available to employees using the intranet.
- **Business operations and management:** Intranets are also being used as a platform for developing and deploying applications to support business operations and decisions across the internetworked enterprise.
- **Cost-effective:** Users can view information and data via web-browser rather than maintaining physical documents such as procedure manuals, internal phone list and requisition forms. This can potentially save the business money on printing, duplicating documents, and the environment as well as document maintenance overhead.
- **Enhance collaboration:** Information is easily accessible by all authorised users, which enables teamwork.
- **Cross-platform capability:** Standards-compliant web browsers are available for Windows, Mac, and UNIX.
- **Built for one audience:** Many companies dictate computer specifications which, in turn, may allow Intranet developers to write applications that only have to work on one browser (no cross-browser compatibility issues).
- **Promote common corporate culture:** Every user has the ability to view the same information within the Intranet.
- **Immediate updates:** When dealing with the public in any capacity, laws, specifications, and parameters can change. Intranets make it possible to provide your audience with "live" changes so they are kept up-to-date, which can limit a company's liability.
- **Supports a distributed computing architecture:** The intranet can also be linked to a company's management information system, for example a time keeping system.

Wireless Application Protocol:

- WAP is a technical standard for accessing information over a mobile wireless network.
- A WAP browser is a web browser for mobile devices such as mobile phones that uses the protocol.
- WAP is a specification for a set of communication protocols to standardize the way that wireless devices, such as cellular telephones and radio transceivers, can be used for Internet access, including e-mail, the World Wide Web, newsgroups, and instant messaging.

The WAP layers are:

- Wireless Application Environment (WAE)
- Wireless Session Layer (WSL)
- Wireless Transport Layer Security(WTLS)
- Wireless Transport Layer (WTP)

Web security:

- It is a branch of Information Security that deals specifically with security of websites, web applications and web services.
- At a high level, Web application security draws on the principles of application security but applies them specifically to Internet and Web systems. Typically web applications are developed using programming languages such as PHP, Java EE, Java, Python, Ruby, ASP.NET, C#, VB.NET or Classic ASP.

Technological Convergence:

- Technological convergence is the tendency that as technology changes, different technological systems sometimes evolve toward performing similar tasks.
- Digital convergence refers to the convergence of four industries into one conglomerate, ITTCE (Information Technologies, Telecommunication, Consumer Electronics, and Entertainment).Previously separate technologies such as voice data and productivity applications, and video can now share resources and interact with each other synergistically.
- Telecommunications convergence, network convergence or simply convergence are broad

terms used to describe emerging telecommunications technologies, and network architecture used to migrate multiple communications services into a single network.

- Convergence in this instance is defined as the interlinking of computing and other information technologies, media content, and communication networks that has arisen as the result of the evolution and popularization of the Internet as well as the activities, products and services that have emerged in the digital media space.
- Convergent services, such as VoIP, IPTV, Mobile TV, Smart TV, and others, tend to replace the older technologies and thus can disrupt markets. IP-based convergence is inevitable and will result in new service and new demand in the market.

Technology Implications:

Convergent solutions include both fixed-line and mobile technologies. Recent examples of new, convergent services include:

- Using the Internet for voice telephony
- Video on demand
- Fixed-mobile convergence
- Mobile-to-mobile convergence
- Location-based services
- Integrated products and bundles

Convergent technologies can integrate the fixed-line with mobile to deliver convergent solutions.

Convergent technologies include:

- IP Multimedia Subsystem
- Session Initiation Protocol
- IPTV
- Voice over IP
- Voice call continuity
- Digital video broadcasting - handheld

Collaborative Product Development:

- CPD is a business strategy, work process and collection of software applications that facilitates different organizations to work together on the development of a product. It is also known as collaborative product definition management (CPDM).
- Collaborative Product Development helps individual users and companies manage, share and view your CAD projects without the cost and complexity of purchasing an entire PDM or PLM solution. CPD comes in the form of a Software as a service delivery model, which allows for rapid iterations and little or no downloads and installs.
- Exactly what technology comes under this title does vary depending on whom one asks; however, it usually consists of the Product Lifecycle Management (PLM) areas of: Product Data Management (PDM); Product visualization; team collaboration and conferencing tools; and supplier sourcing software. It is generally accepted as not including CAD geometry tools, but does include data translation technology.

Content Management System:

- A content management system (CMS) is a computer application that allows publishing, editing and modifying content, organizing, deleting as well as maintenance from a central interface. Such systems of content management provide procedures to manage workflow in a collaborative environment.
- CMSs are often used to run websites containing blogs, news, and shopping. Many corporate and marketing websites use CMSs. CMSs typically aim to avoid the need for hand coding, but may support it for specific elements or entire pages.

Main features of CMS:

- The function and use of content management systems is to store and organize files, and provide version-controlled access to their data. CMS features vary widely. Simple systems showcase a handful of features, while other releases, notably enterprise systems, offer more complex and powerful functions. Most CMS include Web-based publishing, format management, revision control (version control), indexing, search, and retrieval. The CMS increments the version number when new updates are added to an already-existing file. Some content management systems also support the separation of content and presentation.

- A CMS may serve as a central repository containing documents, movies, pictures, phone numbers, scientific data. CMSs can be used for storing, controlling, revising, semantically enriching and publishing documentation.

The content management system (CMS) has two elements:

- Content management application (CMA) is the front-end user interface that allows a user, even with limited expertise, to add, modify and remove content from a Web site without the intervention of a Webmaster.
- Content delivery application (CDA) compiles that information and updates the Web site.

Web Traffic:

Web traffic is the amount of data sent and received by visitors to a web site.

Web traffic is measured to see the popularity of web sites and individual pages or sections within a site. This can be done by viewing the traffic statistics found in the web server log file, an automatically generated list of all the pages served. A *hit* is generated when any file is served.

The following types of information are often collated when monitoring web traffic:

- The number of visitors.
- The average number of page views per visitor – a high number would indicate that the average visitors go deep inside the site, possibly because they like it or find it useful.
- Average visit duration – the total length of a user's visit. As a rule the more time they spend the more they're interested in your company and are more prone to contact.
- Average page duration – how long a page is viewed for. The more pages viewed, the better it is for your company.
- Domain classes – all levels of the IP Addressing information required to deliver Webpages and content.
- Busy times – the most popular viewing time of the site would show when would be the best time to do promotional campaigns and when would be the most ideal to perform maintenance
- Most requested pages – the most popular pages
- Most requested entry pages – the entry page is the first page viewed by a visitor and shows which are the pages most attracting visitors

- Most requested exit pages – the most requested exit pages could help find bad pages, broken links or the exit pages may have a popular external link
- Top paths – a path is the sequence of pages viewed by visitors from entry to exit, with the top paths identifying the way most customers go through the site
- Referrers; The host can track the (apparent) source of the links and determine which sites are generating the most traffic for a particular page.

Content Marketing:

- Content marketing is any marketing that involves the creation and sharing of media and publishing content in order to acquire and retain customers.
- It is a strategic marketing approach focused on creating and distributing valuable, relevant, and consistent content to attract and retain a clearly-defined audience — and, ultimately, to drive profitable customer action.
- Basically, content marketing is the art of communicating with your customers and prospects without selling.
- It is non-interruption marketing. Instead of pitching your products or services, you are delivering information that makes your buyer more intelligent.

Supply Chain Management:

It is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption.

Supply chain management must address the following problems:

- Distribution Network Configuration: Number and location of suppliers, production facilities, distribution centers, warehouses and customers.
- Distribution Strategy: Centralized versus decentralized, direct shipment, cross docking, pull or push strategies, third party logistics.
- Information: Integrate systems and processes through the supply chain to share valuable information, including demand signals, forecasts, inventory and transportation.
- Inventory Management: Quantity and location of inventory including raw materials, work

in-process and finished goods.

Features of Supply Chain Management:

In electronic commerce, supply chain management has the following features.

- An ability to source raw material or finished goods from anywhere in the world
- A centralized, global business and management strategy with flawless local execution
- On-line, real-time distributed information processing to the desktop, providing total supply chain information visibility
- The ability to manage information not only within a company but across industries and enterprises
- The seamless integration of all supply chain processes and measurements, including third-party suppliers, information systems, cost accounting standards, and measurement systems
- The development and implementation of accounting models such as activity based costing that link cost to performance are used as tools for cost reduction
- A reconfiguration of the supply chain organization into high-performance teams going from the shop floor to senior management.

Components of Supply Chain Management:

The following are five basic components of SCM.

➤ **Plan:**

This is the strategic portion of SCM. You need a strategy for managing all the resources that go toward meeting customer demand for your product or service. A big piece of planning is developing a set of metrics to monitor the supply chain so that it is efficient, costs less and delivers high quality and value to customers.

➤ **Source:**

Choose the suppliers that will deliver the goods and services you need to create your product. Develop a set of pricing, delivery and payment processes with suppliers and create metrics for monitoring and improving the relationships. And put together processes for managing the inventory of goods and services you receive from suppliers, including receiving shipments, verifying them, transferring them to your manufacturing facilities and authorizing supplier payments.

➤ **Make:**

This is the manufacturing step. Schedule the activities necessary for production, testing, packaging and preparation for delivery. As the most metric-intensive portion of the supply chain, measure quality levels, production output and worker productivity.

➤ **Deliver:**

This is the part that many insiders refer to as logistics. Coordinate the receipt of orders from customers, develop a network of warehouses, pick carriers to get products to customers and set up an invoicing system to receive payments.

➤ **Return:**

The problem part of the supply chain. Create a network for receiving defective and excess products back from customers and supporting customers who have problems with delivered products.

Measuring A Supply Chain's Performance:

The performance of a supply chain is evaluated by how it reduces cost or increases value. SCM performance monitoring is important; in many industries, the supply chain represents roughly 75 percent of the operating budget expense. Three common measures of performance are used when evaluating SCM performance:

- Efficiency focuses on minimizing cost by decreasing the inventory investment or value relative to the cost of goods sold. An efficient firm is therefore one with a higher inventory turnover or fewer weeks' worth of inventory on hand.
- Responsiveness focuses on reduction in both inventory costs and missed sales that comes with a faster, more flexible supply chain. A responsive firm is proficient in an uncertain market environment, because it can quickly adjust production to meet demand.
- Effectiveness of the supply chain relates to the degree to which the supply chain creates value for the customer

To examine the effect of the Internet and electronic commerce on the supply chain is to examine the impact the Internet has on the efficiency, responsiveness, effectiveness, and overall performance of the supply chain.

Advantages of Internet/E-Commerce Integrated Supply Chain:

The primary advantages of Internet utilization in supply chain management are speed, decreased

cost, flexibility, and the potential to shorten the supply chain.

➤ **Speed:**

A competitive advantage accrues to those firms that can quickly respond to changing market conditions. Because the Internet allows near instantaneous transfer of information between various links in the supply chain, it is ideally suited to help firms keep pace with their environments. Many businesses have placed a priority upon real-time information regarding the status of orders and production from other members of the supply chain.

➤ **Cost decrease:**

Internet-based electronic procurement helps reduce costs by decreasing the use of paper and labor, reducing errors, providing better tracking of purchase orders and goods delivery, streamlining ordering processes, and cutting acquisition cycle times.

➤ **Flexibility:**

The Internet allows for custom interfaces between a company and its different clients, helping to cost-effectively establish mass customization.

Disadvantages of Internet/E-Commerce Integrated Supply Chain:

➤ **Increased interdependence:**

Increased commoditization, increased competition, and shrinking profit margins are forcing companies to increase outsourcing and subcontracting to minimize cost. By focusing on its core competencies, a firm should be able to maximize its economies of scale and its competitiveness. However, such a strategy requires increased reliance and information sharing between members of the supply chain. Increased dependency on various members of the supply chain can have disastrous consequences if these supply chain members are unable to handle the functions assigned to them.

➤ **The costs of implementation:**

Implementation of a fully-integrated Internet-based supply chain is expensive. This expense includes hardware cost, software cost, reorganization cost, and training costs. While the Internet promises many advantages once it is fully integrated into a supply chain, a significant up front investment is needed for full deployment.

E-Payment System:

Electronic payment systems are central to on-line business process as companies look for ways

to serve customers faster and at lower cost. Emerging innovations in the payment for goods and services in electronic commerce promise to offer a wide range of new business opportunities.

Electronic payment systems and e-commerce are highly linked given that on-line consumers must pay for products and services. Clearly, payment is an integral part of the mercantile process and prompt payment is crucial. If the claims and debits of the various participants (consumers, companies and banks) are not balanced because of payment delay, then the entire business chain is disrupted. Hence an important aspect of e-commerce is prompt and secure payment, clearing, and settlement of credit or debit claims.

Electronic payment systems are becoming central to on-line business transactions nowadays as companies look for various methods to serve customers faster and more cost effectively. Electronic commerce brings a wide range of new worldwide business opportunities. There is no doubt that electronic payment systems are becoming more and more common and will play an important role in the business world. Electronic payment always involves a payer and a payee who exchange money for goods or services. At least one financial institution like a bank will act as the issuer (used by the payer) and the acquirer (used by the payee).

Types of Electronic Payment Systems:

Electronic payment systems are proliferating in banking, retail, health care, on-line markets, and even government—in fact, anywhere money needs to change hands.

- Organizations are motivated by the need to deliver products and services more cost effectively and to provide a higher quality of service to customers.
- The emerging electronic payment technology labeled electronic funds transfer (EFT).
- EFT is defined as –any transfer of funds initiated through an electronic terminal telephonic instrument, or computer or magnetic tape so as to order, instruct, or authorize a financial institution.

EFT can be segmented into three broad categories:

➤ **Banking and financial payments**

- Large-scale or wholesale payments (e.g., bank-to-bank transfer)
- Small-scale or retail payments (e.g., automated teller machines)
- Home banking (e.g., bill payment)

➤ **Retailing payments**

- Credit Cards (e.g., VISA or MasterCard)
- Private label credit/debit cards (e.g., J.C. Penney Card)
- Charge Cards (e.g., American Express)

➤ **On-line electronic commerce payments**

❖ **Token-based payment systems**

- Electronic cash (e.g., DigiCash)
- Electronic checks (e.g., NetCheque)
- Smart cards or debit cards (e.g., Mondex Electronic Currency Card)

❖ **Credit card-based payments systems**

- Encrypted Credit Cards (e.g., World Wide Web form-based encryption)
- Third-party authorization numbers (e.g., First Virtual)

Concept of E-Cash:

- There are many ways that exist for implementing an e-cash system, all must incorporate a few common features.
- Electronic Cash is based on cryptographic systems called –digital signatures.
- This method involves a pair of numeric keys: one for locking (encoding) and the other for unlocking (decoding).

E-cash must have the following four properties.

- Monetary value
- Interoperability
- Retrievability
- Security

• Electronic cash is a general term that describes the attempts of several companies to create value storage and exchange system that operates online in much the same way that government-issued currency operates in the physical world.

• Concerns about electronic payment methods include:

- Privacy

- Security
- Independence
- Portability

Electronic Cash Storage:

- Two methods

- **On-line**

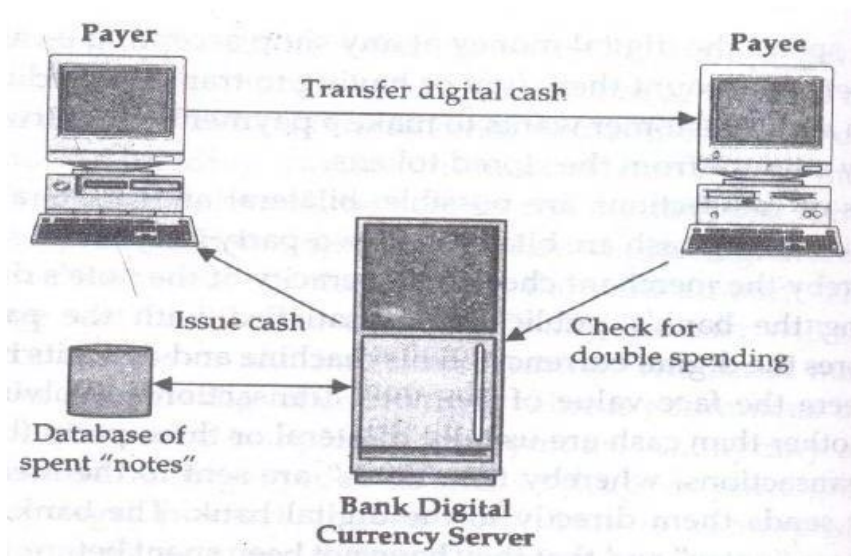
- Individual does not have possession personally of electronic cash
 - Trusted third party, e.g. e-banking, bank holds customers' cash accounts

- **Off-line**

- Customer holds cash on smart card or electronic wallet
 - Fraud and double spending require tamper-proof encryption

The purchase of e-cash from an on-line currency server (or bank) involves two steps:

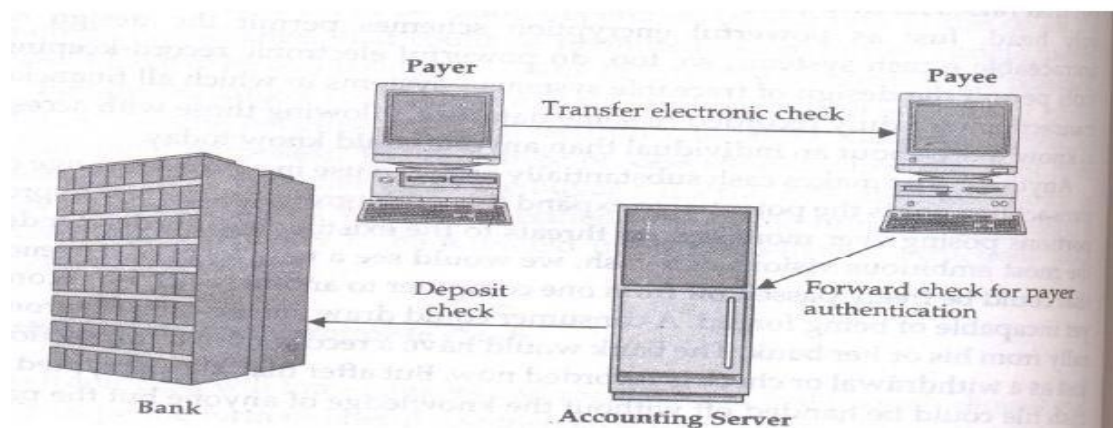
- Establishment of an account
 - Maintaining enough money in the account to bank the purchase.
-
- Once the tokens are purchased, the e-cash software on the customer's PC stores digital money undersigned by a bank.
 - The users can spend the digital money at any shop accepting e-cash, without having to open an account there or having to transmit credit card numbers.
 - As soon as the customer wants to make a payment, the software collects the necessary amount from the stored tokens



– Convenience

3.2 Electronic Checks:

- It is another form of electronic tokens.
- Buyers must register with third-party account server before they are able to write electronic checks.
- The account server acts as a billing service.



Advantages of Electronic Checks:

1. They work in the same way as traditional checks.
2. These are suited for clearing micropayments.

3. They create float & availability of float is an important for commerce.
4. Financial risk is assumed by the accounting server & may result in easier acceptance.

Smart Cards & Electronic Payment Systems:

- Smart cards have been in existence since the early 1980s and hold promise for secure transactions using existing infrastructure.
- Smart cards are credit and debit cards and other card products enhanced with microprocessors capable of holding more information than the traditional magnetic stripe.

Types of Smart Cards:

- Relationship-Based Smart Credit Cards
- Electronic Purses also known as debit cards
- **Relationship-Based Smart Credit Cards:**
 - It is an enhancement of existing cards services &/ or the addition of new services that a financial institution delivers to its customers via a chip-based card or other device.
 - These services include access to multiple financial accounts, value-added marketing programs, or other information card holders may want to store on their card.
 - It includes access to multiple accounts, such as debit, credit, cash access, bill payment & multiple access options at multiple locations.

➤ **Electronic Purses:**

To replace cash and place a financial instrument are racing to introduce electronic purses, wallet-sized smart cards embedded with programmable microchips that store sums of money for people to use instead of cash for everything.

The electronic purse works in the following manner:

- After purse is loaded with money at an ATM, it can be used to pay for candy in a vending machine with a card reader.
- It verifies card is authentic & it has enough money, the value is deducted from balance on the card & added to an e-cash & remaining balance is displayed by the vending machine.

Credit Card-Based Electronic Payment Systems:

Payment cards are all types of plastic cards that consumers use to make purchases:

– Credit cards

- Such as a Visa or a MasterCard, has a preset spending limit based on the user's credit limit.

– Debit cards

- Removes the amount of the charge from the cardholder's account and transfers it to the seller's bank.

– Charge cards

- Such as one from American Express, carries no preset spending limit.

Advantages:

– Payment cards provide fraud protection.

– They have worldwide acceptance.

– They are good for online transactions.

Disadvantages:

Payment card service companies charge merchants per-transaction fees and monthly processing fees.

Risks in Electronic Payment systems:

➤ Customer's risks

– Stolen credentials or password

– Dishonest merchant

– Disputes over transaction

– Inappropriate use of transaction details

➤ Merchant's risk

– Forged or copied instruments

– Disputed charges

– Insufficient funds in customer's account

– Unauthorized redistribution of purchased items

Electronic payments Issues:

- Secure transfer across internet
- High reliability: no single failure point
- Atomic transactions

- Anonymity of buyer
- Economic and computational efficiency: allow micropayments
- Flexibility: across different methods
- Scalability in number of servers and users

Security Requirements in Electronic Payment Systems:

➤ **Integrity and authorization**

A payment system with integrity allows no money to be taken from a user without explicit authorization by that user. It may also disallow the receipt of payment without explicit consent, to prevent occurrences of things like unsolicited bribery. Authorization constitutes the most important relationship in a payment system. Payment can be authorized in three ways: via out-band authorization, passwords, and signature.

➤ **Out-band authorization**

In this approach, the verifying party (typically a bank) notifies the authorizing party (the payer) of a transaction. The authorizing party is required to approve or deny the payment using a secure, out-band channel (such as via surface mail or the phone). This is the current approach for credit cards involving mail orders and telephone orders: Anyone who knows a user's credit card data can initiate transactions, and the legitimate user must check the statement and actively complain about unauthorized transactions. If the user does not complain within a certain time (usually 90 days), the transaction is considered -approved by default.

➤ **Password authorization**

A transaction protected by a password requires that every message from the authorizing party include a cryptographic check value. The check value is computed using a secret known only to the authorizing and verifying parties. This secret can be a personal identification number, a password, or any form of shared secret. In addition, shared secrets that are short - like a six-digit PIN - are inherently susceptible to various kinds of attacks. They cannot by themselves provide a high degree of security. They should only be used to control access to a physical token like a smart card (or a wallet) that performs the actual authorization using secure cryptographic mechanisms, such as digital signatures.

➤ **Signature authorization**

In this type of transaction, the verifying party requires a digital signature of the authorizing party. Digital signatures provide non repudiation of origin.

➤ **Confidentiality**

Some parties involved may wish confidentiality of transactions. Confidentiality in this context means the restriction of the knowledge about various pieces of information related to a transaction: the identity of payer/payee, purchase content, amount, and so on. Typically, the confidentiality requirement dictates that this information be restricted only to the participants involved. Where anonymity or un-traceability are desired, the requirement may be to limit this knowledge to certain subsets of the participants only, as described later.

➤ **Availability and reliability**

All parties require the ability to make or receive payments whenever necessary. Payment transactions must be atomic: They occur entirely or not at all, but they never hang in an unknown or inconsistent state. No payer would accept a loss of money (not a significant amount, in any case) due to a network or system crash. Availability and reliability presume that the underlying networking services and all software and hardware components are sufficiently dependable. Recovery from crash failures requires some sort of stable storage at all parties and specific resynchronization protocols. These fault tolerance issues are not discussed here, because most payment systems do not address them explicitly.

Electronic Data Interchange (EDI):

- Electronic Data Interchange (EDI) - interposes communication of business information in standardized electronic form.
- Prior to EDI, business depended on postal and phone systems that restricted communication to those few hours of the workday that overlap between time zones.

Why EDI?

- Reduction in transaction costs
- Foster closer relationships between trading partners

EDI & Electronic Commerce

- Electronic commerce includes EDI & much more

- EDI forges boundary less relationships by improving interchange of information between trading partners, suppliers, & customers.

3.3 EDI layered architecture:

- Semantic (or application) layer
- Standards translation layer
- Packing (or transport) layer
- Physical network infrastructure layer

EDI semantic layer	Application level services	
EDI standard layer	EDIFACT business form standards	
	ANSI X12 business form standards	
EDI transport layer	Electronic mail	X.435, MIME
	Point to point	FTP, TELNET
	World Wide Web	HTTP
Physical layer	Dial-up lines, Internet, I-way	

EDI semantic layer:

- Describes the business application
- Procurement example
 - Requests for quotes
 - Price quotes
 - Purchase orders
 - Acknowledgments
 - Invoices
- Specific to company & software used

Standards translation:

- Specifies business form structure so that information can be exchanged
- Two competing standards
 - American National Standards Institute(ANSI)X12
 - EDIFACT developed by UN/ECE, Working Party for the Facilitation of International Trade Procedures

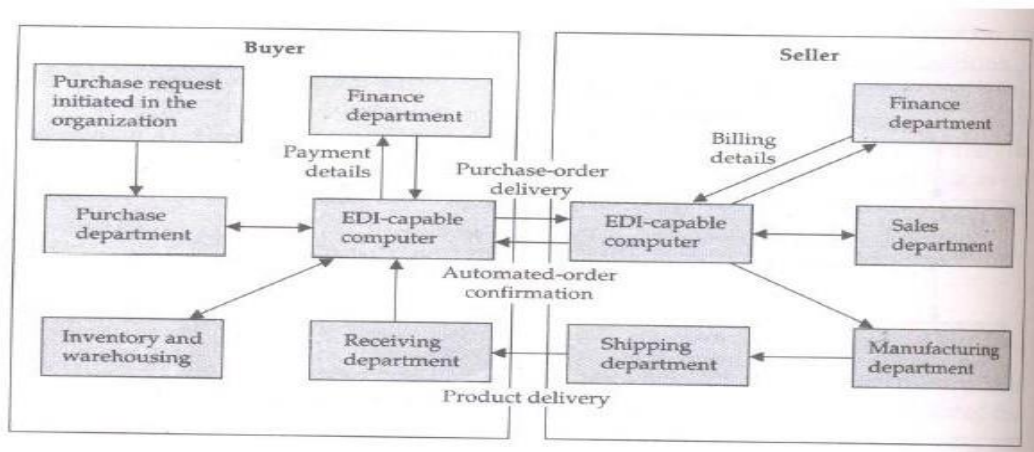
EDI transport layer

- How the business form is sent, e.g. post, UPS, fax
- Increasingly, e-mail is the carrier
- Differentiating EDI from e-mail
 - Emphasis on automation
 - EDI has certain legal status

Physical network infrastructure layer

- Dial-up lines, Internet, value-added network, etc.

Information flow with EDI:



1. Buyer sends purchase order to seller computer
2. Seller sends purchase order confirmation to buyer
3. Seller sends booking request to transport company
4. Transport company sends booking confirmation to seller
5. Seller sends advance ship notice to buyer
6. Transport company sends status to seller
7. Buyer sends Receipt advice to seller
8. Seller sends invoice to buyer
9. Buyer sends payment to seller

Applications of EDI:

1. Role of EDI in international trade:

- Reduced transaction expenditures

- Quicker movement of imported & exported goods
- Improved customer service through –track & trace programs
- Faster customs clearance & reduced opportunities for corruption, a huge problem in trade

2. Interbank Electronic Funds Transfer (EFT)

- EFTS is credit transfers between banks where funds flow directly from the payer's bank to the payee's bank.
- The two biggest funds transfer services in the United States are the Federal Reserve's system, Fed wire, & the Clearing House Interbank Payments System (CHIPS) of the New York clearing house

3. Health care EDI for insurance EDI

- Providing good & affordable health care is a universal problem
- EDI is becoming a permanent fixture in both insurance & health care industries as medical provider, patients, & payers
- Electronic claim processing is quick & reduces the administrative costs of health care.
- Using EDI software, service providers prepare the forms & submit claims via communication lines to the value-added network service provider
- The company then edits sorts & distributes forms to the payer. If necessary, the insurance company can electronically route transactions to a third-party for price evaluation
- Claims submission also receives reports regarding claim status & request for additional Information

4. Manufacturing & retail procurement using EDI

- These are heavy users of EDI
- In manufacturing, EDI is used to support just-in-time.
- In retailing, EDI is used to support quick response

EDI Protocols:

- ANSI X12
- EDIFACT

Comparison of EDIFACT & X.12 Standards:

- These are comprised of strings of data elements called segments.
- A transaction set is a set of segments ordered as specified by the standard.

- ANSI standards require each element to have a very specific name, such as order date or invoice date.
- EDIFACT segments, allow for multiuse elements, such as date.
- EDIFACT has fewer data elements & segments & only one beginning segment (header),but it has more composites.
- It is an ever-evolving platform.

E-Marketing:

- E-marketing is directly marketing a commercial message to a group of people using email. In its broadest sense, every email sent to a potential or current customer could be considered email marketing.
- It usually involves using email to send ads, request business, or solicit sales or donations, and is meant to build loyalty, trust, or brand awareness.
- Email marketing can be done to either sold lists or a current customer database. Broadly, the term is usually used to refer to sending email messages with the purpose of enhancing the relationship of a merchant with its current or previous customers, to encourage customer loyalty and repeat business, acquiring new customers or convincing current customers to purchase something immediately, and adding advertisements to email messages sent by other companies to their customers.

Advantages:

- An exact return on investment can be tracked and has proven to be high when done properly. Email marketing is often reported as second only to search marketing as the most effective online marketing tactic.
- Email marketing is significantly cheaper and faster than traditional mail, mainly because of high cost and time required in a traditional mail campaign for producing the artwork, printing, addressing and mailing.
- Advertisers can reach substantial numbers of email subscribers who have opted in (i.e., consented) to receive email communications on subjects of interest to them.
- Almost half of American Internet users check or send email on a typical day with email blasts that are delivered between 1 am and 5 am local time outperforming those sent at other times in open and click rates.

- Email is popular with digital marketers, rising an estimated 15% in 2009 to £292 m in the UK.
- If compared to standard email, direct email marketing produces higher response rate and higher average order value for e-commerce businesses.

Disadvantages:

- A report issued by the email services company Return Path, as of mid-2008 email deliverability is still an issue for legitimate marketers. According to the report, legitimate email servers averaged a delivery rate of 56%; twenty percent of the messages were rejected, and eight percent were filtered.
- Companies considering the use of an email marketing program must make sure that their program does not violate spam laws such as the United States' Controlling the Assault of Non-Solicited Pornography and Marketing Act (CAN-SPAM), the European Privacy and Electronic Communications Regulations 2003, or their Internet service provider's acceptable use policy.

Tele Marketing:

- Telemarketing is a method of direct marketing in which a salesperson solicits prospective customers to buy products or services, either over the phone or through a subsequent face to face or Web conferencing appointment scheduled during the call.
- Telemarketing can also include recorded sales pitches programmed to be played over the phone via automatic dialing.
- Telemarketing may be done from a company office, from a call center, or from home. It may involve a live operator voice broadcasting which is most frequently associated with political messages.
- An effective telemarketing process often involves two or more calls. The first call (or series of calls) determines the customer's needs. The final call (or series of calls) motivates the customer to make a purchase. Prospective customers are identified by various means, including past purchase history, previous requests for information, credit limit, competition entry forms, and application forms. Names may also be purchased

from another company's consumer database or obtained from a telephone directory or another public list. The qualification process is intended to determine which customers are most likely to purchase the product or service.

- Charitable organizations, alumni associations, and political parties often use telemarketing to solicit donations. Marketing research companies use telemarketing techniques to survey the prospective or past customers of a client's business in order to assess market acceptance of or satisfaction with a particular product, service, brand, or company. Public opinion polls are conducted in a similar manner.
- Telemarketing techniques are also applied to other forms of electronic marketing using e-mail or fax messages, in which case they are frequently considered spam by receivers.

Disadvantages:

- Telemarketing has been negatively associated with various scams and frauds, such as pyramid schemes, and with deceptively overpriced products and services
- Telemarketing is often criticized as an unethical business practice due to the perception of high-pressure sales techniques during unsolicited calls.
- Telemarketers marketing telephone companies may participate in telephone slamming, the practice of switching a customer's telephone service without their knowledge or authorization.
- Telemarketing calls are often considered an annoyance, especially when they occur during the dinner hour, early in the morning, or late in the evening.

Security Threats to E-commerce:

E-Commerce security requirements can be studied by examining the overall process, beginning with the consumer and ending with the commerce server. Considering each logical link in the commerce chain, the assets that must be protected to ensure secure e-commerce include client computers, the messages travelling on the communication channel, and the web and commerce

servers – including any hardware attached to the servers. While telecommunications are certainly one of the major assets to be protected, the telecommunications links are not the only concern in computer and e-commerce security. For instance, if the telecommunications links were made secure but no security measures were implemented for either client computers or commerce and web-servers, then no communications security would exist at all.

Client threats

Until the introduction of executable web content, Web pages were mainly static. Coded in HTML, static pages could do little more than display content and provide links to related pages with additional information. However, the widespread use of active content has changed this perception.

Active content: Active content refers to programs that are embedded transparently in web pages and that cause action to occur. Active content can display moving graphics, download and play audio, or implement web-based spreadsheet programs. Active content is used in e-commerce to place items one wishes to purchase into a shopping cart and to compute the total invoice amount, including sales tax, handling, and shipping costs. The best known active content forms are Java applets, ActiveX controls, JavaScript, and VBScript.

Malicious codes: Computer viruses, worms and trojan horses are examples of malicious code. A trojan horse is a program which performs a useful function, but performs an unexpected action as well. Virus is a code segment which replicates by attaching copies to existing executables. A worm is a program which replicates itself and causes execution of the new copy. These can create havoc on the client side.

Server-side masquerading: Masquerading lures a victim into believing that the entity with which it is communicating is a different entity. For example, if a user tries to log into a computer across the internet but instead reaches another computer that claims to be the desired one, the user has been spoofed. This may be a passive attack (in which the user does not attempt to authenticate the recipient, but merely accesses it), but it is usually an active attack.

Communication channel threats

The internet serves as the electronic chain linking a consumer (client) to an e-commerce resource. Messages on the internet travel a random path from a source node to a destination node. The message passes through a number of intermediate computers on the network before reaching the final destination. It is impossible to guarantee that every computer on the internet

through which messages pass is safe, secure, and non-hostile.

Confidentiality threats: Confidentiality is the prevention of unauthorized information disclosure. Breaching confidentiality on the internet is not difficult. Suppose one logs onto a website – say www.anybiz.com – that contains a form with text boxes for name, address, and e-mail address. When one fills out those text boxes and clicks the submit button, the information is sent to the web-server for processing. One popular method of transmitting data to a web-server is to collect the text box responses and place them at the end of the target server's URL. The captured data and the HTTP request to send the data to the server is then sent. Now, suppose the user changes his mind, decides not to wait for a response from the [anybiz.com](http://www.anybiz.com) server, and jumps to another website instead – say www.somecompany.com. The server [somecompany.com](http://www.somecompany.com) may choose to collect web demographics and log the URL from which the user just came (www.anybiz.com). By doing this, [somecompany.com](http://www.somecompany.com) has breached confidentiality by recording the secret information the user has just entered.

Integrity threats: An integrity threat exists when an unauthorized party can alter a message stream of information. Unprotected banking transactions are subject to integrity violations. Cyber vandalism is an example of an integrity violation. Cyber vandalism is the electronic defacing of an existing website page. Masquerading or spoofing – pretending to be someone you are not or representing a website as an original when it really is a fake – is one means of creating havoc on websites. Using a security hole in a domain name server (DNS), perpetrators can substitute the address of their website in place of the real one to spoof website visitors. Integrity threats can alter vital financial, medical, or military information. It can have very serious consequences for businesses and people.

Availability threats: The purpose of availability threats, also known as delay or denial threats, is to disrupt normal computer processing or to deny processing entirely. For example, if the processing speed of a single ATM machine transaction slows from one or two seconds to 30 seconds, users will abandon ATM machines entirely. Similarly, slowing any internet service will drive customers to competitors' web or commerce sites.

Server threats

The server is the third link in the client-internet-server trio embodying the e-commerce path between the user and a commerce server. Servers have vulnerabilities that can be exploited by anyone determined to cause destruction or to illegally acquire information.

Web-server threats: Web-server software is designed to deliver web pages by responding to HTTP requests. While web-server software is not inherently high-risk, it has been designed with web service and convenience as the main design goal. The more complex the software is, the higher the probability that it contains coding errors (bugs) and security holes – security weaknesses that provide openings through which evildoers can enter.

Commerce server threats: The commerce server, along with the web-server, responds to requests from web browsers through the HTTP protocol and CGI scripts. Several pieces of software comprise the commerce server software suite, including an FTP server, a mail server, a remote login server, and operating systems on host machines. Each of this software can have security holes and bugs.

Database threats: E-commerce systems store user data and retrieve product information from databases connected to the web-server. Besides product information, databases connected to the web contain valuable and private information that could irreparably damage a company if it were disclosed or altered. Some databases store username/password pairs in a non-secure way. If someone obtains user authentication information, then he or she can masquerade as a legitimate database user and reveal private and costly information.

Common gateway interface threats: A common gateway interface (CGI) implements the transfer of information from a web-server to another program, such as a database program. CGI and the programs to which they transfer data provide active content to web pages. Because CGIs are programs, they present a security threat if misused. Just like web-servers, CGI scripts can be set up to run with their privileges set to high – unconstrained. Defective or malicious CGIs with free access to system resources are capable of disabling the system, calling privileged (and dangerous) base system programs that delete files, or viewing confidential customer information, including usernames and passwords.

Password hacking: The simplest attack against a password-based system is to guess passwords. Guessing of passwords requires that access to the complement, the complementation functions, and the authentication functions be obtained. If none of these have changed by the time the password is guessed, then the attacker can use the password to access the system.

Security Requirements for E-Commerce:

Authentication:

This is the ability to say that an electronic communication (whether via email or web) does

genuinely come from who it purports to. Without face-to-face contact, passing oneself off as someone else is not difficult on the internet.

In online commerce the best defense against being misled by an imposter is provided by unforgeable digital certificates from a trusted authority (such as VeriSign). Only certificates from trusted authorities will be automatically recognized and trusted by the major web browser and email client software.

Authentication can be provided in some situations by physical tokens (such as a driver's license), by a piece of information known only to the person involved (eg. a PIN), or by a physical property of a person (fingerprints or retina scans). Strong authentication requires at least two or more of these. A digital certificate provides strong authentication as it is a unique token and requires a password for its usage.

Privacy:

In online commerce, privacy is the ability to ensure that information is accessed and changed only by authorized parties. Typically this is achieved via encryption. Sensitive data (such as credit card details, health records, sales figures etc.) are encrypted before being transmitted across the open internet – via email or the web. Data which has been protected with strong 128-bit encryption may be intercepted by hackers, but cannot be decrypted by them within a short time. Again, digital certificates are used here to encrypt email or establish a secure HTTPS connection with a web-server. For extra security, data can also be stored long-term in an encrypted format.

Authorization:

Authorization allows a person or computer system to determine if someone has the authority to request or approve an action or information. In the physical world, authentication is usually achieved by forms requiring signatures, or locks where only authorized individuals hold the keys.

Authorization is tied with *authentication*. If a system can securely verify that a request for information (such as a web page) or a service (such as a purchase requisition) has come from a known individual, the system can then check against its internal rules to see if that person has sufficient authority for the request to proceed.

In the online world, authorization can be achieved by a manager sending a digitally signed email. Such an email, once checked and verified by the recipient, is a legally binding request for a service. Similarly, if a web-server has a restricted access area, the server can request a digital

certificate from the user's browser to identify the user and then determine if they should be given access to the information according to the server's permission rules.

Integrity:

Integrity of information means ensuring that a communication received has not been altered or tampered with. Traditionally, this problem has been dealt with by having tight control over access to paper documents and requiring authorized officers to initial all changes made – a system with obvious drawbacks and limitations. If someone is receiving sensitive information online, he not only wants to ensure that it is coming from who he expects it to (authentication), but also that it hasn't been intercepted by a hacker while in transit and its contents altered. The speed and distances involved in online communications requires a very different approach to this problem from traditional methods.

One solution is afforded by using digital certificates to digitally sign messages. A travelling employee can send production orders with integrity to the central office by using their digital certificate to sign their email.

Non-repudiation:

Non-repudiation is the ability to guarantee that once someone has requested a service or approved an action. Non-repudiation allows one to legally prove that a person has sent a specific email or made a purchase approval from a website. Traditionally non-repudiation has been achieved by having parties sign contracts and then have the contracts notarized by trusted third parties. Sending documents involved the use of registered mail, and postmarks and signatures to date-stamp and record the process of transmission and acceptance. In the realm of e-commerce, non repudiation is achieved by using digital signatures. Digital signatures which have been issued by a trusted authority (such as VeriSign) cannot be forged and their validity can be checked with any major email or web browser software. A digital signature is only installed in the personal computer of its owner, who is usually required to provide a password to make use of the digital signature to encrypt or digitally sign their communications. If a company receives a purchase order via email which has been digitally signed, it has the same legal assurances as on receipt of a physical signed contract.

Security policy for E-commerce:

The security policy may cover issues like:

- What service types (e.g., web, FTP, SMTP) users may have access to?
- What classes of information exist within the organization and which should be encrypted before being transmitted?
- What client data does the organization hold. How sensitive is it? How is it to be protected?
- What class of employees may have remote access to the corporate network?
- Roles and responsibilities of managers and employees in implementing the security policy.
- How security breaches are to be responded to?

The security policy should also consider physical aspects of network security. For example,

- Who has access to the corporate server?
- Is it in a locked environment or kept in an open office?
- What is the procedure for determining who should be given access? The security policy regulates the activities of employees just as much as it defines how IT infrastructure will be configured. The policy should include details on how it is to be enforced
- How individual responsibilities are determined?

For it to be effective, the policy needs regular testing and review to judge the security measures. The review process needs to take into account any changes in technology or business practices which may have an influence upon security. Lastly, the policy itself needs to be regarded as a living document which will be updated at set intervals to reflect the evolving ways in which the business, customers and technology interact.

Security Standards:

There are various standards pertaining to the security aspects of enterprises. Some of them are

- ISO 17799 (Information technology – Code of practice for information security management).
- (ISO/IEC 2000).
- SSE-CMM (Systems security engineering – Capability maturity model).
- (SSE-CMM 2003).
- COBIT (Control objectives for information and related technology).
- (COBIT 2000).

ISO 17799 provides detailed guidelines on how a management framework for enterprise security should be implemented. It conceives ten security domains. Under each domain there are certain security objectives to be fulfilled. Each objective can be attained by a number of controls. The controls may prescribe management measures like guidelines and procedures, or some security infrastructure in the form of tools and techniques. It details various methods that can be followed by enterprises to meet security needs for e-commerce. It talks about the need for security policies, security infrastructure, and continuous testing in the same manner as has been detailed above.

The main objective of the COBIT is the development of clear policies and good practices for security and control in IT for worldwide endorsement by commercial, governmental and professional organizations. The SSE-CMM is a process reference model. It is focused upon the requirements for implementing security in a system or series of related systems that are in the Information Technology Security domain.

Enterprise Resource Planning:

Enterprise resource planning (ERP) is business management software—usually a suite of integrated applications—that a company can use to collect, store, manage and interpret data from many business activities, including:

- Product planning, cost
 - Manufacturing or service delivery
 - Marketing and sales
 - Inventory management
 - Shipping and payment
-
- ❖ ERP provides an integrated view of core business processes, often in real-time, using common databases maintained by a database management system. ERP systems track business resources—cash, raw materials, production capacity—and the status of business commitments: orders, purchase orders, and payroll. The applications that make up the system share data across the various departments that provide the data. ERP facilitates information flow between all business functions, and manages connections to outside stakeholders.
 - ❖ Enterprise system software is a multi-billion dollar industry that produces components

that support a variety of business functions. IT investments have become the largest category of capital expenditure in United States-based businesses over the past decade. Though early ERP systems focused on large enterprises, smaller enterprises increasingly use ERP systems.

- ❖ The ERP system is considered a vital organizational tool because it integrates varied organizational systems and facilitates error-free transactions and production. However, ERP system development is different from traditional systems development.
- ❖ ERP systems run on a variety of computer hardware and network configurations, typically using a database as an information repository.

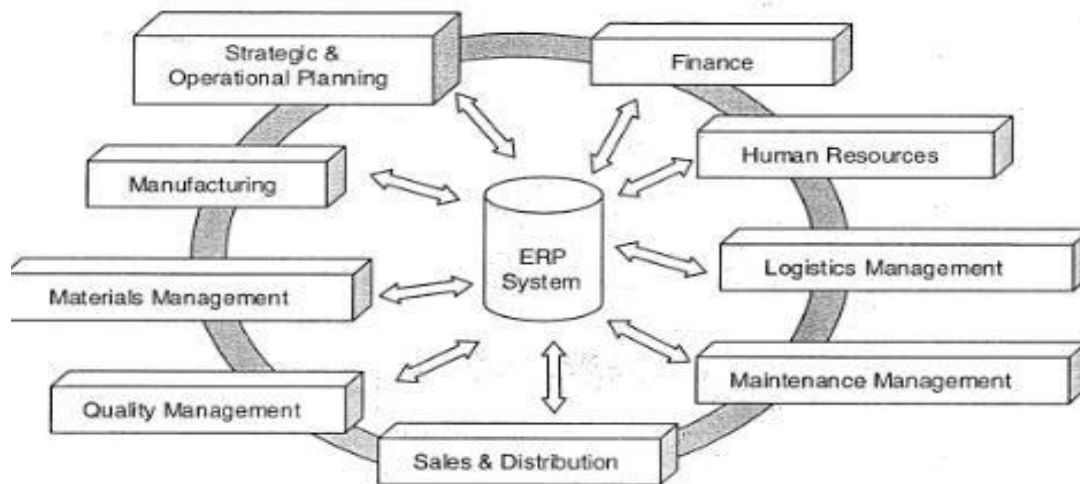
Functional areas of ERP:

An ERP system covers the following common functional areas. In many ERP systems these are called and grouped together as *ERP modules*:

- Financial accounting: General ledger, fixed asset, payables including vouchering, matching and payment, receivables cash application and collections, cash management, financial consolidation
- Management accounting: Budgeting, costing, cost management, activity based costing
- Human resources: Recruiting, training, rostering, payroll, benefits, 401K, diversity management, retirement, separation
- Manufacturing: Engineering, bill of materials, work orders, scheduling, capacity, workflow management, quality control, manufacturing process, manufacturing projects, manufacturing flow, product life cycle management
- Order Processing: Order to cash, order entry, credit checking, pricing, available to promise, inventory, shipping, sales analysis and reporting, sales commissioning.
- Supply chain management: Supply chain planning, supplier scheduling, product configurator, order to cash, purchasing, inventory, claim processing, warehousing (receiving, put away, picking and packing).
- Project management: Project planning, resource planning, project costing, work breakdown structure, billing, time and expense, performance units, activity management
- Customer relationship management: Sales and marketing, commissions, service, customer contact, call center support - CRM systems are not always considered part of

ERP systems but rather Business Support systems (BSS).

- Data services: Various "self-service" interfaces for customers, suppliers and/or employees.



Benefits of ERP:

- ERP can improve quality and efficiency of the business. By keeping a company's internal business processes running smoothly, ERP can lead to better outputs that may benefit the company, such as in customer service and manufacturing.
- ERP supports upper level management by providing information for decision making.
- ERP creates a more agile company that adapts better to change. ERP makes a company more flexible and less rigidly structured so organization components operate more cohesively, enhancing the business—internally and externally.
- ERP can improve data security. A common control system, such as the kind offered by ERP systems, allows organizations the ability to more easily ensure key company data is not compromised.
- ERP provides increased opportunities for collaboration. Data takes many forms in the modern enterprise. Documents, files, forms, audio and video, emails. Often, each data medium has its own mechanism for allowing collaboration. ERP provides a collaborative platform that lets employees spend more time collaborating on content rather than mastering the learning curve of communicating in various formats across distributed systems.

Disadvantages of ERP:

- Customization can be problematic. Compared to the best-of-breed approach, ERP can be seen as meeting an organization's lowest common denominator needs, forcing the organization to find workarounds to meet unique demands.

- Re-engineering business processes to fit the ERP system may damage competitiveness or divert focus from other critical activities.
- ERP can cost more than less integrated or less comprehensive solutions.
- High ERP switching costs can increase the ERP vendor's negotiating power, which can increase support, maintenance, and upgrade expenses.
- Overcoming resistance to sharing sensitive information between departments can divert management attention.
- Integration of truly independent businesses can create unnecessary dependencies.
- Extensive training requirements take resources from daily operations.
- Due to ERP's architecture (OLTP, On-Line Transaction Processing) ERP systems are not well suited for production planning and supply chain management (SCM).
- Harmonization of ERP systems can be a mammoth task (especially for big companies) and requires a lot of time, planning, and money.

Business Modules In ERP:

The important modules in ERP are

➤ **Finance:**

- ❖ The entire concept of information technology is based on the premise that providing the right information, to the right people, at the right time can make a critical difference to the organization.
- ❖ Much of this key information could be taken from the financial data. But merely having the financial data is not enough.
- ❖ You need a set of processes and views of your data that provided up-to-the minute financial information in exactly the form you need it to make that critical difference and help with that critical decision.
- ❖ Accounting software needs access to information in each area of organization, from R&D and market research through manufacturing, distribution and sales.
- ❖ Financial solution must provide the management with information that can be leveraged for strategic decisions, in order to achieve comprehensive advantage.
- ❖ In today's business enterprise, you need to know that your financial decisions are based on today's data, not numbers from records closed a month ago, or even a week ago. And you need to know that this same today's' data represents every segment of your

organization's activities, whether your enterprise stretches across a room or around the globe.

- ❖ This is essential, because the most efficient way to get our enterprise to where you want it tomorrow is to know exactly where it is today.
- ❖ Whatever be the financial goals of the organization, the financial application components of the ERP solutions work hand-in-hand to improve the bottom line.
- ❖ The Finance modules of the most ERP systems provide financial functionality and analysis
- ❖ Support to thousands of businesses in many countries across the globe.
- ❖ These ERP systems include not only financial application components, but also Human resources, Logistics, Business workflow and links to the internet.

- ❖ Financial Accounting has several sub systems. They are:
 - General Ledger
 - Accounts receivable and payable
 - Asset accounting
 - Legal Consolidation
 - Controlling

➤ **Investment Management:**

- ❖ Investment Management provides extensive support for investment processes right from planning through settlement.
- ❖ Investment management facilitates investment planning and budgeting at a level higher than that needed for specific orders or projects.
- ❖ You can define an investment program hierarchy using any criteria-for example department-wise.
- ❖ Investment program allows you to distribute budgets, which are used during the capital spending process.
- ❖ Investment Management provides tools, enabling you to plan and manage your capital spending projects right from the earliest stage
- ❖ Investment Management module recognizes the importance of the asset accounting aspects of investment measures.
- ❖ The system automatically separates costs requiring capitalization from costs that are not capitalized, debiting the correct costs to the asset under construction.

- ❖ Asset accounting provides precise proof of origin for all transactions affecting acquisition and production costs.

➤ **Plant Maintenance:**

- ❖ The achievement of world class performance demands delivery of quality products expeditiously and economically. Organizations simply cannot achieve excellence with unreliable equipment.
- ❖ The attitude towards maintenance management has changed as a result of quick response manufacturing, Just-in time reduction of work in process inventory and the elimination of wasteful manufacturing practices.
- ❖ Machine breakdown and idle time for repair was once an accepted practice.
- ❖ Today when a machine breaks down, it can shut down the production line and the customer's entire plant.
- ❖ The preventive Maintenance module provides an integrated solution for supporting the operational needs of an enterprise-wide system.
- ❖ The plant Maintenance module includes an entire family of products covering all aspects of plant/equipment maintenance and becomes integral to the achievement of process improvement.
- ❖ The major subsystems of a plant Maintenance module are:
 - Preventive Maintenance Control
 - Equipment Tracking
 - Component Tracking
 - Plant Maintenance Calibration Tracking
 - Plant Maintenance Warranty Claims
 - Tracking

➤ **Quality Management:**

- ❖ The ISO9000 series of standards defines the functions of quality management and the elements of a quality management system.
- ❖ The functions in the Quality Management module support the essential elements of such a system. The other integrated modules in the system complement this functionality.
- ❖ The ISO standards require that quality management systems penetrate all processes within an organization.
- ❖ The task priorities, according to the quality loop, shift from production (implementation

phase) to production planning and product development (planning phase) to procurement and sales and distribution, as well as into the entire usage phase.

- ❖ Computer-integrated Quality Management (CIQ) is more appropriate term in comparison to Computer-Aided Quality Management (CAQ), because an isolated CAQ system cannot carry out the comprehensive tasks of a quality management system.
- ❖ The ERP system takes this into consideration by integrating the quality management functions into the affected applications themselves (for example, procurement, warehouse, warehouse management, production and sales/distribution), instead of delegating them to isolated CAQ systems.
- ❖ As a result of this approach, the processes described in the quality manual can be implemented and automated in the electronic data processing (EDP) system.
- ❖ As a part of the Logistics applications, the Quality Management module handles the traditional tasks of:
 - Quality planning
 - Quality inspection
 - Quality Control.
- ❖ For example, it support quality management in procurement, product verification, quality documentation and in the processing of problems.
- ❖ The quality Management module's internal functions do not directly interact with the data or processes of other modules.

The quality Management module fulfills the following functions:

- Quality planning (Management of basic data for quality planning and inspection planning, material specifications, Inspection planning).
- Quality Inspection (Trigger inspections, Inspection processing with inspection plan selection and sample calculation, print shop papers for sampling and inspection, Record results and defects, Make the usage decision and trigger follow-up actions).
- Quality Control: (Dynamic sample determination on the basis of the quality level history, Application of statistical process control techniques using quality control charts).
- ❖ The Quality Management module uses the system's integration to link the tasks of quality management with those of the other applications, such as materials management, production, sales/distribution and cost accounting.

➤ **Materials Management:**

- ❖ The Material Management module optimizes all purchasing processes with workflow-driven processing functions, enables automated supplier evaluations, lower procurement and warehousing costs with accurate inventory and warehouse management and integrates invoice verification.
- ❖ The main modules of the Material Management module are:
 - Pre-purchasing Activities
 - Purchasing
 - Vendor Evaluation
 - Inventory Management
 - Invoice Verification and Material Inspection.
- ❖ The pre-purchasing activities include maintaining a service master database, in which the descriptions of all services that are to be procured can be stored.
- ❖ Purchasing is a very important component of the Material Management module. It supports all phases of material management: materials planning and control, purchasing, goods receiving, inventory management and invoice verification.
- ❖ The vendor evaluation component has been completely integrated into the Material management module. Information such as delivery dates, prices and quantities can be taken from purchase orders. the continual monitoring of exiting supply relationships.
- ❖ Inventory Management system allows you to manage your stocks on a quantity and value basis, plan, enter and check any goods movements and carry out physical inventory.
- ❖ Invoice Verification component is part of the material management system. It provides the link between the material management components and the financial accounting, controlling and asset accounting components.

Enterprise Application Integration (EAI):

- ❖ Enterprise application integration (EAI) is the use of software and computer systems' architectural principles to integrate a set of enterprise computer applications.
- ❖ Enterprise application integration is the process of linking such applications within a single organization together in order to simplify and automate business processes to the greatest extent possible, while at the same time avoiding having to make sweeping changes to the existing applications or data structures. Applications can be linked either at the back-end (database) or the front-end (GUI).

- ❖ The various systems that need to be linked together may reside on different operating systems, use different database solutions or computer languages, or different date and time formats, or may be legacy systems that are no longer supported by the vendor who originally created them. In some cases, such systems are dubbed "stovepipe systems" because they consist of components that have been jammed together in a way that makes it very hard to modify them in any way.

EAI can be used for different purposes:

- Data integration: Ensures that information in multiple systems is kept consistent. This is also known as enterprise information integration (EII).
- Vendor independence: Extracts business policies or rules from applications and implements them in the EAI system, so that even if one of the business applications is replaced with a different vendor's application, the business rules do not have to be re-implemented.
- Common facade: An EAI system can front-end a cluster of applications, providing a single consistent access interface to these applications and shielding users from having to learn to use different software packages.

Disadvantages of EAI:

1. Constant change: The very nature of EAI is dynamic and requires dynamic project managers to manage their implementation.
2. Shortage of EAI experts: EAI requires knowledge of many issues and technical aspects.
3. Competing standards: Within the EAI field, the paradox is that EAI standards themselves are not universal.
4. EAI is a tool paradigm: EAI is not a tool, but rather a system and should be implemented as such.
5. Building interfaces is an art: Engineering the solution is not sufficient. Solutions need to be negotiated with user departments to reach a common consensus on the final outcome. A lack of consensus on interface designs leads to excessive effort to map between various systems data requirements.

6. Loss of detail: Information that seemed unimportant at an earlier stage may become crucial later.
7. Accountability: Since so many departments have many conflicting requirements, there should be clear accountability for the system's final structure.