PONDICHERRY UNIVERSITY

(A Central University)

DIRECTORATE OF DISTANCE EDUCATION

MASTER OF COMMERCE

M.Com – Second Year

Course Code: 59   **Paper Code: MCOM2005**

E - COMMERCE

DDE – WHERE INNOVATION IS A WAY OF LIFE

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E – COMMERCE

PAPER XI – E-COMMERCE

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UNIT-I

INTRODUCTION TO E-COMMERCE

In the emerging global economy, electronic commerce (E-commerce) and electronic business (E-business) have increasingly become an essential component of business strategy and a strong mechanism for economic development. E-commerce is a mediating technology that exchanges information between individuals or organisations as well as the electronically based inter- or intra-organisational activities. It is the business option in which the transactions take place via telecommunication networks. The integration of Information and Communications Technology (ICT) in business has revolutionized relationships within organizations and those between and among organizations and individuals. In particular, the use of ICT in business has enhanced production, encouraged greater customer participation, and enabled mass customization, in addition it reducing the costs.

E-commerce has been defined broadly as any form of business transaction or information exchange is executed through internet. The emergence of electronic commerce began in the early 1970s with such innovations as electronic transfer of funds. However, the applications were limited to large corporations and a few daring small businesses. Then Electronic Data Interchange (EDI), which added other kinds of transaction processing and extended participation to all industries. Since the commercialization of the Internet and the introduction of the Web in the early 1990s, E-Commerce applications have rapidly expanded. E-commerce is directly or indirectly applicable in all areas of human life like in banking, entertainment, shopping in electronic malls, buying stocks, online processing cycle or Supply Chain Management (SCM). Due to its wide variety of applications e-commerce has gained a lot of popularity over the last decade. It has drawn the attention of researchers regarding the new technologies and resolving the security issues regarding the electronic transactions.

In early 1990s businesses achieving greater efficiencies within their organisation using information technology, Electronic Fund Transfer (EFT) technology is the earliest examples which allows organisation to transfer funds between one another electronically. Later Electronic Data Interchange (EDI) was introduced in order to help inter business transactions from financial institutions to other type of business and also provides transactions and information exchanges from suppliers to the end customer. Nowadays e-commerce is used everywhere in everyday life. It ranges from credit/debit card authorization, travel reservation

over a phone or network, wire fund transfers across the globe, online point of sale (POS) transactions in retailing, EDI, EFT, electronic banking, electronic insurance, interactive marketing and supply chain management, fund raising, political campaigning, funeral services on-line. Various e-commerce solutions are depicted in the figure given below

Fig. 1 Electronic Commerce Solutions

Electronic commerce is the application of communication and information sharing technologies among trading partners to the pursuit of business objectives. E-Commerce can be defined as a modern business methodology that addresses the needs of organizations, merchants, and consumers to cut costs while improving the quality of goods and services and increasing the speed of service delivery. E-commerce is associated with the buying and selling of information, products and services via computer networks. Key element of e-commerce is information processing. The effects of e-commerce are already appearing in all areas of business, from customer service to new product design. It facilitates new types of information

based business processes for reaching and interacting with customers – online advertising and marketing, online-order taking and on-line customer service etc. It can also reduce costs in managing orders and interacting with a wide range of suppliers and trading partners, areas that typically add significant overhead to the cost of products and services. Also E-commerce enables the formation of new types of information-based products such as interactive games, electronic books, and information-on demand that can be very profitable for content providers and useful for consumers. Virtual enterprises are business arrangements in which trading partners separated by geography and expertise are able to engage in complex joint business activities, as if they were a single enterprise. One example would be true supply chain integration, where planning and forecast data are transmitted quickly and accurately throughout a multi-tier supply chain. Another example would be non-competing suppliers with a common customer using e-commerce to allow that customer to do "one stop shopping" with the assurance that a single phone call will bring the right materials to the right location at the right time.

Meaning and Definition of E-Commerce

Electronic commerce includes all forms of business transactions, such as the purchase of goods or services, undertaken through electronic means, such as telephones, televisions, computers, and the Internet.

In simple terms, e-commerce is selling of products on the net. It encompasses the use of technology, process of management practices that enhance organisational competitiveness through the strategic use of electronic information. Any process related to the core business activities of buying and selling of physical/electronic goods and services through an electronic medium falls in the domain of electronic commerce.

Electronic commerce or e-commerce refers to a wide range of online business activities for products and services. It also pertains to "any form of business transaction in which the parties interact electronically rather than by physical exchanges or direct physical contact".

Electronic commerce is an emerging concept that describes the process of buying or exchanging of products, services and information through computer network including the internet. It includes all intercompany and intra company function viz marketing, finance,

manufacturing, selling and distribution, etc., that enable commerce and use electronic mail, Electronic Data Interchange (EDI), file transfer, fax, video conferencing, workflow, or interaction with remote computer.

E-commerce has been one of the most exciting developments following the internet revolution. E-Commerce basically uses the electronically networked information systems to carry out potential commercial activity across the globe enabling times to generate business in a big way. Information technology has amply exhibited its potential to revitalize and revolutionize the business process on global phenomena. It has the means to provide basic infrastructure for an efficient global business.

A more complete definition is: E-commerce is the use of electronic communications and digital information processing technology in business transactions to create, transform, and redefine relationships for value creation between or among organizations, and between organizations and individuals.

According to Vladimir Zwass, 'electronic commerce is sharing of business information, maintaining business relationships and conducting business transactions by means of telecommunications networks'.

Electronic commerce describes the buying, selling, and exchanging of products, services, and information via computer networks, primarily the Internet. It refers to a broad definition of EC, not just buying and selling, but also servicing customers, collaborating with business partners, and conducting electronic transactions within an organization. According to Lou Gerstner, IBM's CEO, "e-business is all about time cycle, speed, globalization, enhanced productivity, reaching new customers, and sharing knowledge across institutions for competitive advantage".

Electronic Commerce versus Traditional Commerce

Traditionally, commerce is more than just the trading transactions, it involves a variety of processes such as information exchange, identification of items or services, price comparisons, buying, payment, delivery, customer support, marketing feedback and research design, manufacturing of new products, and their distribution. In many cases business processes use traditional commerce activities very effective, and these processes cannot be

improved upon through technology. Products that buyers desire to touch, smell, or examine closely are difficult to sell using electronic commerce. For instance, customers might be reluctant to buy high-fashion clothing and perishable food products, such as meat or vegetables, because they cannot examine the products directly before agreeing to purchase them. In the case of conventional commerce retail merchants have years of experience in creating store environments that help convince a customer to buy. The combination of store design, outline and product display knowledge is called merchandising. Sales persons in course of time can develop skills that allow them to identify customer needs and find products and services that meet those needs. The arts of merchandising and personal selling can be difficult to practice over an electronic link.

Through ecommerce branded products such as books or *CDs* can be easily sold. Because one copy of a new book is identical to other copies and because a customer would not be concerned about freshness he would willingly order a title without examining the specific copy they would receive. The advantage of electronic commerce includes the ability of one site to offer a wider selection of titles than even the largest physical bookstore, can be more important than the conventional bookstore, namely the facility to browse. Major difference between traditional and electronic commerce are listed in the following table

Sl. No.	Traditional Commerce	E-Commerce
1	Heavy dependency on information exchange from person to person.	Information sharing is made easy via electronic communication channels making little dependency on person to person information exchange.
2	Communication/ transaction are done in synchronous way. Manual intervention is required for each communication or transaction.	Communication or transaction can be done in asynchronous way. Electronics system automatically handles when to pass communication to required person or do the transactions.
3	It is difficult to establish and maintain standard practices in traditional commerce.	A uniform strategy can be easily established and maintain in e-commerce.
4	Communications of business depends upon individual skills.	In E-Commerce or Electronic Market, there is no human intervention.
5	Unavailability of a uniform platform as traditional commerce depends heavily on personal communication.	E-Commerce website provides user a platform where al l information is available at one place.
6	No uniform platform for information sharing as it depends heavily on personal communication.	E-Commerce provides a universal platform to support commercial / business activities across the globe.

Introduction of Convergence

Convergence is the welding of consumer electronics, television, publishing, telecommunication and computer for the purpose of facilities new forms of information based commerce. Convergence is the concept of polling together all materials and resources at one place for easy and guide distribution. Amalgamation, absorption and merge are taking place in the electronic markets. The aim of such convergence is to reduce the risk of uncertainly in the global market. The convergence may be classified as: (1) Multimedia convergence; and (2) Cross media convergence.

Multimedia convergence:

It refers to the convergence of text, sound, data, image, graphics and video into digital content. The effects of convergence are already being felt. Many companies are pooling their resources and talents through alliances and mergers with other companies to make the electronic market place a reality. Part of their motivation may include reducing their risk in light of the uncertainty about what from this eventual global market place and e-commerce application will take.

The term E-commerce has become irrevocably linked with the idea of convergence of industries centered on information that until today has been isolated content, storage, networks, business applications and consumer devices. Convergences, telecommunications and computers for the purpose of facilitating new forms of information based commerce. The public can be for-given for finding the concept perplexing, since the popular press uses the terms multimedia and cross-media interchangeably. Multimedia convergence applies to the conversion of text, voice, data, image, graphics and full-motion video into digital content. Cross-media convergence refers to the integration of various industries entertainment, publication and communication media based on multimedia content.

These two types of convergence are often closely related. For instance, in a new era of interactive TV, the lines between advertisement, education and services often become blurred. While watching an Olympic soccer match between Nigeria and Ireland, you may develop an urge to know more about Nigeria. Instead of running to the local bookstore and purchasing a book, you can link to an on-line database and search while not missing any part of the match.

The information in these on-line databases is not limited to text but also provide photographs and digital videos (multimedia). In short, convergence requires removing the barriers between the telecommunications, broadcasting, computing, movie, electronic games and publishing industries to facilitate interoperability.

Driving the phenomenon of convergence are some simple technological advances:

Convergence of content: It translates all types of information content books, business documents, videos, movies and music into digital information. Once concerted into digital form, that information can easily be processes, searched, sorted, enhanced, converted, compressed, encrypted, replicated transmitted and so on, in ways that are conveniently matched today's information processing systems.

Convergence of transmission: compresses and digitized information so it can travel through existing phone and cable wiring. New switching techniques and other technological breakthroughs enable all types of information to travel to the home. Here we see a convergence of communication, equipment that provides the "pipelines" to transmit voice, data, image and video all without rewiring the neighbourhood.

Convergence of information: It access devices has the sophistication to function as both computers and televisions. Other examples are the telephones with internal fax machine, modem and video monitor, capable of receiving fax, e-mail and video.

Convergence is also being driven by of certain market conditions including the following:

The widespread availability of increasingly low cost, high performance enabling component technologies, including semiconductors, storage and display devices, communications systems and operating systems, among others. Entrepreneurs who are feeding on anticipated end user demand for new applications-both products and services that rely on the aforementioned enabling technologies. Aggressive regulatory actions that are introducing competition in monopoly markets local and long distance communications, telecommunication and cable equipment and right-of-way to customer's curb-and that serve to facilitate the rapid deployment of these new applications.

E-Commerce and E-Business

While some use e-commerce and e-business interchangeably, they are distinct concepts. In e-commerce, information and communications technology (ICT) is used in inter-business or inter-organizational transactions (transactions between and among firms/organizations) and in business-to-consumer transactions (transactions between firms/organizations and individuals). In e-business, on the other hand, ICT is used to enhance the business. It includes any process that a business organization conducts over a computer-mediated network (either for profit, governmental or non-profit entity). A more comprehensive definition of e-business is: "*The transformation of an organization's processes to deliver additional customer value through the application of technologies, philosophies and computing paradigm of the new economy.*"

Electronic business means changes in an organisations business and functional processes with the application of technologies, philosophies and computing paradigms of the new digital economy. It is any internet initiative, which transforms business relationships. It includes all aspects of e-commerce, with the help of e-business solutions, the companies have succeeded in developing their technology and increasing their turnover.

Together e-business and e-commerce have helped create a system of applications and utilities whereby money, information and services can be exchanged via the web. It is important to align the main business of the firm with the e-business strategy of the firm in order to succeed.

Channels of E-Commerce

E-commerce is defined as the strategic deployment of computer-mediated tools and information technologies to satisfy business objectives. The internet is a major player in the relationships between producers and consumers. These relationships can be described in terms of channels or the paths that products or services move from source to destination. Channels can be of different types, ranging from advertising channels, order-processing channels, to customer support channels. The internet is currently being used as a medium for these types of channels in the supply chain.

The popular commercial use of internet is for business advertising. When companies setup official websites, the first goal is usually to advertise their products and services. Applications of this kind are called as "shop-front" applications.

BUSINESS APPLICATIONS OF E-COMMERCE

Electronic commerce is the purchasing of goods and services and the transfer of funds in any way using electronic communications in inter- and intra-company business activities. Its application has led to many changes in the way of business is conducted. An e-commerce solution is a solution to conduct business using technology, through an intra-, extra- or internet solution. There are two types of e-commerce viz Business to Consumer (B2C) e-commerce involving companies selling products or services to individuals and Business to Business (B2B) e-commerce relating companies selling their business to other business organisation.

Undertaking a business to the internet is a sound strategy for increasing business volume, making business internationally. Going international facilitates better support for 24*7 business solutions. A business with a strong internet presence can reduce staffing and office space overhead, which result in more competitive pricing of goods and services and also more economical form of advertising. A firm with an effective e-business strategy develops the capabilities needed to improve the flow of information and business intelligence among partners, suppliers, employees and customers.

I. E-commerce application in Manufacturing

Manufacturing is the transformation of raw materials into finished goods for sale, or intermediate processes involving the production or finishing of semi-manufactures. The production of goods and services is the result of the efforts of many organisations-a complex web of contracts and co-operation known as the supply chain or the value system. As shown below manufacturing requires various components, sub-assemblies as well as include transportation, storage, paperwork etc.

Each supply chain transaction adds cost without intrinsic value. E-commerce can be applied to the supply chain to reduce costs or improve service. In this way e-commerce can enhance manufacturing process by

- Enhancing efficiency
- Reducing cost/cycle time
- Providing accuracy and flexibility
- Supporting inventory levels

II. E-commerce Application in Wholesale

Wholesale is the sale of goods or services in large quantities and at lower prices to someone other than consumers. Wholesale consists of the sale of goods merchandise to retailers, to individuals, commercial, institutional or other professional business users or to other wholesalers and related subordinated services. Sometimes these persons are called middleperson, middle-man or distributor.

Wholesaler frequently physically assemble, sort and grade goods in large lots, break bulk, repack and redistribute in small lots, for instance pharmaceuticals; store, refrigerate, deliver and install goods, engage in sales promotion for their customers and label design.

Role of E-commerce in wholesale

In a sound market economy, low operating costs, access to information and quick response are the key to success for an enterprise. Through advanced information technology enterprises can reach out the global market and at the same time obtain information from around the world at low cost and high speed. E-commerce provides a fundamental solution to the problem of diminishing profit margin and brings new opportunities to the stagment traditional wholesale business. It supports

- Low operational costs
- Access to information
- Quick response

Through the internet, wholesalers can now gain competitive edge that could only be enjoyed by multinational companies in the past.

E-commerce is developing worldwide at an unprecedented speed. Network economy has made a big impact on traditional economy. By shortening the distance between

manufacturer and consumer, e-commerce poses serious threats to intermediaries in the supply chain. It also weakens the role of traditional wholesalers. Those that are unable to adapt to the network economy will transform into small but powerful new players.

It can be expected that wholesalers in the future will operate more like a portal site of an enterprise where only information gatherers, market analysts, a small number of operation and management personnel and network technicians are visible. Compared to the existing major wholesalers that have large number of employees, they will be much smaller in scale requiring less staff and less physical space. However, the ubiquitous and ever expanding internet provides them with a cyberspace that will enable them to reach out to their customers throughout the world easily. It also offers them a wide range of information, intermediary and business services.

III.   E-Commerce Application in Retail

Retailing involves selling products and services to consumers for their personal or family use. Department stores, discount stores and specialty stores like jewellers; toys are all examples of retail stores. Service providers, like dentists, hotels and hair salons and on-line stores, like Amazon.com are also retailers. Many businesses, like home depot, are both wholesalers and retailers because they sell to consumers and building contractors.

Role of E-commerce in Retailing

Advances in technology, like the internet, have helped make retailing an even more challenging and exciting field in recent in recent years. The nature of the business and the way retailing is done are currently undergoing fundamental changes. However, retailing in some form will always be necessary. For example, even though the internet is beginning to make it possible for manufacturers to sell directly to consumers, the very vastness of cyberspace will still make it very difficult for a consumer to purchase every product he or she uses directly. On-line retailers, like Amazon.com, bring together assortments of products for consumers to buy in the same way that bricks-and –mortar retailers do.

In addition, traditional retailers with physical stores will continue to be necessary. Of course, retailers who offer personal services, like hair styling, will need to have face-to-face interaction with the consumer. But even with products, consumers often want to see, touch and

try them before they buy. Or, they may want products immediately and won't want to wait for them to be shipped. Also, and perhaps most importantly, in many cases the experience of visiting the retailer is an important part of purchase. Everything that the retailer can do to make the shopping experience pleasurable and fun can help ensure that customers come back.

IV.   E-commerce application in service sector

The service sector or the service industry is one of the three main industrial categories of a developed economy, the others being the secondary industry (manufacturing and primary goods production such as agriculture), and primary industry (extraction such as mining and fishing). The tertiary sector of industry involves the provision of services to other businesses as well as final consumers. Services may involve the transport, distribution and sale of goods from producer to a consumer as may happen in wholesaling and retailing, or may involve the provision of a service, such as happens in the restaurant industry. However the focus is on people interacting with people and serving the consumer rather than transforming physical goods.

The service sector consists of the "soft" parts of the economy such as insurance, tourism, banking, retailing and education. Public utilities are often considered part of the tertiary sector as they provide services to people, while creating the utility's infrastructure is often considered part of the secondary sector, even though the same business may be involved in both aspects of the operation.

Role of E-commerce in service sector

As discussed above, e-commerce can be implemented in service sector for gaining competitive advantages by proving strategies for differentiation and cost leadership and customer satisfaction. E-commerce will improve the speed of transactions, reduce management expenditure, increases competitiveness and helpful in the banking, insurance and financial sectors, and real estate, construction, telecom, tourism, postal and logistics services

Need for E-Commerce

E-Commerce has several benefits over the normal manual trade. The vast reach of internet, the merchant can sell goods to a large number of people. Moreover, a merchant can

reach customer who is physically too far away. On the other hand, the customers can buy something from a merchant who would otherwise not have been accessible to him. The customer has wider choice. Moreover, unnecessary delays that are involved in conducting trade (moving to the place where trade is conducted) can be cut short. This can also reduces overhead costs in certain cases. For example in the case of normal auction, you have to pay for the person conducting the auction and the place where the auction is being conducted. However, if the auction is conducted on the internet, you just have to pay for the web application conducting the auction, which in general will be too cheap or might be come for free. The other advantage to the customer is round-the-clock availability of goods or services. The demands of customers can be met at awkward hours for there is no person needed to conduct the trade. The seller can have a web application selling his goods.

Electronic commerce is the business environment in which information for the buying, selling and transportation of goods and services moves electronically. It includes any technology that enables a company to do business electronically. Some of the major benefits of E-commerce are:

- ➢ Improved productivity
- ➢ Cost savings
- ➢ Streamlined business processes
- ➢ Better customer service
- ➢ Freedom of choice
- ➢ Opportunities for new business

Detailed discussion of benefits are given below

Improved productivity

Using electronic commerce, the time required to create transfer and process a business transaction between trading partners is significantly reduced. Furthermore, human errors and other problems like duplications of records are largely eliminated with the reduction of data-entry and re-entry in the process this improvement in speed and accuracy plus the easier access to document and information will result in increase in productivity.

Cost Saving

Based on the experience of wide variety of early adopters of electronic commerce, Forester research has estimated that doing business on the internet can result in cost saving of about 5 percent to 10 percent of sales. This cost savings steam from efficient communication quicker turnaround time and closer access to markets.

Streamlined business processes

Cost savings are amplified when businesses go a step further and adopt their internal processes and back-end legacy systems to take advantage of e-commerce. Inventories can be shared if businesses use the internet to share such information as promotional plans, point-of-sale data and sales forecasts. Business processes can also be a made more efficient with automation.

Better customer service

With electronic commerce, there is better and more efficient communication with customers. In addition, customers can also enjoy the convenience of shopping at any hour, anywhere in the world.

Freedom of choice

E-commerce offers multiple options for the consumer because the internet contains number of different topics and locations, services and users can access throughout the world. It thus allows rationalization of the decisions taken by consumers due to its large number of sites of the flow of information in a timely and coordinated manner and accurate, allowing easy comparison between products and services. Both in terms of price or quality or method of payment, and the time required receiving the required item or service and electronic commerce is particularly important for consumers in developing countries, where it can overcome the traditional barriers of distance and lack of information

Opportunities for new business

Business over the internet has a global customer reach. There are endless possibilities for business to explicit and expand their customer base. E-commerce is the use of

telecommunications and data processing technology to improve the quality of transactions between business partners. It has existed in some form since the invention of the telegraph and early automated data processing equipment but its use has greatly increased. E-commerce improves organisational efficiencies by leveraging data processing, database storage and data communications technologies. Existing network facilities can be utilised to achieve great savings in labour costs and the reduction of paper storage and handling facilities. It has enabled firms to be more effective in improving the quality of standard goods and services and to offer a variety of new services. The global marketplace has become larger and wider than ever because of the expansion of e-commerce activity.

Consumer Oriented E-Commerce Applications

Consumer needs and wants are very hard to predict, pinpoint, or decipher in electronic markets whose shape, structure, and population are still in the early stages. Needs envisioned include entertainment on-demand, including 500-channel TV, video on-demand, games on-demand, and news on-demand electronic retailing via catalogs and kiosks and home shopping networks; interactive distance education; collaboration through desktop videoconferencing; medical consultants and many more. Predicting which applications will be the winners and which will be "duds" resulting in huge losses will not be easy until experiments are done, but those experiments require an infrastructure. To plan the infrastructure, however, hard choices about a wining application have to be made- a classic chicken /egg problem. People needs entertainment on demand including video, games, news on-demand, electronic retailing via catalogs etc.

The convergence of money, commerce, computing and networks is laying the foundation for a global consumer market place. Some fundamental business issues must be addressed before consumer oriented e-commerce can become widespread, including:

1. Establishment of standard business processes for buying and selling products and services in electronic markets.

2. Development of widespread and easy-to-use implementations of mercantile protocols for order-taking, online payment, and service delivery similar to those found in retail/ credit card based transactions.

3. Development of transport and privacy methods that will allow parties that have no reason to trust one another to carry on secure commercial exchanges.

In other words, to make consumer-oriented e-commerce more effective, we need a better understanding of the components of the business process from the initial search and discovery of the product/services via on-line catalogs to the management of the order-to-delivery cycle, including the all-important payment/settlement component.

The wide range of applications envisioned from the consumer market place can be broadly classified into two aspects namely Consumer life style needs and Complementary multimedia services. Entertainment includes movies on demand, video cataloguing, interactive advertisements, multi user games, on-line discussions. Essential services consists home shopping, electronic catalogs, telemedicine, remote diagnostics and education and training comprises interactive education, multi user games, video conferencing, on-line databases. The basic consumer applications are discussed below

Fig. 2 Process of Customer Electronic Shopping

Home Banking Services:

Home banking is the newest technology can facilitates direct deposit of payroll, on-line bill payment and telephone transfers. The technology for paying bills, whether by computer or telephone, is infinitely more sophisticated than anything on the market a few years ago. In 1980s were the days of "stone age" technology because of technology choices for accessing

services were limited. For home banking, greater demands on consumers and expanding need for information, its services are often categorized as
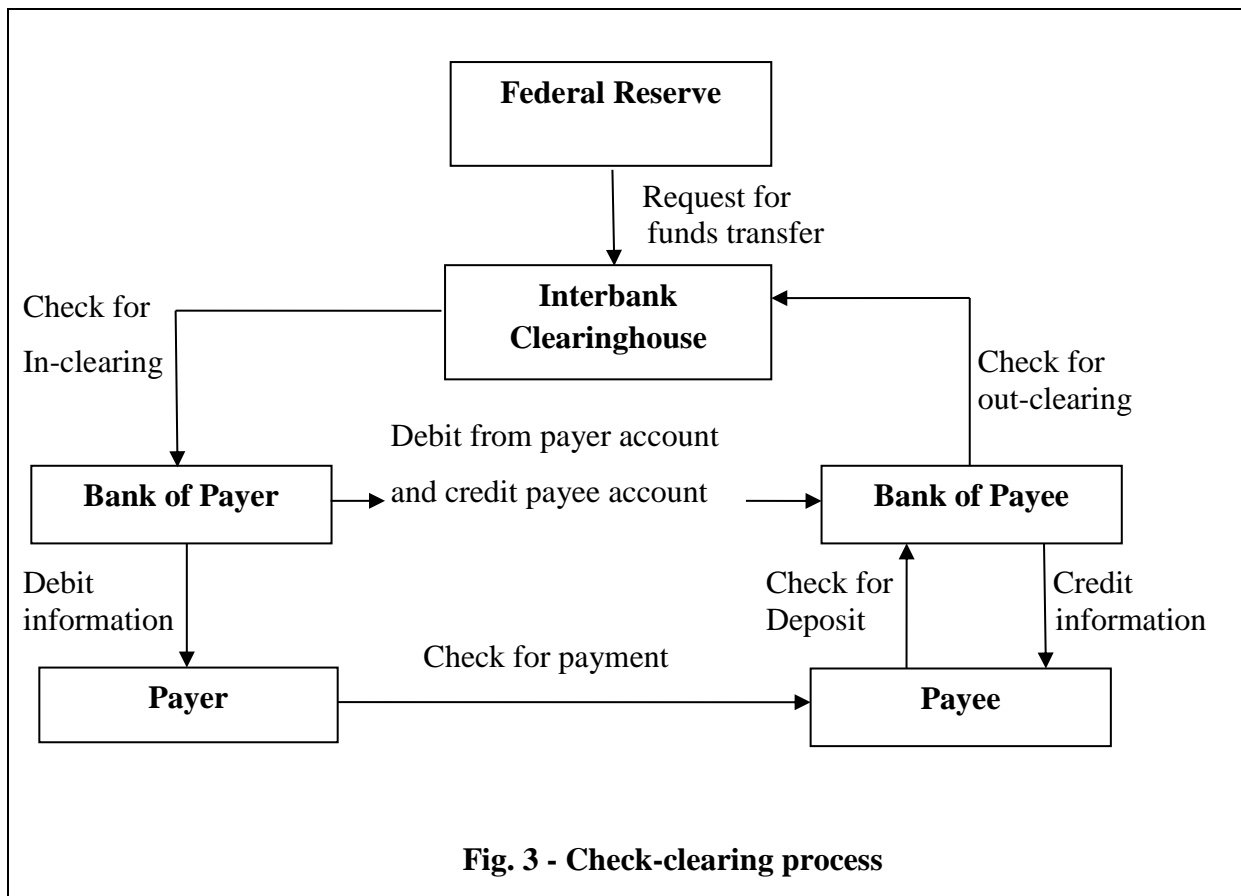
       1. Basic Services

       2. Intermediate services

       3. Advanced services

1. Basic services:

It is related to personal finance i.e. checking savings account statement around the clock, banking with ATM (Automated Teller Machines), Bill payment, balancing cheque book status of payment or stock payment requested etc. In fact, ATMs are today thought to be one single concept that changes the way banks functioned. It can be noted that the individual ATMs are connected to a Bank Switching Centre. The Switching Centre's of several banks are interconnected to an association switching centre (May be all banks of a particular region, for example). All such centres are globally connected to a main switching centre. While the actual operations are not important to note that the PC are any such computers are not employed at the customer level. It is also argued that an average customer is more comfortable with the process of simple insertion of a card rather than complicated operations on PCs.

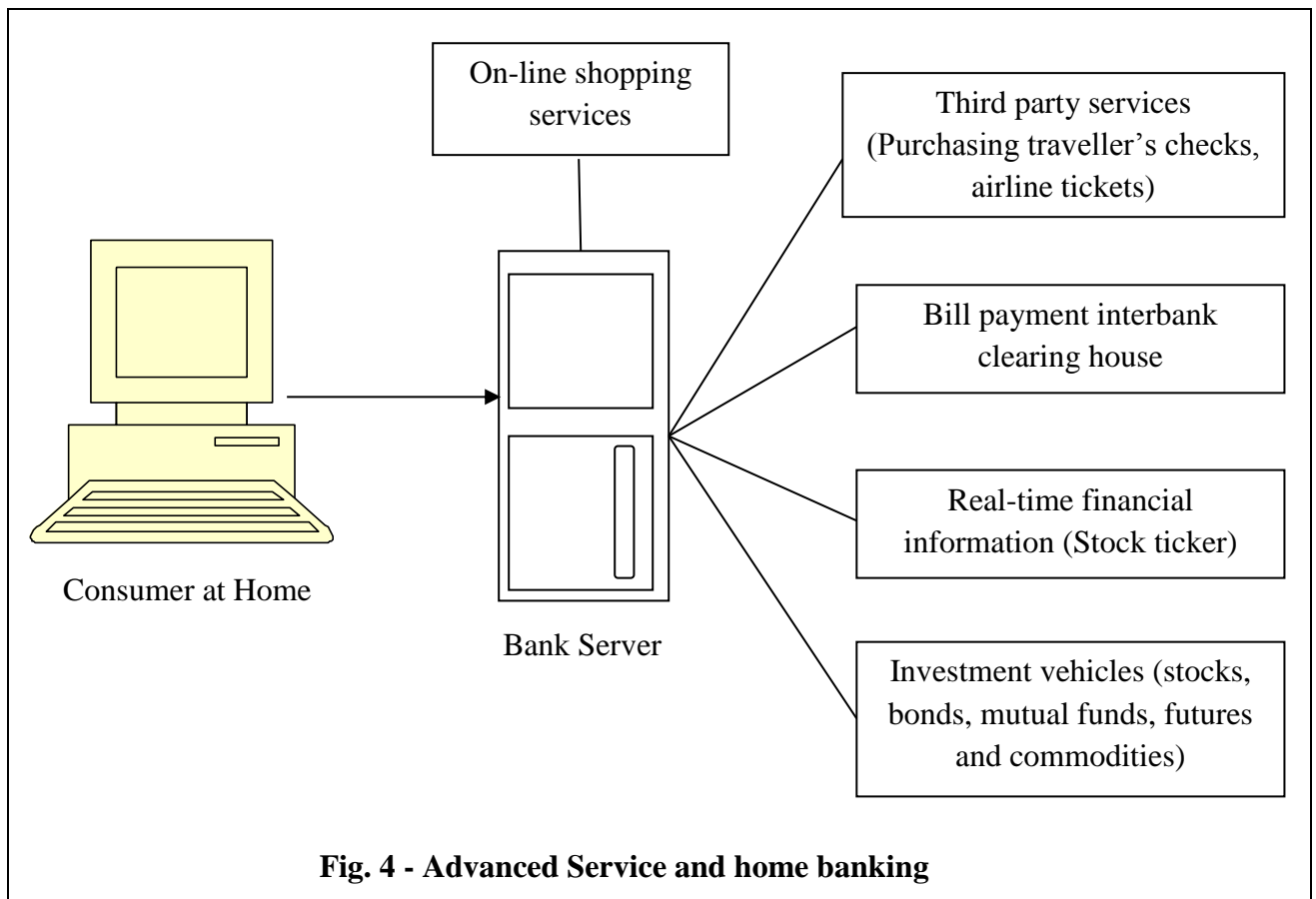**2. Intermediate services:**

It includes a broader array of financial management services which include non-banking activities and also bank activities such as household banking, tax return preparations etc. The problem with home banking in 1980 is expensive service that requires a PC, a modem and special software. As the equipment becomes less expensive and as bank offers broader services, home banking develops into a comprehensive package that could even include as insurance entertainment. Consider the computerized on-line bill-payment system, it never forgets to record a payment and keeps track of user account number, name, amount and the date and we used to instruct with payment instructions.

Fig. 3 - Check-clearing process

3. Advanced services:

The goal of advanced series is to offer their on-line customers a complete portfolio of life, home, and auto insurance along with mutual funds, pension plans, home financing, and other financial products. The Figure explains the range of services that may well be offered by banks in future. The services range from on-line shopping to real-time financial information from anywhere in the world. In short, home banking allows consumers to avoid long lines and gives flexibility

Fig. 4 - Advanced Service and home banking

Home shopping:

One of the examples often sighted about e-commerce is home shopping which is widely used and had generated substantial revenue for many companies racing to develop on-line malls. In the simplest case, the channels describe the various aspects of their product and the customer can order items over phone. The goods are delivered to his home and payment can be made in the normal modes. In a more sophisticated version, orders can be placed online (through computers) and payment also can be made through credit/debit cards. It may be noted that several concepts of traditional marketing like negotiation, trial testing etc. are missing from this scheme and it is most suitable for those customers who are almost sure of what they need to buy who are too busy to go to the shops. Otherwise, there is hardly any concept of interaction and there is little scope to ensure the quality of product, after sales services etc. The exact operating method of these services has yet to be determined, but the retailers are well aware of the potential opened up by the ability to transmit huge amounts of digital information into home and to provide interactive control to the shopper.

(i) Television based Shopping:

It is launched in 1977 by the Home Shopping Network (HSN). It provides a variety of goods ranging from collectibles, clothing, small electronics, house wares, jewellery, and computers. When HSN started in Florida in 1977, it mainly sold factory overruns and discontinued items. It works as the customer uses her remote control at shop different channels with touch of button. At this time, cable shopping channels are not truly interactive

(ii) Catalogue based Shopping:

In this the customer identifies the various catalogs that fit certain parameters such as safety, price, and quality. The online catalogue business consists of brochures, CD ROM catalogs and online interactive catalogs. Most online catalogs are some form of electronic brochure. Electronic brochures are multimedia replacement for direct mail, paper & brochures used in the business to business marketing. Basically electronic catalogue contains highly interactive programs using still images, graphics, animation, sound, text & data. One of the disadvantages of this catalogue is its prohibitive cost.

Home Entertainment:

It is another application area of E-commerce, the most important services are provided under this application. These are movies on demand, interactive games. The online gaming industry in turn parallels the TV industry where the customer is primarily interested in good quality programming and is not faithful to any one network. In the entire home entertainment area, the key element is the notion of customer control under programming entertainment on demand as expected to give each viewer total control over what, when and where to watch. In addition to game technology we also witness the emerging services of entertainment support function such as on screen catalogues, TV guide that inform users what is on TV.

Micro Transactions for Information

The telephone directories provide a basic type of micro transaction. If you want by one particular of item- say – books – they list the addresses and phone numbers of the various book dealers whom you may contact. Similar facilities are available on the internet- may be for number of items and also with more details. IT may include detailed catalogues; other related information etc. of course, the customer has to pay a small charge for visiting the site- each time he visits the site. This can be thought of as an extension of the earlier described television based ordering. You don't have to order only those items that are shown in the computer, but

search for an item that you need. Also ordering is on line. Some preliminary two way interactions are also possible.

Several modifications and value addition to the above mentioned preliminary scheme are possible. Of course, each value addition also adds cost.

1. Desirable characteristics of E-marketing

Common sense tells us that few transactions are more congenial for e-marketing than others. We list out the desirable features of a hypothetical market pace – let us call it e-market.

2. A minimal size of the phase

Obviously for any such place to thrive is a critical size, below which it is not profitable to operate. This minimal number of buyers and sellers characterizes the profitability of the place.

3. A scope for interactions

Interactions include trial runs of the products, classifications of doubts on the part of the customers, details of after sales services, ability to compare different products and of course scope for negotiations and bargaining. Negotiations can be on account of cost, value additions, terms and conditions, delivery dates etc.
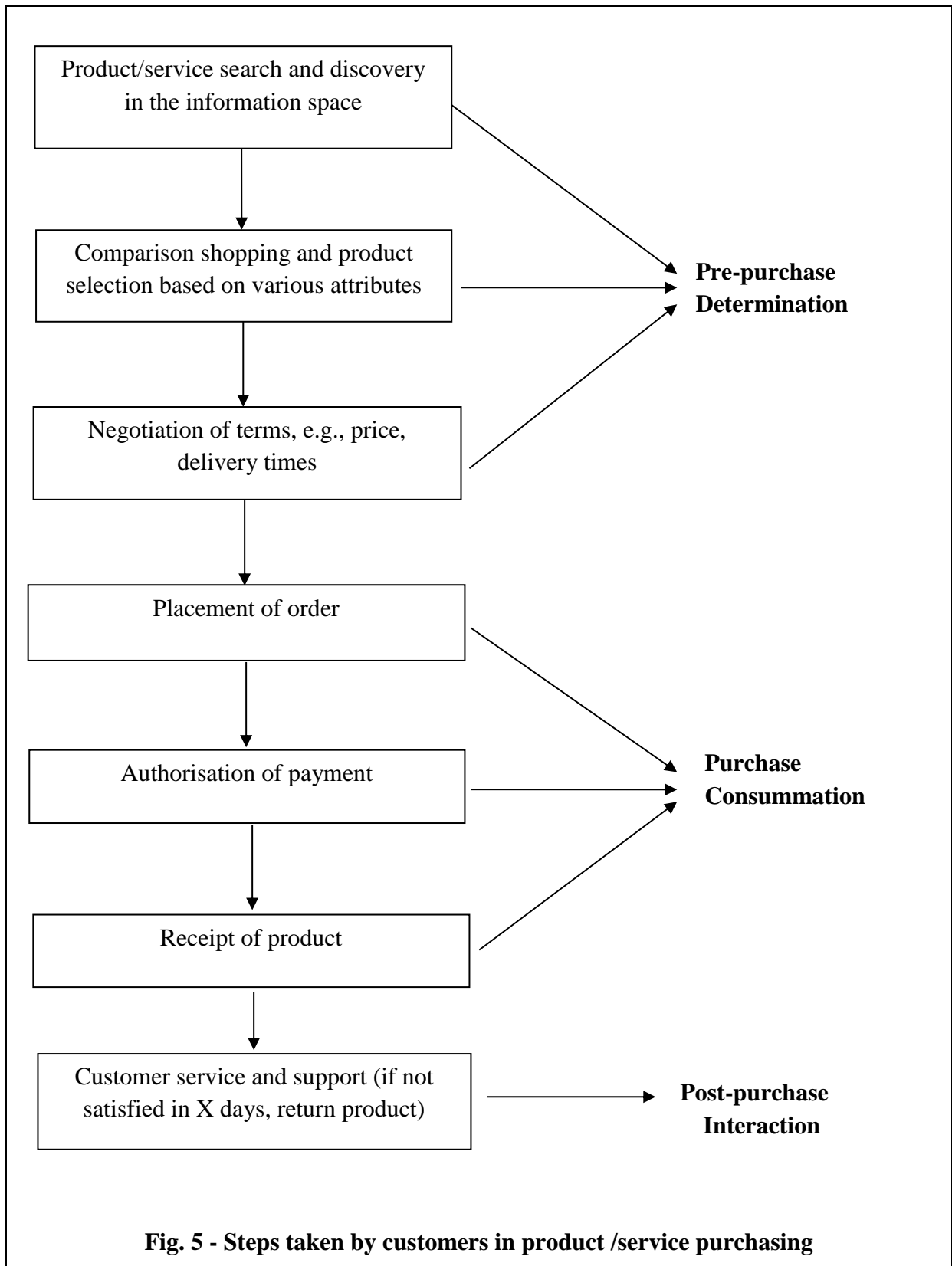
4. Scope for designing new products

The customer need not only buy only what is available. He can ask for modifications, upgradation etc. The supplier must be able to accept these and produce made to order items.

5. A seamless connection to the marketplace

It is obvious that each customer will be operating with a different type of computer, software, connectivity etc. There should be available standards so that any of these customers will be able to attach himself to any of the markets without changing his hardware/software/ interfaces etc.

6. Recourse for disgruntled users

It is native to believe that transaction of such a place to end up in complete satisfaction to all parties concerned. Especially because of the facelessness of the customer and the supplier, there should be a standard recourse to settle such disputes.

Fig. 5 - Steps taken by customers in product /service purchasing

Consumers and the electronic shopping environment

The purchase of goods and services through on-line is a form of electronic commerce using the Internet that is becoming very popular with consumers. In order to shop on-line, consumers need a computer and network device that is connected to the Internet through an Internet service provider (ISP). Generally, most ISPs provide local access numbers that home computer owners can dial into directly through telephone lines. ISPs not only act as a "gateway" or "on ramp" to the Internet, but many also provide their own information and entertainment services and shopping outlets. Once connected to the Internet, web browsers and search engines help consumers locate specific destinations on the network, such as the web site for a particular store or product manufacturer. Consumers can either type in the specific Internet addresses or search for locations by entering keywords that describe what they are looking for.

Products and services are arranged in a variety of ways on the Internet. For example, many retail stores and catalogue companies now offer their goods on-line for selection and purchase by customers. New on-line or "virtual" stores selling everything from books and CDs to computer equipment and used automobiles are now open for business on the World Wide Web. Providers of services such as real estate brokers, insurance companies and travel agents also have an on-line presence. Some airlines, for example, offer discounted "cyberfares" to consumers who book their arrangements via the Internet.

However, an Internet shopper need not go directly to an on-line store in order to buy something. Some media sites, ISPs, and search engines prominently feature retailers and provide direct links to their sites. Specialty retailers, large discounters, service companies, and mall/marketplaces from around the world have their place on-line.

Most on-line shopping outlets try to make the electronic shopping experience as familiar and easy for consumers as possible. Physical goods such as flowers, clothing, and household products are often described with detailed product information, pricing and size information, and are represented with photographs of the product. When ready to make a purchase, the customer has only to decide whether to complete the transaction on-line or not.

To purchase on-line, a customer selects the product, enters basic name and address information along with a credit card number, depresses the enter key on the computer, and the

transaction is completed. Some consumers, however, prefer to use the Internet primarily as an information resource, comparing prices and then making their purchases through traditional means.

E-Commerce Organisation Applications

Corporations do not buy information and communications technology simply because it is interesting to writers in the press. Companies adopt technology to save money and improve the bottom line. The organisational electronic commerce application provides solution to the questions like how can electronic markets be utilised to further such organisational goals as better internal coordination, faster problem solving, and improved decision making? How can it help the organisation to provide better service to the customer? How can the organisation to better interact with the suppliers and distributors? How will these new application impact business processes currently established internally? The organisation applications of e-commerce are given below
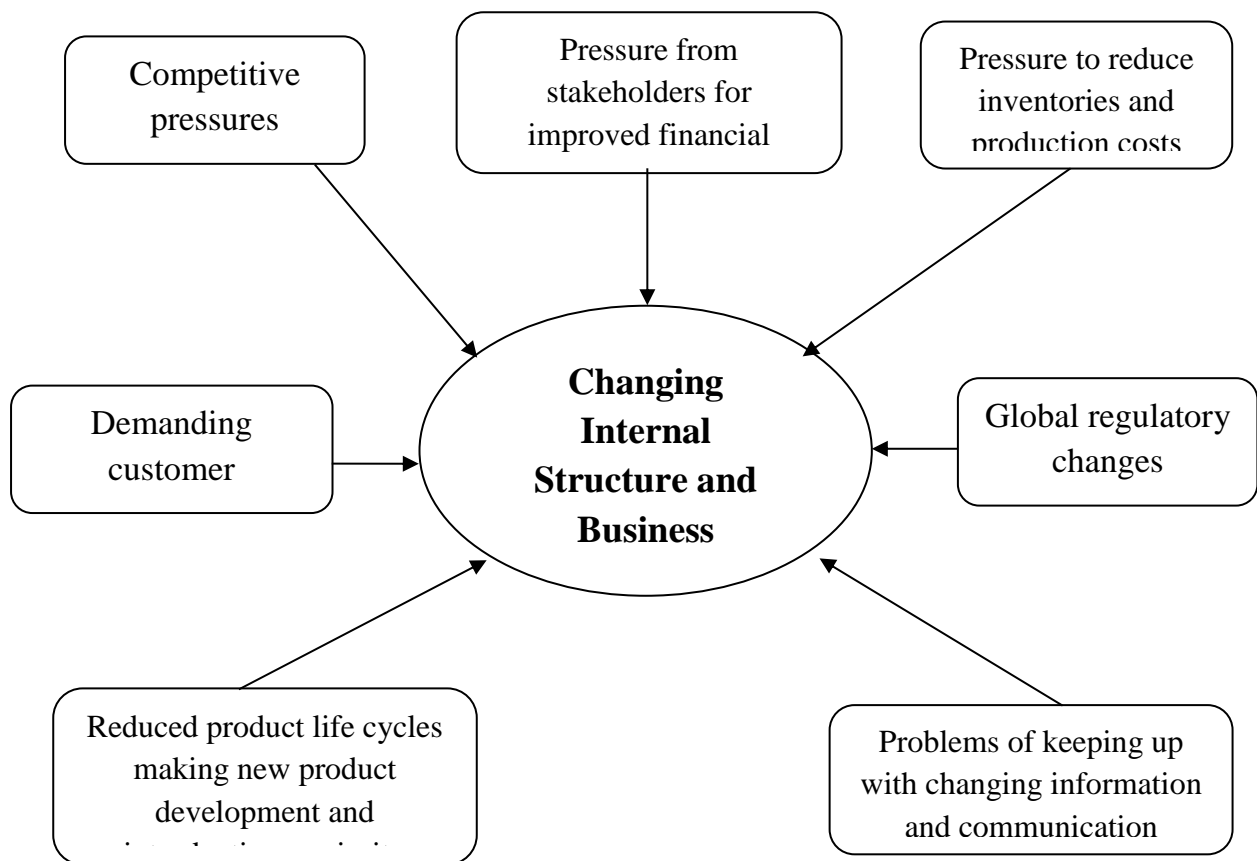
Marketing:

E-commerce is forcing the companies to rethink the existing ways of doing target marketing (isolated and focusing on a segment of the population), relationship marketing (building and sustaining a long-term relationship with existing and potential customers), and even event marketing (setting up a virtual booth where interested people come and visit). Marketing through Ecommerce is possible either through online catalogue or Advertisement. Online catalogues are interactive and fascinate the user of each category. This eliminates the cost of printing and postage for catalogue. It consists of images of the product along with their price. Now a day's mobile phone catalogue are common which show 3D images along with their ring tones. Advertisement in e-commerce is possible by using banners, referrals and link exchange programs etc.

Changing business Environment

The traditional business environment is changing rapidly as customers and business seeks flexibility to change trading partners, platforms, carriers and networks at will. Many companies are looking outside and within to shape business strategies. These activities include

establishing private electronic connections to customers, suppliers, distributors, industry groups etc. The information superhighway will expand this trend to another level all together so that it will allow business to exchange Information.

Internetworking through a public network infrastructure provides a firm with the pathways to conduct e-commerce between trading partners, support collaboration with partners who can supply needed capabilities, and stay close to the customer. Interestingly traditional firms and financial institutions such as banks and credit institutions view electronic commerce with a mix of eagerness, fear and confusion. Many large and successful organisations fear that their vision of business no longer seems to apply. In general firm utilize consumer and market research to form the assumptions that shape its strategy, and helps to take decisions.

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  ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
  │ Competitive  │   │ Pressure from│   │ Pressure to  │
  │  pressures   │   │stakeholders  │   │   reduce     │
  │              │   │for improved  │   │ inventories  │
  │              │   │  financial   │   │ and          │
  └──────────────┘   └──────────────┘   │production    │
                                        │costs         │
                                        └──────────────┘
                    ┌──────────────┐
  ┌──────────────┐  │   Changing   │  ┌──────────────┐
  │  Demanding   │  │   Internal   │  │ Global       │
  │  customer    │  │ Structure and│  │ regulatory   │
  │              │  │   Business   │  │ changes      │
  └──────────────┘  └──────────────┘  └──────────────┘
  ┌──────────────┐              ┌──────────────┐
  │Reduced product│             │Problems of   │
  │life cycles    │             │keeping up with│
  │making new     │             │changing       │
  │product        │             │information and│
  │development and │            │communication  │
  └──────────────┘              └──────────────┘
```

Fig.6 - Pressures influencing business

The reactions to numerous pressures are depicted in the fig.--. Companies are restructuring, lean and mean is the battle cry of companies seeking increased market share to offset decreasing profit margins and to gain competitive global positioning through reduced

operational costs. Organisations downsizing or reducing the major work force as the way to gain operational efficiency and agility. The need for faster reaction times to environmental events (customer request and competitive new products) typically results in a decrease in middle management and line employees, whom top management visualizes as hampering organisational flexibility and not contributing directly to the bottom line.

Supply Chain Management:

It is a management of getting raw material from manufacturer and sending finished products to the consumer .Through ecommerce, number of middleman get reduced. Ordering cost also reduced because whenever order is placed by the company, it get immediate response. Due to this company does not need to maintain large inventory which reduce the carrying cost. EDI is used for purchase order, shipping bill and other invoices.

The inventory management strategies were implemented through very expensive computer system and private networks, the cost was an easy barrier for small businesses. Inventory management solutions (QR and JIT) address only part of the overall picture. Using QR or JIT may not be feasible for a company, if it depends on an unresponsive supplier for key components. For instance, a manufacturing company may develop the capability to assemble products quickly in response to customers order but may find this ability is constrained by suppliers long lead times. Hence, what is required is a technique for managing unanticipated problems in the supply chain.

Supply chain management (SCM) is also called "extending" which means integrating the internal and external partners on the supply and process chains to get raw materials to the manufacturers and finished products to the consumers. Most of the companies fail to integrate their supply chain strategies for a number of reasons; among them a lack of system integration due to fragmented supply chain responsibilities. But in neglecting integration and the broader concept of supply chain management, firms might be missing an opportunity to cut costs and boost customer service. SCM rests on the premise that product excellence alone fail to guarantee corporate success. In fact customers expect many services, including the prompt delivery of produces to precise locations with near-perfect administrative and physical quality.

Supplier management: The goal is to reduce the number of suppliers and get them to become partners in business in a win/win relationship. The benefits are seen in reduced purchase order (PO) processing costs; increased number of Pos processed by fewer employees, and reduced order processing cycle times.

Inventory management: The goal is to shorten the order-ship-bill cycle. When a majority of partners are electronically linked, information faxed or mailed in the past can now be sent instantly. Documents can be tracked to ensure they were received, thus improving auditing capabilities. The inventory management solution should enable the reduction of inventory levels, improve inventory turns, and eliminate out-of-stock occurrences.

Distribution management: The goal is to move documents related to shipping (bill of lading, purchase orders, advanced ship notice, and manifest claims). Paper work that typically took days to cycle in the past can now be sent in moments and contain more accurate data, thus allowing improved resources planning.

Channel management: The goal is to quickly disseminate information about changing operational to trading partners. In other words, technical, product and pricing information that once required repeated telephone calls and countless labour hours to provide can now be posted to electronic bulletin boards, thus allowing instant access. Thus electronically linking production with their international distributor and reseller networks eliminates thousands of labor hours per week in the process.

Payment management: The goal is the link the company and the suppliers and distributors so that payments can be sent and received electronically. This process increase the speed at which companies can compute invoices, reducing clerical errors and lowering transaction fees and costs while increasing the number of invoices processed.

Financial management: The goal is to enable global companies to manage their money in various foreign exchange accounts. Companies must work with financial institutions to boost their ability to deal on a global basis. They need to assess their risk and exposure in global financial markets and deal with global information opposed to local market information.

Sales force productivity: The goal is to improve the communication and flow of information among the sales, customer, and production functions. Linking the sales force with regional and

corporate offices establishes greater access to market intelligence and competitor information that can be funneled into better customer service and service quality. Companies need to collect market intelligence quickly and analyse it more thoroughly. They also need to help their customers introduce their products to market faster, giving them a competitive edge.

In sum, the SCM process increasingly depends on electronic markets because of global sourcing of products and services to reduce costs, short product life cycles, and increasingly flexible manufacturing systems resulting in an variety of customizable products.

E-Commerce and the retail Industry

Conditions are changing in the "new economy" with respect to the retail industry. Consumers are demanding lower prices, better quality, a large selection of in-season goods. Retailers are filling their order by slashing back-office costs, reducing profit margins, reducing cycle times, buying more wisely and making huge investments in technology. They are revamping distribution channels to make sure that warehouse costs are down by reducing their average inventory levels and coordinating the consumer demand and supply patterns. In the push to reduce prices, more and more retailers are tuning to overseas suppliers, in part because of cheaper labour costs.

Retailers are in the immediate line of fire and were first to bear the brunt of cost cutting. They are putting that pressure on the manufacturing and supplier end of the pipeline. At the same time, the quest for efficiencies has led to turmoil and consolidation within the retail industry. The pressure experienced by the retailers and suppliers can be seen in the disappearance of jobs, in mergers, and in the increase failures in the manufacturing sector. The problems are indeed serious, electronic markets could provide a partial solution by promising customers more convenience and merchant's greater efficiency and interactivity with suppliers to revitalize the troubled retail sector.

Inventory Management and Organizational Applications

With borders opening up and companies facing stiff global competition for the first time in decades, managers know they need to catch on quickly to better ways of doing international business. Adaptation would include moving to computerized, "paperless" operations, to reduce costs and facilitate the adoption of new business processes.

Once targeted business process is inventory management, solutions for these processes go by different names. In manufacturing industry, they're known as just-in-time inventory systems, in the retail as quick response programs, and in transportation industry as consignment tracking systems. Inventory reduction if often a target as it average two percent of sales; and when the cost of inbound warehousing of raw materials or the cost of warehousing work-in-process inventory is included, the total often reaches 6 percent to 30 percent of sales. Electronic commerce projects seek to reduce this cost by as much as 90 percent.

Just-in-Time (JIT) Manufacturing

JIT is viewed as an integrated management system consisting of a number of different management practices dependent on the characteristics of specific plants. The JIT management system, an evolution of the Japanese approach to manufacturing and initially introduced for the Toyota production system, is based on two principles: elimination of waste and empowering workers. The first principle is elimination of all waste (time, materials, labour & equipment) in the production cycle. The following management practices are focused factory, reduced set-up times, group technology, total productive maintenance, multifunction employees, uniform workloads, IT purchasing, kanban total quality control & quality circles.

JIT purchasing considered an integral part of JIT, has received considerable attention in electronic commerce. It allows a manufacturer to incorporate its supplier's efforts towards eliminating waste in the upstream portion of the manufacturing cycle. JIT purchasing focuses on the reduction of inventories throughout the logistical systems of the manufacturing firms involved and provides a careful audit of the production process. Basically, it optimises supplier and customer relations. In a production plant the needed materials are to be supplied just in time, no earlier or later than is demanded for processing. Production costs will decrease as the required level of stock is reduced. Materials from the supplier will be ordered only if the production plant can sell its product. Market risks are therefore passed on through the supplier chain. Furthermore, quality control of production is considerably enhanced. All stages of production are closely monitored, enabling an adequate assessment of imperfections. Such close collaboration between suppliers and customers has introduced the concept of co-makership. The companies involved in overall production are integrated and combine their efforts through long-term trade relations as evident in the Japanese system of kieretsu. The I-way makes this practice more affordable and easily available to a number of small firms.

Quick Response Retailing (QR)

It is a version of JIT purchasing tailored for retailing. To reduce the risk of being of out of stock, retailers are implementing QR systems. It provides for a flexible response to product ordering and lowers costly inventory levels. QR retailing focuses on market responsiveness while maintaining low levels of stocks. It creates a closed loop consisting of retailer, vendor, and consumer chain, and as consumers make purchases the vendor orders new deliveries from the retailer through its computer network. The bar-coded articles are logged by the cash registers at the point of sale, the inventory system of the store then determines the needed supply, and the system transmits as order message to the retailer. The availability of accurate information with respect to the current sales enables sophisticated marketing capable of responding to consumers preferences.

Work group Collaboration Applications:

A internetwork that enables easy and inexpensive connection of various organizational segments to improve communications and information sharing and to gather and analyze competitive data in real-time. E-commerce also facilitates sales force automation by enabling salespeople to carry product and reference information in one portable device. Other applications, such as videoconferencing, document sharing and multimedia e-mail, are expected to reduce travel and encourage telecommuting. Business might also save big on reduced processing costs by improving the distribution channel for documents and records to suppliers, collaborators and distributors.

Commerce as an Electronic Trading System – Special features

Many individual investors are making long term investment in the shares are probably the best strategy. Most of the investors don't have the experience or time to trade online. However, some investors trading can be an extremely profitable profession. Though there have been professionals who made their living off trading. It was not until recently that technology enabled individuals not working for a brokerage to directly access the markets. This tutorial will investigate into the workings of the electronic systems that allow this direct access. Various electronic trading systems are discussed give below

New York Stock Exchange (NYSE)

The NYSE is an auction market that uses floor traders to make most of the trades. Each stock on the NYSE has a specialist; this is a person who oversees and facilitates all of the trades for a particular stock. If the investor wishes to buy a stock that trades on the NYSE the broker will either call the order to a floor broker, or enter it into the DOT system.

National Association of Securities Dealers Automated Quotation System (NASDAQ)

On the other hand, the NASDAQ is not physical entity. It is known for its fancy market site in Times Square, but very little is done there. It is an OTC market and it relies on market makers rather than specialists to facilitate trading and liquidity in stocks. For each stock, there is at least one market maker. Rather than being an auction market, the NASDAQ is a communications network between thousands of computers. Instead of brokers calling out orders, market makers place their name on a list of buyers and sellers, which is then distributed by the NASDAQ in a split second to thousands of other computers. If the investor wants to buy a stock that trades on the NASDAQ, the broker will either call up a market maker with the information of the trade or enter the order into a NASDAQ sponsored online execution system.

Internet concept and technologies

A network of network or internet is a group of two or more networks that are interconnected physically, capable of communicating and sharing data with each other and able to act together as a single network. Machines on one network can communicate with machines on other networks, and send data, files, and other information back and forth.

The internet is a network of computers and smaller networks, which enables computers around the world to communicate with each other, for example by transferring files and documents. Smaller networks are connecting to the big network, the internet, all the time and because of this the internet is constantly changing and growing (SOU 1999:106). These new networks offer new opportunities for people, but they also involve new uncertainties. New ways of doing things usually create a feeling of uncertainty among people. Thus, there is a need for promoting trust and confidence on the internet.

Evolution of internet

Even though e-commerce encompasses all forms of electronic commercial transactions, the recent commercialization of the Internet has greatly facilitated the growth of electronic commerce. The basis of today's Internet was initially developed through U.S. Government investment in computer networking technology dating back to the 1960's. The Internet was originally used for linking and transmitting information among scientists and universities doing government sponsored research in diverse locations. In the 1990's, however, the network was commercialized. Since then, the number of business transactions taking place electronically has grown at an astronomical pace.

The internet has evolved through a series of advancements in networking and computer technologies. From its beginning in 1969, the ARPANET provided a test-bed for networking research and development. An important development that grew out of ARPANET was the TCP/IP protocols, which provided standard rules for networked computers to communicate with each other.

Other significant events included the introduction of the desktop computer, the development of networking tools such as telnet, FTP, gopher and WWW, and the release of graphical browsers. Advancements in networking enabled the NSFNET to upgrade its speed several times, allowing more and more connections.

1960's

In 1969 the Department of Defence Advanced Research Projects Organisation in the USA created an experimental network called ARPANET (Advanced Research Projects Agency Network). This network provides a test-bed for emerging network technologies. ARPANET originally connected four universities and enabled scientists to share information and resources across long distance. ARPANET continued to expand, connecting many more sites throughout the 1970's and 1980's.

1970's

In 1972 the National Center for Supercomputing Applications (NCSA) develops the telnet application for remote login, making it easier to connect to a remote computer. FTP (File

Transfer Protocol) was introduced in 1973 in order to standardising the transfer of files between networked computers.

1980's

Several important events occurred in 1983, including the Transfer Control Protocol/Internet Protocol (TCP/IP) is a set of rules that describe how computers can communicate over a network, used on the ARPANET. This decision sets a standard for other networks, and generates the term 'internet' as the network of networks which either uses the TCP/IP protocols or are able to interact with TCP/IP networks. To keep military and non-military network sites separate, the ARPANET splits into two networks: ARPANET and MILNET.

The first desktop computers begin to appear in 1982-1983. Many are equipped with an operating with an operating system called Berkeley UNIX, which includes networking software. This allows for relatively easy connection to the internet using telnet.

The personal computer revolution continues through the eighties, making access to computer resources and networked information increasingly available to the general public. In 1985-86 the National Science Foundation (NSF) connects the nation's six supercomputing centers together. This network is called the NSFNET or NSFNET backbone. To expand access to the internet, the NSF supported the development of regional networks, which were then connected to the NSFNET backbone. In addition, the NSF supported institutions, such as universities, in their efforts to connect to the regional networks.

In 1987 the NSF awards a grant to merit network includes to operate and manage future developments of the NSFNET backbone. Merit network, inc. collaborates with International Business Machines (IBM) Corporation and MCI Telecommunication Corporation to research and develop faster networking technologies. In 1989 the backbone network is upgraded to "T1" which means that it is able to transmit data at speeds of 1.5 million bits of data per second, or about 50 pages of text per second.

1990's

The ARPANET is dissolved in 1990 and Gopher is developed at the University of Minnesota in 1991. Gopher provides a hierarchical menu-based method for providing and locating information on the internet. This tool makes using the internet much easier. In 1993 the European Laboratory for Particle Physics in Switzerland (CERN) releases the World Wide Web (WWW), developed by Tim Berners-Lee. The WWW uses hypertext transfer protocol (HTTP) and hypertext links, changing the way information can be organised.

In 1993-94 the graphical web browsers Mosaic and Netscape Navigator are introduced and spread through the internet community. Due to their intuitive nature and graphical interface, these browsers make the WWW and the internet more appealing to the general public. In 1995 the NSFNET backbone is replaced by new network architecture, called VBNS (very high speed backbone network system) that utilises network service providers, regional networks and Network Access Points (NAPs).

The commercial development started in the 1990's, when the internet also became available for companies and private users through commercial networks that were created around the world. The internet connects billions of users all over the world and about 1.1 billion people use the internet today. Today the internet is used for many different things, for example the possibility to send electronic mail (e-mail) is widely used. E-mail is a fast, simple and cheapest way to communicate with people living in different parts of the world. The creation of World Wide Web (WWW) is an important part in internet's development. The web is not synonymous with the internet; it is another way to use the internet. The user can download any documents and get any information from different websites on the internet. Today, millions of websites /homepages are owned by organisations and individuals.

Web technologies

Web servers and web browsers are communicating client-server computer programs for distributing documents and information, generally called web data, over the Internet. Web data are marked up in the HTML language for presentation and interaction with people in web browsers. Each web server uses an IP address or domain name as well as a port number for its identification. People use web browsers to send data requests to web servers with the HTTP

protocol, and the web servers running on server computers either retrieve the requested data from local disks or generate the data on-the-fly, mark up the data in HTML, and send the resulting HTML files back to the web browsers to render. *Apache*, *Tomcat* and *IIS* are popular web server programs, and *IE* and *Firefox* are popular web browsers.

Web Architecture

A typical web application involves four tiers as depicted in the following web architecture figure: web browsers on the client side for rendering data presentation coded in HTML, a web server program that generates data presentation, an application server program that computes business logic, and a database server program that provides data persistency. The three types of server programs may run on the same or different server machines. Web browsers can run on most operating systems with limited hardware or software requirement. They are the graphic user interface for the clients to interact with web applications. The basic functions of a web browser include:

• Interpret HTML markup and present documents visually;

• Support hyperlinks in HTML documents so the clicking on such a hyperlink can lead to the corresponding HTML file being downloaded from the same or another web server and presented;

• Use HTML form and the HTTP protocol to send requests and data to web applications and download HTML documents;

• Maintain cookies (name value pairs, explained later) deposited on client computers by a web application and send all cookies back to a web site if they are deposited by the web application at that web site (cookies will be further discussed later in this chapter);

• Use plug-in applications to support extra functions like playing audio-video files and running Java applets;

• Implement a *web browser sandbox* security policy: any software component (applets, JavaScript, ActiveX) running inside a web browser normally cannot access local clients' resources like files or keyboards, and can only communicate directly with applications on the web server from where it is downloaded.

The web server is mainly for receiving document requests and data submission from web browsers through the HTTP protocol on top of the Internet's TCP/IP layer. The main function of the web server is to feed HTML files to the web browsers. If the client is requesting a static existing file, it will be retrieved on a server hard disk and sent back to the web browser

right away. If the client needs customized HTML pages like the client's bank statement, a software component, like a JSP page or a servlet class (the "Extension" box in the web architecture figure), needs to retrieve the client's data from the database and compose a response HTML file on-the-fly. The application server is responsible for computing the business logics of the web application, like carrying out a bank account fund transfer and computing the shortest route to drive from one city to another. If the business logic is simple or the web application is only used by a small group of clients, the application server is usually missing and business logics are computed in the web server extensions (PHP, JSP or servlet). But for a popular web application that generates significant computation load for serving each client, the application server will take advantage of a separate hardware server machine to run business logics more efficiently. This is a good application of the divide-and-conquer problem solving methodology.

Information providers or publishers run programs called servers from which the browsers (clients) can obtain information these programs can either be Web servers that understand the hypertext transfer protocol (HTTP), "gateway" programs that convert an existing information format to hypertext, or a non-HTTP server that web browsers can access-anonymous FTP or Gopher servers.

Web servers are composed of two major parts: the hypertext transfer protocol for transmitting documents between servers and clients and the hypertext markup language (HTML) format for documents. The link between HTML files and the HTTP servers is provided by the uniform resource locators (URLs).

GLOBAL PUBLISHING CONCEPT

The large part of the growth of the World Wide Web can be attributed to its ability to integrate a variety of information, seamlessly from distributor servers. In the process of the integration, the web addresses several issues and offers the following advantages:

Platform transparency:

Access to the web is through a piece of software called the browser. In spite of, whether the browsers running on the windows or X-windows, it offers the same interface. The web is

not limited to any single platform or machine. The data residing in a variety of server platforms are available to users, through the same look and face interface.

Distribution transparency:

The web is distributed information system. The information stored at a variety of geographically dispersed server platforms, is available to the web users on a single interface window. The distributed nature of the web enables it to successfully provide so much information, stored in thousands of servers located across the globe.

Information type transparency:

The web offers seamless integration of multiple types of information content. Text, graphics, sound, video and various other data formats can be integrated and displayed uniformly through the browser interface. It can be integrate a variety of information content, stored on distant servers, through the Hypertext mechanism. The concept of hypertext really means that instead of sticking to reading text in linear, rigid structure, the important terms can be made rich by adding/linking the explanation to it.

Interactive:

Information browsing on the web is based on selecting and clicking on links. Clicking on links retrieves and offers additional information on-screen. A simple interaction on the web can lead one to a maze of information. Web servers can collect the input information from users, through the form mechanism, add it to a database, update the database, or provide customised information, depending upon the inputs.

Dynamic:

The information retrieved by browsers is stored in a site and offered through a web server. At any point of time, if the information is updated at the server site, the latest version is available to anyone browsing it. Unlike, published documents and books were every new version/edition to be distributed physically. Web publishing does not incur any cost of reproducing copies. Anyone accessing the publication reads the latest version on their browser screen.

Graphical and navigational:

The capability of web to integrate and display graphics, text and other multimedia formats, in color on a same page, is probably the reason for its gaining popularity over such a short span of line. Prior to the web, the information on the internet was accessible through command and menu based interface. The hyper linking mechanism has also reduced the task of navigating through the information to point and click.

Hypertext Publishing

A hypertext-publishing medium is a system in which readers can follow hypertext links across a broad and growing body of published works. Therefore hypertext publishing involves more than publication of isolated hypertexts, such as HyperCard stacks. Hypertext publishing systems can provide an open and relatively inexpensive medium having the expressiveness of print augmented by links. Electronic publication of reference-links, indexes and works will speed the transmission of ideas; criticism-links and filtering mechanisms will speed their evaluation.

Benefits of Hypertext

Hypertext provides a flexible working environment in which the user can temporarily stop reading current material and look into some other material. *Jeff Conklin (1987)* lists the following are advantages or benefits of hypertext:

Ease of tracing references and creating a new one:

Machine support for link tracing means that all references are equally easy to follow forward or backward. In many hypertext environments, the user can contribute their ideas, works, and published it into the web site. Users can produce their own networks or simply annotate someone else documents with a comment (without changing the referenced document).

Ease of navigation:

Users have faster access to information. Navigation tools, such as bookmarks, history list, searching tools, allow the users to access quickly to any documents or within it. Bookmarks

allow return to points of interest and history lists allow back tracking of the learners' navigational steps.

Reader or learner control:

Hypertext environment gives the learner control over paths of learning. Reader control allows the learner make choices in navigating and manipulating the content of the sites. As well, hypertext allows for non-linear movement within a document with the option of quickly returning to the point of origin.

Create the new way of analyzing a problem through different kind of views (links)

Critical thinking:

It is suggested that hypertext can encourage users to think more critical because they are facing with many views from many different authors (multiple perspectives) for one topic study. Web hypertext provides more complete, complex and wide information on problem with the power of linking. Information gathered from different sources engages users in critical thinking as they make choices, discover, and problem solve their own route through the topic being studied.

More environmentally friendly:

Reduction of printing and distribution costs associated with the presenting manuals and handbooks. We can reduce the paper, stamp, courier, and all related to administration costs from using the internet. But it does not replace if one wants to make the mail more personal.

Up to date and accurate information:

Writers of hypertext can easily access their work and update information, links, and references, to ensure an active and functional site.

Can store a large amount of information:

With hypertext we can store a large amount of information in just one media. For example, in the web site there are many links that one document can connect too many other documents and we just have to browse it from the computer.

Have the better visual prominence using animation or interactive graphics to make an interesting way of learning:

Many web sites had their animation or moving pictures to make their web site more interesting.

Collaboration:

Several authors can collaborate with the Comments about the document being interwoven.

Information structuring:

Both hierarchical and nonhierarchical organisations can be imposed on unstructured information; even multiple hierarchies can organize the same material.

Global view:

Browsers provide table of contents style views supporting easier restructuring of large and complex documents. Global and local views can be mixed effectively.

Customized documents:

Text segments can be threaded together in many ways allowing the same document to serve multiple functions.

Modularity of information:

Since the same text segment can be referenced from several places an idea can be expressed with less overlap and duplication.

Consistency of information:

References are embedded in their text and if the text is moved, even to other documents, the link information still provides direct access to the reference.

Task stacking:

The user is supported in having several paths of Inquiry active and displayed on the screen at the same time. Any given path can be unwound to the original task.
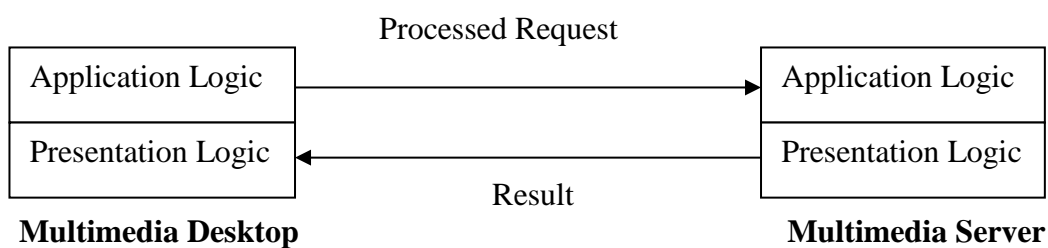
Client Server Concept

All e-commerce applications follow the client-server model. Clients are devices plus software that request information from servers. The client-server model of computing is a common one in networking. It consists essentially of two computers: the client and the server. The client is intelligent, is the one initiating the action and is where the control lies. The server is less intelligent but is there to provide a service on demand. Typically the server is a very large computer that can handle several clients all at once. The client-server model replaces traditional mainframe-based models that worked well for a long time. Mainframe computing, which traditionally meant "dumb" terminals attached to a computer housed in a glass house, is too costly and slow to cope with new data types like audio and video. In contrast, the dominant

model of client-server architecture links PCs to a storage (or database) server, where most of the computing is done on the client. Even existing client-server models based on the PC servers, while providing back-end technology for scalable and flexible database management; have to be reengineered to accommodate new data types.

The client-server model, allows the client to interact with the server through a request-reply sequence governed by a paradigm known as message passing. The server manages application tasks, handles storage and security, and provides scalability-ability to add more clients as needed for serving more customers − and client devices (from personal digital assistant to PCs) handle the user interface. In effect, the multimedia server handles the critical elements (distribution, connectivity, security, accounting), and so is expected to simplify and make scaling more cost effective.

Be aware, however, that the full impact of the fundamental shift in the computing paradigm from host-terminal architecture to networked client-server architecture will take several more years to be realised. There is a long way to go before the installed base of mainframes and minicomputers is networked or replaced by workstations and PCs. Commercial users have only recently begun downsizing their applications to run on client-server networks, a trend that electronic commerce is expected to accelerate.

Exhibit: distribution of processing in multimedia client-server world

Hypertext Publishing

Web provides functionality necessary for e-commerce. The web has become an umbrella for wide range of concepts and technology that differ markedly in purpose and scope which include hypertext publishing concept, the universal reader concept and the client server concept.

Hypertext publishing promotes the idea of seamless information world in which all online information can be accessed and retrieved. In a constant and simple way hypertext

publishing is a primary application of web interest in hypermedia. On the internet (called distributed or global hypermedia). As accelerated shortly following are the success of web media and browser. This success has been aided by more powerful work station high resolution graphic display faster network communication and decreased cost for large online service.

Uniform Resource Locators (URL)

The documents that the browsers display are hypertext that contains pointers to other documents. The browsers deal with the pointers in a transparent way, select the pointer and presented with the text to which it points. This pointer is implemented using a concept that is central to web browsers: uniform resource locators (URLs). A URL for a digital library would be a unique call number that provides the exact location of every book in the world, including the country, city, library and shelf location.

In practice URLs are the strings used as addresses of objects (documents, images) on the web. Think of them as analogous to your e-mail address. Just as your address is unique and may be used by any other internet user to send you mail without knowing exactly where you are, a URL marks the unique location on the internet where a file or service can be found.

URLs follow a fairly consistent pattern. The first part describes the type of resources; second part gives the name of the server housing resources; and the third part gives the full file name of the resource. URLs are universal in that they provide access to a wide range of network services which required separate applications in the past. For a new network protocol one can easily form an address as the set of parameters necessary to retrieve the object. If these parameters are encoded into a concise string, with a prefix to identify the protocol and encoding, one has a new URL scheme. Some URL formats are given below

> FTP: ftp://seerver.address/complete.file.name
> TELNET: telnet://server.address:port
> HTTP: http://server.address:port/homepage.html
> News: news://misc.stocks.invest
> Gopher: gopher://server.address:port/directory/filename

There are URLs for internet news and new groups (the NNTP protocol), and for HTTP archives, for TELNET destinations, email addresses, and so on. The same can be done for names of objects in a given name space. For example, the URL of the main page for the web

project happens to be: http://web.w3.org/hypertext/web/the project.html. The prefix http in the preceding example indicates the address space and defines the interpretation of the rest of the string. The http protocol is to be used, so the string contains the address of the server to be contacted, and a substring to be passed to the server.
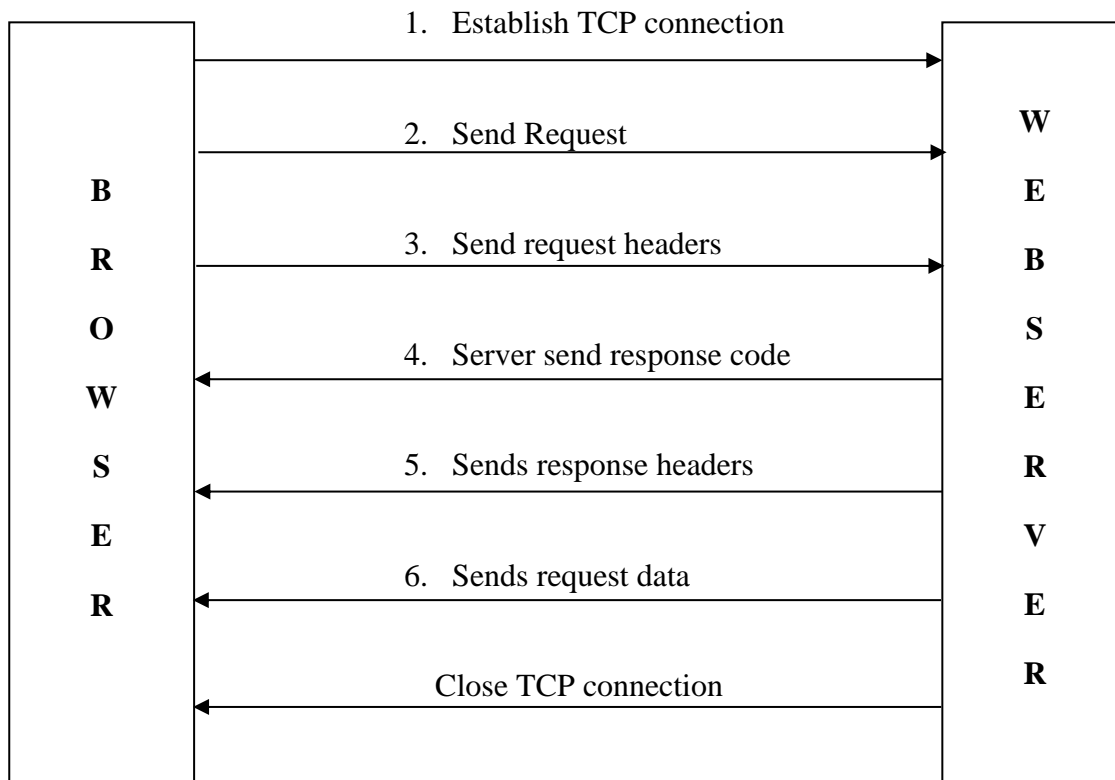
Hypertext Transfer Protocol (HTTP):

It is the simple request response protocol that is currently run over TCP and is the basis of WWW. HTTP is a protocol for transferring information efficiently between the requesting client and server. The data transferred may be plain text, hypertext images or anything else. When a user browses the web objects are retrieved in rapid succession from often widely dispersed servers.

HTTP is used for retrieving documents in an unbounded & extensible set of formats. It is an internet protocol. It is similar in its readable, text based style to the file transfer (FTP) and the network news (NNTP) protocols that have been used to transfer files and news on the internet for many years. When objects are transferred over network, information about them is transferred in HTTP Header. The set of headers is an extension of the multipurpose internet mail extension (MIME) set. This design decision was taken to open the door to integration of hypermedia mail, news and information access.

Hypertext transfer protocol is set of rules that World Wide Web clients and servers use to communicate over the network. It is a connectionless protocol, meaning that browsers and servers do not establish a permanent connection. A client opens a connection and submits a request message to a server. The server on receiving a message processes and responds to it and close the connection. It's also a stateless protocol, implying that the server does not maintain any information on the state of the process. Thus, the server treats each request or message independent of any previous request/message. The protocol is based on the request or response model.

The client, usually a web browser, submits a request to a web browser. The server reads the incoming protocol packet, processes it and sends the response. The content type is built as part of the type of multimedia content delivered to it as a response. The content types used in the protocol are a subset of the standard MIME types. As stated by domain name/IP address, at the specified or standard port. On making a successful connection, the browser submits an HTTP request. A typical HTTP session between the client and server is depicted in figure given below

Fig. 7 - Typical interaction in an HTTP session

The session consists of two phases, the first phase consists of the clients request submission, and the second phase consists of the server response. The client submission, depicted in three steps, involves opening a connection, sending the request and header information.

Establish TCP connection: HTTP packets can be transmitted only after the client has established a connection with the server. In this step the browser parses the URL for identifying the domain name. It uses the services of Domain Name Server (DNS) to resolve the name into an IP address. Using the services offered by the TCP layer, it opens a connection to the IP address, at a standard web or URL specified port. On the successful opening of a connection, the browser starts the HTTP session.

Send Request: the browser submits HTTP packets containing the request command, to the connected server. The common HTTP request commands are "get", "post" and "head". The request in HTTP is made up of three components, namely the command method; resource is identifier and the protocol version number. An example of the "GET" command is as follows:

GET/index.html http/1.0

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The method describes the type of request and determines the response at the server end. The second component is a resource identifier, such as the name of a file to be retrieved. Parsing the URL and stripping out the protocol name, domain name, and the port number, derives the resource identifier from the URL. The last component of the request specifies the version number of protocol being used. For the URL http://icrc.iiml.ac.in/index.htm, the browser, after establishing a connection to the domain name icrc.iiml.ac.in at port80, would submit the following request command.

The 'head method' syntax is identical to that of the 'get method'. It also works in the same way as the get method except that the requested document is never transferred to the browser. The server processes the request in the header information to the browser.

Finally the 'post method 'is devised as an alternative mechanism for submitting the form data entered at the browser end, to the server for processing. A server receives the post command it knows that the data will be arriving after the header information, along with the length and type of the data.

Send request headers:

In this step the browser submits the header information to the server. The header information includes the browser identity, its capability to handle various types of content, and the referring URL. The header information follows a standard format of the header name and the value pair, separated by the colon (:) sign. The following instance shows the header information transmitted by a browser.

GET/HTTP/1.0

The header information is read and processed by the server and is made available at the server end as environment variables.

Server sends response code:

On receiving the client request and header information, the server processes the request and sends the response to the client. If the request was processed and can be delivered, the server sends an OK response. Some common errors that it may send as responses include forbidden document, 'not found', 'internal server error', 'or', 'unauthorised access'. The format of the response sent by the server includes the response code and the protocol version. The protocol version informs the client about the kind of syntax used in responses. Examples of server responses are as follows:

HTTP/1.0 200 OK

HTTP/1.0 404 Not Found

HTTP/1.0 401 unauthorised

HTTP/1.0 403 Forbidden

The first component of the response informs the client about the protocol version number used by the server for sending the response, as the syntax of the response may vary between versions. The second component is the actual response, consisting of the response code and the message. The clients use the code part is displayed to users. In most web servers these messages can be customised as well. On receiving the response code of "200 OK" the browser understands that the request was processed successfully and proceeds to receive the data that it had requested.

Sends response headers:

Prior to sending the required data, the server sends information about the data, such type of content and length of content as well as information about the server itself, as part of the response phase. The response headers sent by servers are also used, at times, for accomplishing authentication and setting up cookies. The response header information follows the same syntax as request headers. The following example shows typical response header information.

Date: Tue, 04 Sept 2010, 02:04:07 GMT

Server: Apache/2.1.2

Last-modified: Sun, 02 Sep 2010, 08:05:10 GMT

Content-length: 8455

Content-type: text/html

The above header information informs the browser of the date and tie at which the server response was sent and the name and version of the server software. It also informs the browser of document-related information. The last-modified date tells the user when the requested document was last updated. The last two headers tell the browser about the length of the requested documents, in bytes and the type of content. In this case the browser, that the document needs to be parsed, interpreted, and rendered for HTML tags. On the other hand content-type of text/plain would have been displayed by the browser as it is.

Sends request data:

The server, after sending the last response header information, sends a blank line to indicate the completion of the header portion the response and to mark the beginning of the response data. The server sends the response data to the browser in the format indicated in the content-type response header.

Close TCP connection:

The web server, on completing the data transmission, is done with responding to the client request. At this stage, it would ordinarily close the TCP connection. However, an HTML document may contain online images and embedded objects that are required for rendering it on the browser screen. Although, the browser can submit a request for retrieving each of these objects, by opening and closing the connections. Network bandwidth and server efficiency can be improved by keeping the connection active for subsequent requests. The browser can accomplish this by including the following request header, in the client request headers.

HTTPD servers: The servers that are used to publish information via WWW servers are called HTTPD servers. While choosing a web server flexibility, ease of administrator, security features, familiarity and performance are considered.

It is important to evaluate the tasks for which the web server is used. A server used for internet based marketing & technical support task will need more powerful server than the web server used internally within a firewall for distributing memos and bulletins. HTTPD servers are ideal for companies that want to provide multitude of services ranging from product information to technical support.

HTTPD

Information publishing is an important element of electronic commerce; organisation must know how to publish information through World Wide Web servers called http servers. Installing and maintaining a web server is not a simple matter, it gives various security and administrative issues. Now there are a number of web servers to choose from and several are very easy to install and administer. In fact, the difficulties are not much more in initialising and maintaining a web server but choosing a server that fits the organisation needs. The following are various issues to be considered:

- What platform and operating system is the right choice?

- What kind of traffic loads are anticipated on the web server-heavy or light?

- What kinds of security features are envisioned?

- How flexible and robust does the server need to be?

Flexibility, ease of administration, security features and familiarity often rank higher in the decision making process than other criteria, such as raw performance. It is also important to evaluate the task for which the web server will be used. A server used for internet-based marketing and technical-support tasks will need more robust resources than a web server used internally within a firewall for distribution memos and bulletins. New security features such as encryption are also making it possible to consider the web as a commercial transaction channel, and the web server will have to support those features.

HTTPD servers are perfect for companies that want to provide a multitude of services ranging from product information to technical support. The way to provide other services via web is with HTML pages and CGI scripts. These simple scripts, which can be written or acquired over the internet, allow the web server to act as a gateway to other internet server such as databases like Oracle, Gopher and news.

Hypertext Markup Language (HTML)

The HTML is used for writing web documents that are interpreted and rendered by web browsers. In the early eighties, IBM has developed the concept of describing documents by their elements. All the documents have similar element such as title, addresses, headings, body text, sections and paragraphs.

HTML is a document formatting language in which the formatting instructions are called tags. Tags in HTML are words and symbols enclosed within less-than (<) and greater-than (>) symbols. Each tag in HTML also has a matching end of the tag markup. For a particular markup code <CODE> the matching end of the tag markup code is denoted by </CODE>. The HTML document is a plain text document containing some markup codes i.e. tags for formatting purposes. HTML documents can be created using any plain text editor. The documents are composed of several distinct elements such as heading, title, paragraphs and lists amongst many others. The tags associate several properties with the portion of document within a tag.

HTML structural document consists of the 'head' and the 'body' portions. In a simple document the header portion contains the identity information of the document like the title, author, and similar information. The body portion describes the structure of the overall document, it can attributes such as the background colour, image of the browser window. The structural tags are placed to assist the browser in identifying the different portions of the document; these tags do not affect the internal format of the document. Three important structural tags describe the overall structure of the document. These tags are denoted in a document as <HTML>, <HEAD> and <BODY> with corresponding end of tag markups </HTML>, </HEAD> and </BODY>.

Example

```
<html>
<head>
<body>
<form method="post" action="http://localhost:8080/demo/echo">
Enter your name: <input type="text" name="user"/> <br/><br/>
<input type="submit" value="Submit"/>
<input type="reset" value="Reset"/>
</form>
</body>
</html>
```

An HTML *tag name* is a predefined keyword, like html, body, head, title, p, and b, all in lower-case. A tag name is used in the form of a *start tag* or an *end tag*. A start tag is a tag name enclosed in angle brackets < and >, like <html> and <p>. An end tag is the same as the corresponding start tag except it has a forward slash / immediately before the tag name, like </html> and </p>.

An *element* consists of a start tag and a matching end tag based on the same tag name, with optional text or other elements, called *element value*, in between them. The following are some element examples:

<p>This is free text</p>

<p>This element has a nested element</p>

While the elements can be nested, they cannot be partially nested: the end tag of an element must come after the end tags of all of its nested elements (*first starting last ending*). The following example is not a valid element because it violates the above rule:
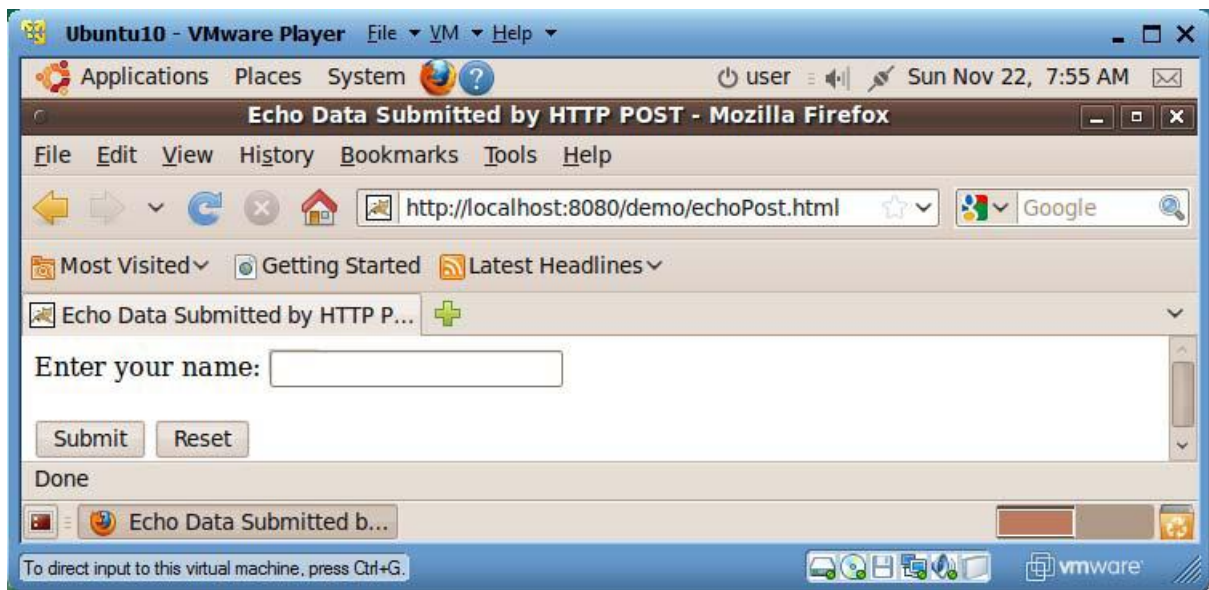
<p>This is not a valid <bold>element<p><bold>

The *newline* character, the *tab* character and the *space* character are collectively called the *white-space characters*. A sequence of white-space characters acts like a single space for web browser's data presentation. Therefore, in normal situations, HTML document's formatting is not important (it will not change its presentation in web browsers) as long as you don't remove all white-space characters between successive words.

If an element contains no value, the start tag and the end tag can be combined into a single one as <tagName/>. As an example, we use <br/> to insert a line break in HTML documents.

The start tag of an element may contain one or more *attributes*, each in the form "attributeName="attributeValue"". The above form element has two attributes: method and action.

An HTML document must contain exactly one top-level html element, which in turn contains exactly one body element. Most of the other contents are nested in the body element. If you load the above file "echoPost.html" in a web browser you will see the following:

The form element is the most important mechanism for interaction between people and web applications. A form typically contains a few input elements and at least one submit button. A form element usually has two attributes: the method attribute for specifying HTTP method for submitting the form data to the web application (only values normally used are "get" and "post"); and the action attribute for specifying the form data submission destination, or the URL of a web application. In this example, when people click on the submit button, the form data will be sent to resource "echo" of the same web application "demo" deployed on your Ubuntu VM's Tomcat web server, which will echo back all information the web browser sent to the web server. If the action value doesn't specify the domain name/IP address or the web application, then the web application from where this HTML file came from will receive the form data. The first input element of type "text" has been rendered as a text field, the second input element of type "submit" has been rendered as a submit button, and the third input element of type "reset" has been rendered as a reset button. The value attribute of the input elements determines what string will be displayed on the element's image. The name attribute of the input element specifies the variable name with which web server programs can access what people type/enter in the element. When the submit button is clicked, the form data will be packaged as an HTTP request and sent to the web resource specified by the action attribute with the method specified by the method attribute.

HTML text formatting tags: Text character can be emphasised, made to appear bold and underlined, as required in a document. Character formatting tags are of two types. The first type of tags includes those that define the logical formatting style. Logical tags are

interpreted and rendered by the specified default behaviour of the browser. If required, users can also define these tags, thus, offering flexibility when viewing a document. The physical style is consistent no matter what browser or which user is accessing the document, allowing a person to format certain items in a manner that will appear the same to all who see the document. Some of the tags are:

<EM> </EM>	The text appearing between the tags is emphasised. The browser uses the default (italics) or user set mechanism for emphasizing.
<CITE> </CITE>	The tag is used for citations of books and articles. The browser typically uses italics for display.
<CODE> </CODE>	The tag is used for enclosing the program code listing. The browser uses fixed width font for displaying.
<STRONG> </STRONG>	The tag is used for placing a strong emphasis on the enclosed text. Browsers typically use bold formatting.

The second type of text formatting tags defines the physical formatting style. The impact of these tags is consistent across browsers. Some sample tags are as follows:

<B> </B>	Text characters between tags appear in bold
<I> </I>	Text characters between tags are italicized
<U> </U>	Text characters between tags are underlined
<TT> </TT>	Text characters between tags appear in teletype format
<STRIKE> </STRIKE>	Text character between tags appear struck out
	Text characters between tags appear as subscript to the preceding character
	Text characters between tags appear as superscript to the preceding character

CGI Gateway Service

Common Gateway Interface is a specification for transferring information between an information server and a World Wide Web server and another application. A CGI programme is any program designed to accept and return data that conforms to the CGI specification. The program could be written in any programming languages namely C, Perl, Java, or visual basic. CGI is used wherever the web server needs to send or receive data from another application, such as database.

CGI programs are the most common way for web servers to interact dynamically with users. A CGI script is a program that negotiates the movement of data between web server and an outside application. A typical use of CGI is to pass data from the web server to a database, filled by a user in HTML form. Many HTML pages that contain forms, for example, use a CGI program to process the form's data once it's submitted. Another increasingly common way to provide dynamic feedback for web users is to include scripts or programs that run on the user's machine rather than the web server. These programs can be Java applets, Java scripts, or ActiveX controls. These technologies are known collectively as client-side solutions, while the use of CGI is a server-side solution because the processing occurs on the web server.

Various steps in the CGI process is given below

Step1: when any HTML form is filled out, the client browser assembles the query and forwards it onto the designated server using the HTTP protocol. In order to enable this action, forms begin with the construct <FORM METHOD= POST ACTION= "cgi-bin/program">…</FORM>. The ACTION should be a URL pointing to the script that will be processing the data collected by the form.

Step2: the server passes the data to an executable program. The server activates the scripts and passes to the script the various values filled out by the user in the HTML form. On a UNIX httpd server, the CGI program will receive the form data from the stdin – provided that the METHOD=POST attribute was used.

Step3: the script then processes the incoming query. Its task is to return an answer in the form of a document that the server can pass back to the client browser. Typically the document will be in HTML or text, but other types are allowed. To differentiate between various document types, the script must specify the type of the document by printing a MIME content type header as the first line

Step4: the server takes the document from the script, and then sends this package back to the client browser via the HTTP protocol. The output generated by the CGI program sent to httpd, which will be sent back to the browser.

Forms and CGI

In addition to formatting linking tags, HTML also has tags to define on screen forms that can be used for accepting input from users and processing it with an application program at the server end. The forms and CGI features of HTML enable the web to become a viable medium for commerce, information search and access and other interactive applications. In the HTML document the <form> </form> tag pair is used for defining a form. The form tag has three important attributes that guide the actions of the browser. These attributes are as follows:

ACTION	The action attribute specifies the CGI program/script that will be used for processing the data entered through the form. The action field accepts URL of the CGI program

ENCTYPE	This attribute specifies how the values entered in the form are encoded for transmission to the URL. Some valid formats are application/ x-www-form-urlencode and multipart/form-data

METHOD	This attribute describes the method used for sending the data to the web server. The two supported methods are get and post. The browser uses the GET or POST protocol packet for sending the data to the server.

Review Questions

1. What is E-commerce and how does it differs from traditional commerce?
2. Describe the need or importance of e-commerce.
3. Explain briefly about various applications of e-commerce?
4. Discuss internet concept and evolution of internet.
5. Discuss the concept of hypertext and its benefits.
6. Explain the role of electronic commerce in business.
7. What is CGI gateway service and explain various forms of CGI?

BUSINESS MODELS OF E-COMMERCE

In this unit we will learn

- ✚ Business Models of E-Commerce

- ✚ Types of Electronic commerce

  - Business to consumer (B2C)
  - Business to Business (B2B)
  - Consumer to consumer or Peer-to-Peer (C2C/P2P)
  - Consumer to Business (C2B)
  - Business to Government (B2G)

- ✚ Supply Chain Management

- ✚ Online Marketing and Online Advertising

- ✚ E-Commerce Resources and Infrastructure Planning

- ✚ Workflow Management

- ✚ Mass Customization

- ✚ Knowledge Management Issues

BUSINESS MODELS OF E-COMMERCE

E-commerce can be defined as any form of business transaction in which the parties interact electronically. An e-business can offer personalised service, high-quality customer service, and improved supply chain management. The ultimate goal of an electronic business is to generate revenue and make a profit as similar to traditional businesses. It is factual that the internet has improved productivity for almost all kind of business organizations that are using it. However, the ultimate aim of an organisation is that productivity must be converted into profitability. To achieve profitability as the final goal, different e-businesses or e-commerce sites position themselves in different parts of the value-chain. To generate revenue, an e-business either sells products/services or shortens the link between the suppliers and consumers. Many business-to-business electronic commerce models are try to eliminate the intermediaries to deliver products/services directly to the end users. By cutting the middlemen the company can offer cheaper products and better customer service to their customers. The end result would be company can attain competitive advantage, increased market share, and increased customer loyalty. Products sold by e-businesses could be either traditional products,

such as books and clothing, or digital products such as songs, computer software, or electronic books.

The combination of a company's policy, operations, technology and ideology define its business model. A business model is a set of planned activities designed to result in a profit in a marketplace. A business model is not always the same as a business strategy although in some cases they are very close insofar as the business model explicitly takes into account the competitive environment (Magretta, 2002). The business model is at the center of the business plan. A business plan is a document that describes a firm's business model. A business plan always takes into account the competitive environment. An e-commerce business model aims to use and leverage the unique qualities of the Internet and the World Wide Web (Timmers, 1998). To transform the scenario of the business, there are various models of e-commerce, which are being proposed to establish an electronic link between the businesses and consumers. These models have brought business and consumer closer to each other transformed the way of conducting the business drastically.

A business model describes a set of business entities and interrelationships among them, the model describes the sources of revenue and potential benefits accruing to the involved business participants. It provides the broad perspective necessary for identifying appropriate solutions at some level of abstraction. The identified solution should be sustainable in terms of revenue and capable of realizing the stated objective. E-commerce models are either an extension or revision of traditional business models, such as advertising model, or a new type of business model that is suitable for the Web implementation, such as info-mediary. E-commerce models are discussed below

- Merchant model
- Brokerage Model
- Info mediary Model
- Subscription model
- Manufacturer model
- Advertising model
- Affiliate model
- Electronic store model

Merchant model

This model basically transfers the old retail model to the e-commerce world by using the internet. There are different types of merchant models. The most common type of merchant model is similar to a traditional business model that sells goods and services over the web. Amazon.com is a good example of this type. An e-business similar to Amazon.com utilizes the services and technologies offered by the web to sell products and services directly to the consumers. By offering good customer service and reasonable prices, these companies establish a brand on the Web. The merchant model is also used by many traditional businesses to sell goods and services over the Internet. Dell, Cisco Systems, and Compaq are popular examples. These companies eliminate the middleman by generating a portion of their total sale over the web and by accessing difficult-to-reach customers.

Brokerage Model

In traditional commerce, brokers play an important role of facilitating transactions by bringing buyers and sellers together. The brokers also known as market makers, charges a fee or a commission on transactions that are facilitated by them. The traditional brokerage model has also been adopted in the electronic commerce and has been applied in the B2C, B2B, C2C and C2B electronic commerce applications.

In the traditional economy, the brokerage functionality has been pervasive in stock trading, commodity exchange markets, auction markets and multi-level market distributions. Early, the stock market operates through agents, who buy and sell the stocks on behalf of their customers and place them on the stock exchange for matching and fulfilling requests. These process are done through phone, fax, and paper has a certain degree of market inefficiency and friction related to the information flow. Electronic commerce reduces these information inefficiencies that drive up the business cost. The financial brokerage firms like e-trade have grown by going online, incurring lower business cost that in turn result in lower transaction commission charged to customers by placing the buy and sell order in financial instruments. The intense competitive pressure among the brokerage firms had accelerated to open online trading channels by larger financial brokerage firms like Fidelity and Charles Schwab charging a transaction fees less than the traditional mechanisms.

Similarly, brokers played an important role in commodity exchange markets like grain, flowers, chemical, equipment, and machinery. Like the traditional commodity exchanges, the

internet trading exchanges bring buyers and sellers together at a common point to create market for exchanging goods. In internet based auctions buyers and sellers are able to trade at globally competitive prices at lower transaction fees. The auction model can also be utilised by businesses to sell excess inventory to customer or by customers to other customers. The electronic auctioneer provides an internet based mechanism and generate revenue by usually charging a fee or commission form seller. Examples are BaZee.com, AuctionIndia.com, eBay.com and onsale.com.

Info mediary Model

An information intermediary or infomediary model collects information about consumers and businesses and then sells this information to interested parties for marketing purposes. The infomediary model is based on the premise of lowering the interaction cost to consumers during the process of searching for suitable products or services and prices. Business based on the infomediary model address the information demand of consumers by identifying the best deal for them. These new intermediaries deliver the value through information mediation rather than the physical distribution. Additionally, careful analyses of customers buying behaviour are extremely valuable and used to target market campaign. The infomediary model builds its revenue stream by charging the consumers for this information. For instance, eMachine (http://www.emachine.com), a computer hardware seller, collects information and sales data during the interaction. The collected data is sold to other businesses that are interested in targeting a specialised set of customers.

Some companies like ePinions (http://www.epinion.com) facilitate users in exchanging information with each other, about the quality of products and services or purchase experience with merchants. The infomediary can recommend a suitable product to the consumer by matching the consumers profile and desired attributes of the product, with the product profiles in its database. The company assured privacy, the profile data is comprehensive and accurate thus of great value to marketers. As a result the consumer is likely to receive considerable discounts, additional services, or money to access the profile directly from the marketers.

Subscription model

An e-business might sell digital products to its customers, by using this model. Scientific journals, news magazines, and other periodic content have been offered, on a subscription basis. Leading publishers and creators of digital content have adapted the same

subscription based model on the internet. Today, many journals, magazines, many news services and valuable audio and video content are also available in digital format. Economic and chemical database, material safety data sheets, stock market databases and economic indicator databases were available in digital format. Multimedia technologies, used for publishing digital content, are fully compatible with the web technology for browsing and delivery of content. The users subscribe and pay to the website in order to access the database and information for a period of time.

Manufacturer model

In a typical distribution system from the time products are manufactured to the time they reach consumers, they pass through several layers of intermediaries, such as wholesalers, distributor, and local store. Each layer adds market friction, thus adding cost to the product and it reducing the profit margin that the manufacturer may get. The power of disintermediation offered by the web reduces this market friction, leading to saving at each disinter mediated layer. The manufacturer as a direct seller to the customer, through the web, offers numerous advantages in the area of customer support service, product marketing, and fulfillment of guarantees. Manufacturer have a better sense of customer requirements, view points, suggestions and complaints with regards to the existing products, leading to improved product offerings newer products. For instance, Dell computers started to sell the products through phone and web.
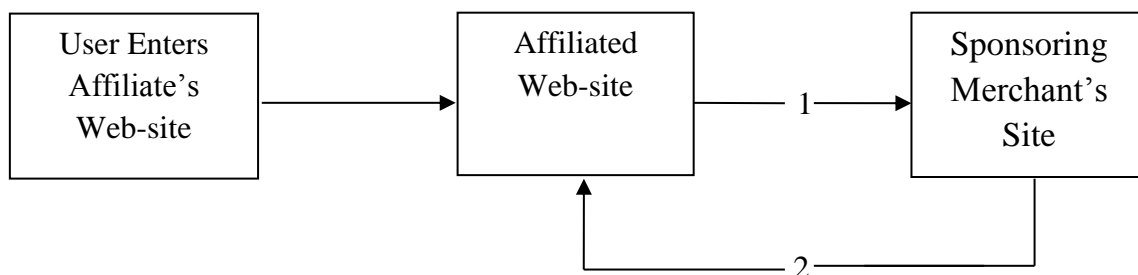
Advertising model

This model is an extension of traditional advertising media, such as television and radio. Internet provides advertisements through e-mail, chat sessions and discussion forums to the content viewers. Search engines and directories such as Google and Yahoo provide contents similar to radio and TV and that allow the users to access this content for free of cost and generate revenue through the advertisements they display. By creating significant traffic, these e-businesses are able to charge advertisers for putting banner advertisements or leasing spots on their sites. The model is derived from commercial television and print-publications that make their basic revenue from the advertisement stream. The model has several variations, banner advertisements being the most popular form. Banner advertisements are served to users visiting one of these popular sites for content service.

Generalized portals and search engines are essentially web traffic aggregators. These businesses position themselves as the starting point or gateway to the excess of information available on the internet. Companies like Cybergold.com are based on promoting the relationship marketing have pioneered incentives based advertising models where users are paid for viewing forms, completing sweepstakes, or signing up for memberships and accounts. Money can be earned and spent for shopping within the community.

Affiliate model

The affiliate companies offer sale products to other manufacturers or e-retailers on their website on an incentive. The visitors of affiliate site may choose product or service offered by e-retailer. The affiliate site redirects the sale transaction to the sponsoring e-retailer or manufacturer, where the actual transaction is carried out. It earns incentive revenue based on the value of each transaction. For instance, Amazon.com offers its affiliate program as Amazon associate program.
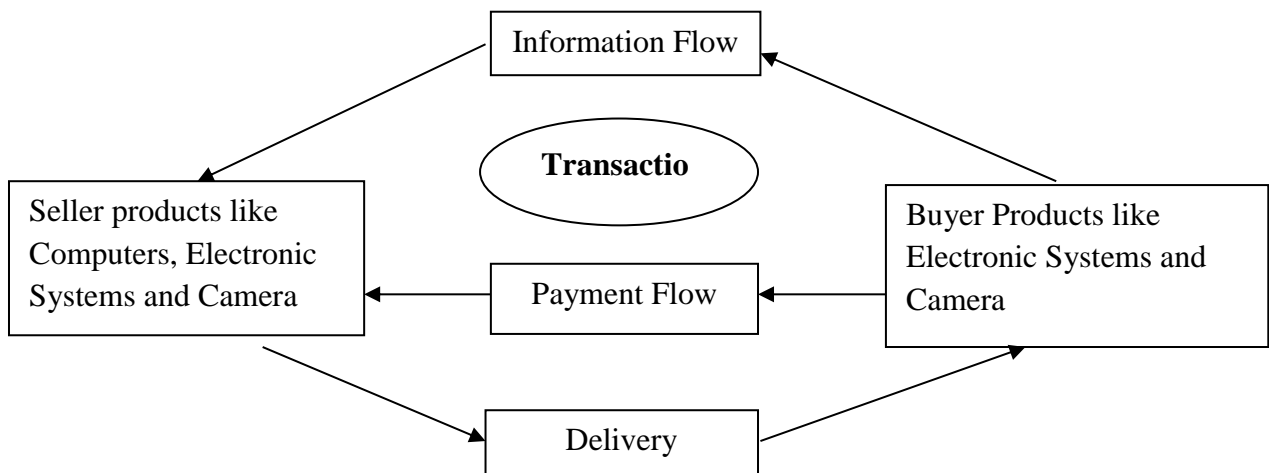

Note:

1. Affiliated site redirects the customer to the sponsoring merchant's site.
2. The sponsoring merchant pays a percentage of transaction to the affiliated site.

Figure 2.1: The Affiliate Model

Electronic store model

The electronic store model has given rise to virtual stores, businesses that operate only on the internet offers traditional as well as digital goods. For instance, Amazon.com started out selling books through web based stores over the internet. In this model, customers interact with the seller though a web based interface for gathering and analysing the information needed for an informed decision. On receiving the payment information, the seller may validate it using

payment gateways or the electronic currency provide, as the case may. Finally the seller initiates the delivery process by altering the shipping and handling department to fulfill the order. In an integrated electronic commerce environment the order transaction automatically raises the shipping and handling transaction, and may also integrate with delivery partners so that pick-ups can be scheduled from appropriate locations for timely delivery. The model faces a major impediment in places where the delivery infrastructure lags behind and is not evolved enough for ready integration into the electronic commerce system.

Figure 2.2: Electronic Store Model

TYPES OF E-COMMERCE

Introduction

An electronic business is defined as a company that has an online presence and that have the ability to sell, trade, negotiate and transact over the web can be considered as e-commerce businesses. Electronic business involves changes in a business organisation and functional processes with the application of technologies, philosophies and computing paradigms of the new digital economy. It includes all aspects of electronic commerce. The ultimate goal of an e-business is similar to traditional businesses i.e. to generate revenue and make a profit. It is factual that the internet has improved productivity for almost all kind of business organizations that are using it. On the other hand, the bottom line is that productivity must be converted to profitability. With the help of e-business solutions, the companies have

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succeeded in developing their technology and increasing their turnover. Both e-commerce and e-business have helped to create a system of applications and utilizes whereby money, information and services can be exchanged through the web. It is important to align the main business of the firm with the e-business strategy of the firm in order to succeed.

There are many benefits of bringing the business to the web. An e-business can offer personalised service, and improved supply chain management. Many business-to-business models try to eliminate the middleman by using the Web to deliver products/services directly to their customers. By doing this they may be able to offer cheaper products and better customer service to their customers. The end result would be a differentiation between them and their competitors, increased market share, and increased customer loyalty. Products sold by e-businesses could be either traditional products, such as books and clothing, or digital products, such as computer software and electronic books. Electronic commerce is classified as following:
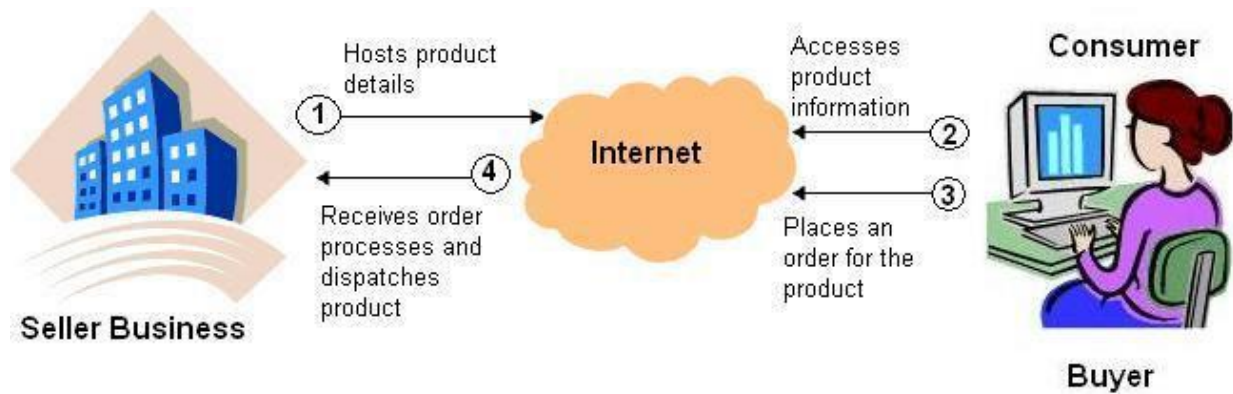
- Business to consumer (B2C)

- Business to Business (B2B)

- Consumer to consumer or Peer-to-Peer (C2C/P2P)

- Consumer to Business (C2B)

- Business to Government (B2G)

E-commerce technology can also be used for streamlining the internal processes of an organisation to derive all the same benefits that are likely to accrue in any inter-organisational (B2B) system. The application of integration ability of electronic commerce within an organisation to streamline processes, reduce friction and internal overhead costs is referred to as the intra-organisational electronic commerce. A common application of intra-organisational electronic commerce is the dissemination of information to employees in order to improve management-employee relationships. These applications of intra-organisational electronic commerce are also referred to as Business to Employee (B2E) applications.

Business-to-Consumer (B2C)

The Business to consumer electronic commerce model involves transactions between business organizations and consumers. It applies to any business organization that sells its products or services to consumers over the Internet. In other words, it provides a direct sale between the supplier and the individual consumer. The B2C model involves transactions between business organizations and consumers. It applies to any business organization that sells its products or services to consumers over the Internet. The two or more entities that interact with each other in this type of transaction involve one selling business and one consumer. The selling business offers a set of merchandise, product and price information in online catalogues, shipping and delivery options. The B2C model also includes online services such as banking, travel services, and health information.

B2C electronic commerce involves electronic retailing or e-tailing. E-tailing involves online retail sale and it facilitates the manufacturer easy to sell their products or services directly to a customer, without the need of an intermediary (retailer). With B2C transactions, there is no need for retailers and therefore, no need for a physical store from which to distribute products. An electronic or web storefront refers to a single company website where products and services are sold. Customers can browse online catalogs or electronic storefronts when it best suits them. The B2C model of e-commerce is more prone to the security threats because individual consumers provide their credit card and personal information in the site of a business organization. In addition, the consumer might doubt that his information is secured and used effectively by the business organization. This is the main reason why the B2C model is not very widely accepted. Therefore, it becomes very essential for the business organizations to provide robust security mechanisms that can guarantee a consumer for securing his information.

Figure 2.3: Business to Consumer E-commerce

The B2C e-commerce opportunity has been utilised by three types of businesses namely channel enhancement, the on-line internet based stores, and small businesses trying to surpass entry barriers. Existing business may use it for expanding the market space and revenues by utilising the internet as new channel to do business with customers. Mail-order catalogue businesses were the early players who took the advantage of the web and internet as they set up their websites where customers could place orders for goods services online. Also, existing consumer merchandisers with established store channels adopt B2C electronic commerce to augment sales through a new channel, as well as to make it easier to reach out to global customers.

Online internet based business-to consumer commerce consists of those businesses that start and build their own electronic commerce business solely on the web to compete with established players utilising the market efficiency offered by electronic commerce. These businesses can gain the market efficiency offered by reduced or no inventory, online transaction, and payment and delivery mechanisms.

Since the internet reached at global level and an expanding market place for goods and services, many small businesses, and antiques and arts and craft sellers can also derive the benefits of electronic commerce. These B2C e-commerce businesses have the option of either setting up their own online shop to attract consumers to business or becoming the part of an intermediary who may be running a shopping mall representing a cluster of businesses. A vast majority of these small businesses may not be in position to create web site and attract enough customers to that site in order to make it a viable option. In the intermediary model consumers are attracted to the mall or some shop in the mall and may indulge in window-shopping or

cross-shopping at other stores. The internet mall and Yahoo stores are the examples of the later model of the B2C electronic commerce.

Major activities of E-commerce

Information sharing:

A B2C e-commerce model may use some or all the following applications and technologies to share information with customers:

- Company web site
- Online catalogs
- E-mail
- Online advertisements
- Message board system
- Newsgroups and discussion groups

Ordering:

A customer may use electronic forms similar to paper forms or e-mail to order a product or service.

Payment:

There are a variety of options. These include:

- Credit cards
- Electronic cheques
- Digital cash

Fulfillment:

The fulfillment function could be very complex depending upon the delivery of physical products (books, videos and CD's) or digital products (software, music, electronic documents). Fulfillment is responsible for physically delivering the product or service from the merchant to the customer.

Service and support:

This aspect is more important in E-commerce than traditional business because E-commerce companies lack a traditional physical presence and need other ways to maintain current customers. Examples include:

- E-mail conformation
- Periodic news flash
- Online surveys
- Help desk
- Guaranteed secure transaction

B2C business, have proven to be extremely successful over the past few years. Not only the actual businesses reap the benefits, but so do the potential customers. With the ever increasing number of E-commerce B2C businesses evolving, the future for traditional, physical business is not looking positive. As the possibilities created by E-commerce continue to expand, so will the number of emerging B2C businesses.

In B2C e-commerce, businesses sell directly a diverse group of products and services to customers. In addition to pure B2C e-commerce players such as Amazon.com, and hepsiburada.com other traditional businesses have entered the virtual marketplace by establishing comprehensive web sites and virtual storefronts. In these cases, e-commerce supplements the traditional commerce by offering products and services through electronic channels. Wal-Mart Stores and the Gap are examples of companies that are very active in B2C e-commerce. Some of the advantages of these e-commerce sites and companies include availability of physical space (customers can physically visit the store), availability of returns (customers can return a purchased item to the physical store), and availability of customer service in these physical stores.

Business to Business Model (B2B)

The Business to Business electronic commerce model involves all electronic transactions between two or more business organisation. It includes purchasing and procurement, supplier management, inventory management, channel management, sales activities, payment management, and service support examples of B2B include online companies that specialize in marketing strategies, advertising, e-mail companies, internet

consultants, website development etc. It's evolved to encompass supply chain management as more companies outsource parts of their supply chain to their trading partners. For example company like LML ltd may deal electronically with its dealers and may place online orders to its vendors for the raw materials and can track the status of those orders. Sometimes in the B2B model, business may exist between virtual companies, neither of which may have any physical existence. In such cases, business is conducted only through the Internet. Internet connects all business. In this stage the intermediaries such as whole seller and broker are eliminated. B2B e-commerce is the main reason behind the increase of extranets. Extranet is the network whose boundaries extend beyond internal cooperate uses to include external partners in business. The business application of B2C electronic commerce can be utilised to facilitate almost all facets of interactions among organisation, such as inventory management, channel management, distribution management, order fulfillment and delivery, and payment management. The B2C electronic commerce can be a supplier-centric, buyer-centric, or an intermediary-centric.

In the supplier-centric model, a supplier sets up the electronic commerce marketplace. Various customer/buyer businesses interact with the supplier at its electronic commerce marketplace. Typically, it is done by a dominant supplier in the domain of products it supplies. The supplier may provide customised solutions and pricing to fit the needs of buyers businesses. The supplier may also institute different pricing schemes for buyers. Usually, differential price structure is dependent upon the volume and loyalty discount.

In buyer-centric electronic commerce, major businesses with high volume purchase capacity create an electronic commerce marketplace for purchase and acquisition by setting a site on their own. The online electronic commerce marketplace is used by the buyer for placing requests for quotations (RFQs) and carrying out the entire purchase process. This kind of facility may be utilised by high volume and well recognised buyers, as they may have adequate capacity and business volumes to lure suppliers to bid at the site. The United States government and the Central Electric's Trading Process Network are examples of buyer centric electronic commerce.

The role of the intermediary company is that of an electronic market maker. It is essential that the intermediary company represent a large number of members in that specific market segment, i.e., both the buyers and the sellers. The intermediary reduces the need for buyers and sellers to contact a large number of potential partners on their own. The

intermediary, by electronically connecting many different buyers and sellers through its database of potential suppliers and buyers, fulfils the role. The information available from the intermediary's database allows a buyer to screen out obvious unsuitable sellers and to compare the offerings of many different potential sellers quickly, conventionally, and inexpensively.

Many a time the bigger players capable of setting up a buyer or supplier-centric electronic commerce site expand the role by forming an intermediary company. Honeywell international and General Electric's Trading Process Network (TPN) are some intermediary-centric electronic commerce markets that have been initiated by the larger players in this market segment.
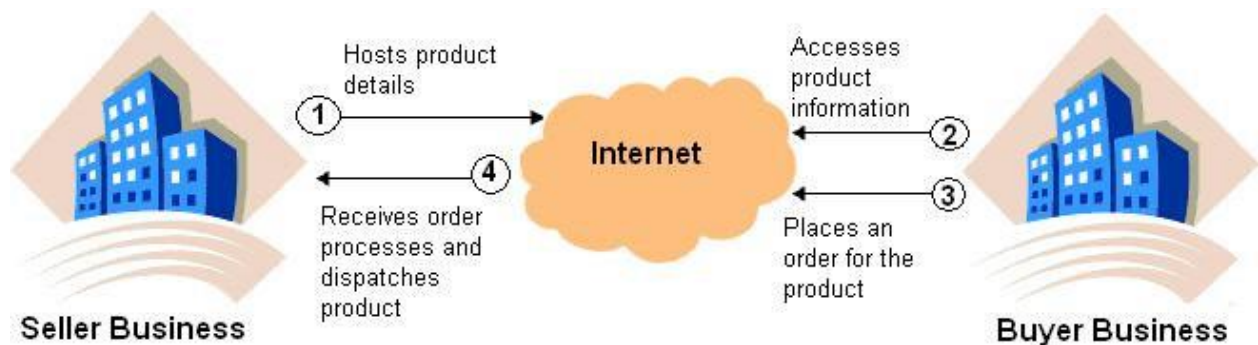
B2B transactions occur when businesses buy and sell goods to and from each other. Basically this electronic commerce strategy works in a way that allows businesses to have more buyers, and then equally there are more sellers with goods available to these buyers. It is not all about outside consumers. Sellers can learn from each other and even produce complementary goods, to corner a bigger market share. The main disadvantage of the high number of buyers in sellers is that unlike in C2C electronic commerce, they are all fragmented. Buyers will not know who all are the sellers, and sellers will not know who all the buyers are. This fragmentation results in both the parties having to travel through millions of web pages trying to find each other. This, in turn, can often increase transaction costs, because the cost-per-customer is increased. It costs more money for both parties to find or attract each other.

The B2B model involves electronic transactions for ordering, purchasing, as well as other administrative tasks between houses. It includes trading goods, such as business subscriptions, professional services, manufacturing, and wholesale dealings. Sometimes in the B2B model, business may exist between virtual companies, neither of which may have any physical existence. In such cases, business is conducted only through the Internet. Let us look at the same example of www.amazon.com. As you know, www.amazon.com is an online bookstore that sells books from various publishers including Wrox, O'Reilly, Premier Press, and so on. In this case, the publishers have the option of either developing their own site or displaying their books on the Amazon site (www.amazon.com), or both. The publishers mainly choose to display their books on www.amazon.com at it gives them a larger audience. Now, to do this, the publishers need to transact with Amazon, involving business houses on both the ends, is the B2B model.

The advantages of the B2B model are:

- It can efficiently maintain the movement of the supply chain and the manufacturing and procuring processes.

- It can automate corporate processes to deliver the right products and services quickly and cost-effectively.

The B2B model is predicted to become the largest value sector of the industry within a few years. This is said to be the fastest growing sector of e-commerce.
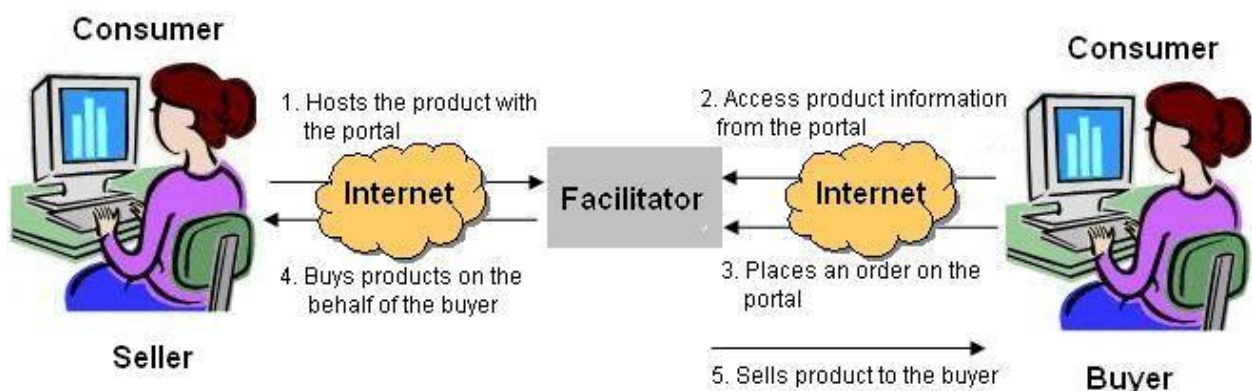

Figure 2.4: Business to Business E-commerce

Consumer to Consumer or Peer to Peer

Consumer to consumer electronic commerce is an activity that provides the opportunity for trading of products or services amongst consumers. In this category electronic tools and internet infrastructure are employed to support transactions between individuals. These exchanges can involve a third party involvement, which can facilitate and provide the infrastructure, place and governance for the transactions or exchanges. OLX.in, quicker.com and eBay are some of the famous examples of Consumer to consumer e-commerce application. It is an online auctioning site that facilitates the trade of privately owned items between individuals. Other examples of C2C electronic commerce applications are service and employment websites such as Monster.com, Seek.com.au and careerone.com.au. These websites provide a valuable service to consumers looking for jobs. Employers can advertise on these websites and potential employees can contact their organisation for an interview. C2C applications are a growing area of E-commerce. As online business expands, peer-to-peer transactions will continue to grow in popularity and the industry will become highly profitable.

Consumer to consumer electronic commerce promotes the opportunity for consumers to transact goods or services with other consumers present on the internet. The C2C, in many situations, models the exchange systems with a modified form of deal making. For deal making purposes a large virtual consumer trading community to compete, check, and decide his own basic selling or buying prices. To many others, it is defined as a financial interaction between non-business entities using the web. Traditionally, C2C electronic commerce has been conducted through both trading forums and intermediaries such as auctions, classified advertisements and collectible shows.

The C2C model involves transaction between consumers. Here, a consumer sells directly to another consumer through internet. EBay and www.bazee.com are common examples of online auction Web sites that provide a consumer to advertise and sell their products online to another consumer. However, it is essential that both the seller and the buyer must register with the auction site. While the seller needs to pay a fixed fee to the online auction house to sell their products, the buyer can bid without paying any fee. The site brings the buyer and seller together to conduct deals.

Figure 2.5: Consumer to Consumer E-commerce

Let us now look at the above figure with respect to eBay. When a customer plans to sell his products to other customers on the Web site of eBay, he first needs to interact with an eBay site, which in this case acts as a facilitator of the overall transaction. Then, the seller can host his product on www.ebay.com, which in turn charges him for this. Any buyer can now browse the site of eBay to search for the product he interested in. If the buyer comes across such a product, he places an order for the same on the Web site of eBay. Now it purchases the product

from the seller and then, sells it to the buyer. In this way, though the transaction is between two customers, an organization acts as an interface between the two organizations.

Consumer to Business (C2B)

Consumer to business can be described as a form of electronic commerce where, the transaction, organized by the customer has a set of requirement specification and specific price of a commodity, service, or item. It is the responsibility of the electronic commerce business entity to match the requirements of the consumers to the best possible extent. Consumer to business enables a consumer to determine the price of a product and/or service offered by a company. In this type of electronic commerce consumers get a choice of a wide variety of commodities and services, along with the opportunity to specify the range of prices they can afford or are willing to pay for a particular item, service, or commodity. As a result, it reduces the bargaining time, increases the flexibility and creates ease at the point of sale for both the merchant and the consumer.

Consumer to business is when the consumer presents themselves as a buyer group. Examples of this include CTB and speackout.com. These sites provide consumers with market strategies and businesses also use them to gain insight into what the consumer wants. These groups may be economically motivated, as with demand aggregators, or socially oriented. The C2B model involves a transaction that is conducted between a consumer and a business organization. It is similar to the B2C model, however, the difference is that in this case the consumer is the seller and the business organization is the buyer. In this kind of a transaction, the consumers decide the price of a particular product rather than the supplier. This category includes individuals who sell products and services to organizations. For example, www.monster.com is a Web site on which a consumer can post his bio-data for the services he can offer. Any business organization that is interested in deploying the services of the consumer can contact him and then employ him, if suitable.

Business to Government (B2G)

Business to government is also known as e-government. B2G is the idea that the government agencies and businesses can use central websites to conduct business and interact with each other more efficiently than usually can off the web. For example, a web site offering B2G services could provide businesses with a single place to locate applications and tax forms

for one or more levels of government (city, state or province, country and so forth) provide the ability to send in filled-out forms and payments, update corporate information, request answer to specific question and so forth. Find law is an example of a site offering B2G services – a single place to locate court documents, tax forms and filing for many different local, state and federal government organisations.
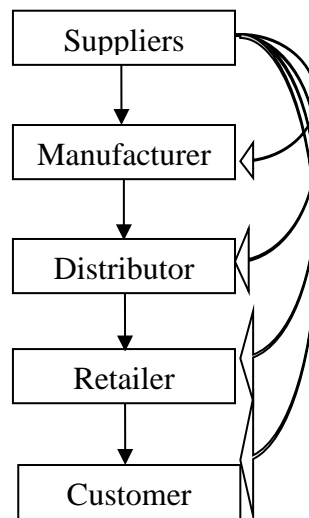
B2G may also include-procurement services, in which businesses learn about the purchasing needs of agencies and agencies request proposal responses. B2G may also support the idea of a virtual workplace in which a business and agency could coordinate the work on a contracted project by sharing a common site to coordinate online meetings, review plans, and manage progress. B2G may also include the rental of online application and databases designed especially for use by government agencies.

SUPPLY CHAIN MANAGEMENT

According to the Council of Supply Chain Management Professionals (CSCMP), "Supply Chain Management (SCM) encompasses the planning and management of all activities involved in sourcing and procurement…and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies."

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer needs and wants. The supply chain includes not only the manufacturer and suppliers, but also transporters, warehouses, retailers, and even customers themselves. In an organisation, a manufacturer supply chain includes all functions involved in receiving and filling a customer demand. These function includes, new product development, marketing, operations, distribution, finance, and customer service.

Figure 2.6: Supply chain Stages

The above figure 2.6 depicts that the supply chain is dynamic and involves the constant flow of information, product, and funds between different stages i.e. from suppliers to manufacturers to distributors to retailers to customers along a chain. The primary purpose of any supply chain is to satisfy customer needs and in the process to generate profit for itself. The term supply chain conjures up images of product or supply moving from. This is certainly part of the supply chain, but it is also important to visualize information, funds, and product flows along both directions of this chain. The term supply chain may also imply that only one player is involved at each stage. In reality, a manufacturer may receive material from several suppliers and then supply several distributors. Thus, most supply chains are actually networks. It may be more accurate to use the term supply network or supply web to describe the structure of most supply chains, as shown in Figure 2.6.

Now days organisations are realising that product excellence does not sufficient for making competitive advantage and profits. Many business firms have been seeking a way of increasing profits through better management of their supply chain using technology and avoiding the extremes of either internalizing it or of outsourcing most functions. In the interest of acquiring an edge, these companies are beginning to use the supply chain network to reduce costs and complement their products with basic and value-added-services.

Management of supply chain is necessary in order to increase profitability and to reap competitive advantages. Essentially, supply chain management encompasses all of those integrated activities that bring product to market and create satisfied customers. The Supply

Chain Management integrates areas from manufacturing operations, purchasing, transportation, and physical distribution into a unified program. Successful supply chain management, then, coordinates and integrates all of these activities into a seamless process. It embraces and links all of the partners include vendors, carriers, third party companies, and information systems providers in the chain and in addition to that all the departments within the organization. SCM optimises information and product flows from the receipt of the order, to purchase of raw materials, to delivery and consumption of finished goods. SCM plays an important role in the management of processes that cut across functional and departmental boundaries. Supply chain management goes beyond organisational boundaries, reaching out to supplies and customers.

Within the organisation, the supply chain refers to a wide range of functional areas. These include SCM related activities such as inbound and outbound transportation, warehousing, and inventory control. SCM is in stark contrast to the traditional approach, whereby executives think in terms of component activities such as forecasting, production planning and scheduling, order processing, warehousing and customer service. Essentially, it also represents the information systems that necessary to monitor for all of these activities. Firms are now realising that in a world of rapid response and order fulfilment, a company that is incapable of managing cross-functional processes may become extinct. For instance, new product development today invariably integrates diverse areas including R&D, marketing, engineering, manufacturing, logistics, finance and law.

SCM is important in retailing because it helps manage the demand and supply functions. It is safe to say that many manufacturers have not reacted well to innovations in this distribution chain, where consolidation has shifted power to hands of big supermarket chains and discount stores, as well as a few mega-wholesalers. These retailers and wholesalers, not to mention consumers, have forced brand-name companies to reengineer their marketing and logistics in an effort to strip out costs and add more value.

Importance of supply chain management

In an increasingly competitive and globalised world, the management of supply chains requires utmost attention as it may lead to large scale variations in inventories, stock outs and delayed deliveries. The operational efficiency of the processing plant cannot be achieved with

misaligned supply of raw materials, demand forecasting and logistics. As efficient management of supply chain impacts the cost quality and profitability, the following issues make its essential for every organisation to pay due attention on the supply chain management:

Globalisation:

In the globalised business environment, the physical supply chains are not constrained by geographical boundaries. Globalisation has expanded the scope and length of supply chain and has brought along the challenges of managing inter-cultural and fluctuating currency environment. The globalisation has also enhanced the risks of disruptions due to distances and national boundaries. But, at the same time, it provides the opportunity of getting better, cheaper and more efficient sources.

Outsourcing:

With the enhanced reach of supply chains, it is not uncommon for businesses to source the goods and services across geopolitical boundaries to exploit the cost efficiencies offered due to cheaper availability of skilled labour, tax breaks and lower cost of raw material.

Operational Improvements:

The widespread acceptance of Total Quality Management (TQM) and lean production practices has enabled businesses to improve quality and reduce costs. In other words, the production costs have largely been minimised. Since, we know that the cost of product consists of production, distribution and logistics and profits, thus, any improvement in distribution and logistics, i.e. supply chain, offers the greatest opportunity for cost competitiveness.

Enhanced competition:

With the opportunity of integrating and sourcing the products, sub-assemblies and components, the product development cycle has become shorter. It is also relatively easier to design and launch newer product and offer personalised products at competitive costs. In an evolutionary arena, like electronics, where technology changes every so often, the product life cycle and time to market opportunity has a very short window. Thus, in order to stay competitive in such a market environment, the integration and coordination of supply chain poses greater challenge.

Supply chain complexity:

The globally integrated supply chains are truly complex as they have to manage across organisational, geopolitical boundaries, and account for disruptions in supply logistics, thus leading to greater degree of reliance on information in a highly uncertain environment. Thus, improved collection and flow of information related to all aspects such as disruption in

logistics, accuracy of demand forecast, late deliveries, and substandard deliveries assumes utmost importance.

Inventory management:

The major cost advantages from improved supply chains accrue to businesses due to reduction in inventories. Excess inventory adds to the cost, while shortages lead to disruption in smooth flow of work and production and the consequent negative impact on the operations. It is important to maintain a smooth and even flow across the operation without building excess inventory of output product as well as input material.
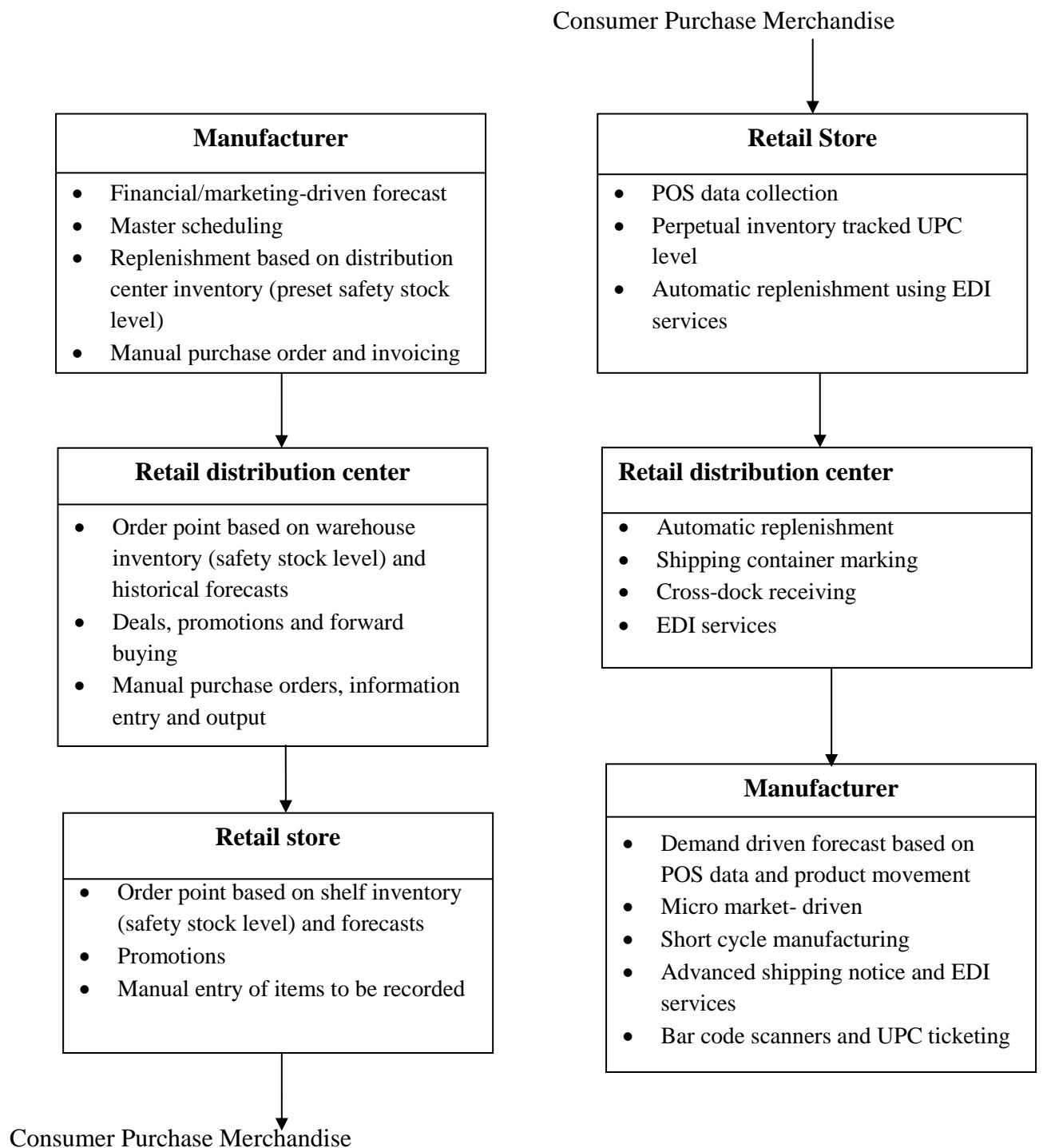
Proliferation of E-commerce:

The increased adoption of internet based electronic commerce technologies in businesses have created a new paradigm of information availability and sharing amongst the entities in the supply chain. This information sharing, as a result of every one of these entities being on the network with the capability to instantaneously share the information, has provided:

- The opportunity to transform many an existing supply chains
- Never ways of linking the supply chain in some cases

Supply Chain Management Models:

Two primary models of supply chain management are push versus pull. These models contain three primary elements:

Consumer Purchase Merchandise

Manufacturer
• Financial/marketing-driven forecast • Master scheduling • Replenishment based on distribution center inventory (preset safety stock level) • Manual purchase order and invoicing

Retail Store
• POS data collection • Perpetual inventory tracked UPC level • Automatic replenishment using EDI services

Retail distribution center
• Order point based on warehouse inventory (safety stock level) and historical forecasts • Deals, promotions and forward buying • Manual purchase orders, information entry and output

Retail distribution center
• Automatic replenishment • Shipping container marking • Cross-dock receiving • EDI services

Retail store
• Order point based on shelf inventory (safety stock level) and forecasts • Promotions • Manual entry of items to be recorded

Manufacturer
• Demand driven forecast based on POS data and product movement • Micro market- driven • Short cycle manufacturing • Advanced shipping notice and EDI services • Bar code scanners and UPC ticketing

Consumer Purchase Merchandise

Figure 2.7: Push vs. Pull based Supply Chain

Integrated Logistics and Distribution

The CSCMP also defines logistics management as "The part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirement. Logistics management is an
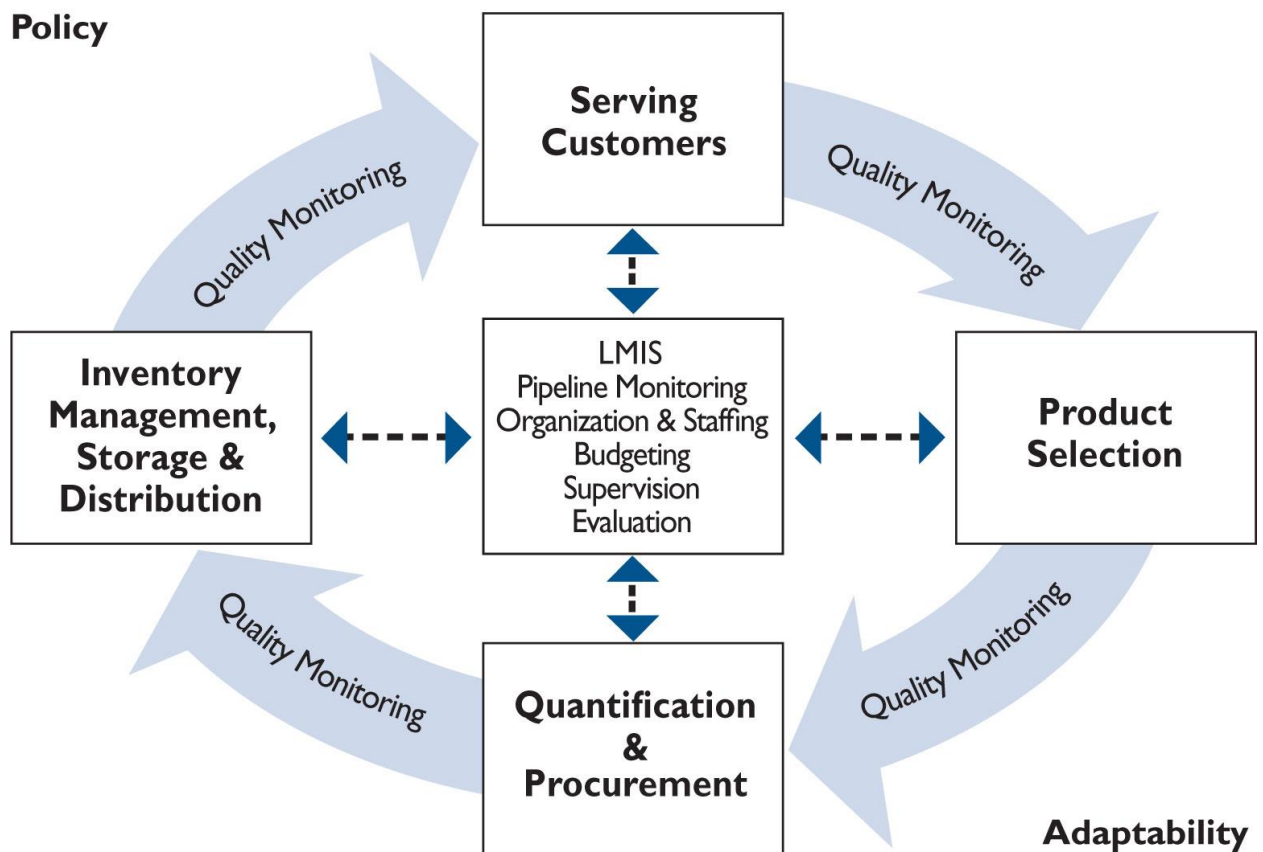
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integrating function, which coordinates and optimizes all logistics activities, as well as integrates logistics activities with other functions including marketing, sales manufacturing, finance, and information technology."

Logistics is the management of the flow of goods, information and other resources including energy and people between the point of origin and the point of consumption in order to meet the requirement of consumers. Software is used for logistics automation which helps the supply chain industry in automating the workflow as well as management of the system. Some of the software includes CVT software, CTMS software, WMS, etc. Logistics is relatively new discipline that deals with the integration of materials management and physical distribution. The manufactured products are delivered to the customer through the logistics function. Logistics and distribution are business function that many firms do not consider a competitive advantage. The distribution revolution described logistics as the last great frontier for performance improvement and cost cutting. Nowadays companies are discovering creative methods of adding value, cutting costs, and increasing speed throughout their entire supply and manufacturing or operation distribution chain. Logistics and distribution can add up to as much as 30 to 40 percent of total cost for some businesses. Wal-mart, United Parcel Service, Compaq computers and others have made innovative distribution and logistics processes a cornerstone of their competitive strategy.

Business firms are hard to predict the demand for the product and based on this to plan production and materials procurements, due to variations in customer demand and exceptional numbers and variety of products on the market. It results in increasing inaccuracy demand forecasting, along with the cost of those errors. It insists the firm to improve forecasts and simultaneously redesign logistics processes to minimize the impact of inaccurate forecasts. SCM provides a way to vies the entire forecasting, planning, and production process, beginning with figuring out what forecasters can and cannot predict well. The supply chain management enables companies to use the power of flexible manufacturing and shorter cycle times much more effectively. Logistics is the heat that forges the supply chain.

Logistics Cycle

Logistics management includes a number of activities that support the six rights. Over the years, logisticians have developed a model to illustrate the relationship between the activities in a logistics system; they call it the logistics cycle

Figure 2.8: Logistics Cycle

Logistics cycle indicates the cyclical or repetitive nature of the various elements in the cycle. Each activity such as serving customers, product selection, quantification and procurement, and inventory management are depends on and is affected by the other activities. For example, product selection is based on serving customers. What would happen if, for a medical reason, we select a product that is not authorized or registered for use in a country program? We would need to rethink our decision and order a product that is authorized and registered for use. This decision would, in turn, affect our procurement and storage, two other activities in the logistics cycle. The activities in the center of the logistics cycle represent the management support functions that inform and impact the other elements around the logistics cycle.

Major activities in the logistics cycle

Let's briefly review the major activities in the logistics cycle:

Serving customers:

Everyone who works in logistics must remember that they select, procure, store, or distribute products to meet customer needs. Storekeepers do not store drugs just for the purpose of storing; they store products to ensure that commodity security exists for every customer to obtain and use the health commodities when they need them. In addition to serving the needs of the end customer, the customer seeking health services to each person in the process is also serving the needs of more immediate customers. Storekeepers provide customer service when they issue medicines to the health facility, and the central medical stores provide customer service when they issue commodities to the district. The logistics system ensures customer service by fulfilling the six rights. Each activity in the logistics cycle, therefore, contributes to excellent customer service and to ensuring commodity security.

Product selection:

In any health logistics system, health programs must select products. In a health logistics system, a national formulary and therapeutics committee, pharmaceutical board, board of physicians, or other government-appointed group may be responsible for product selection. Most countries have developed essential medicine lists patterned on the World Health Organization (WHO) Model List. Products selected for use will impact the logistics system, so the logistics requirements must be considered during the product selection.

Quantification:

After products have been selected, the required quantity and cost of each product must be determined. Quantification is the process of estimating the quantity and cost of the products required for a specific health program (or service), and, to ensure an uninterrupted supply for the program, determining when the products should be procured and distributed. See the suggested reading list at the end of the handbook for sources of additional information about quantification of health commodities.

Procurement:

After a supply plan has been developed as part of the quantification process, quantities of products must be procured. Health systems or programs can procure from international, regional, or local sources of supply; or they can use a procurement agent for this logistics

activity. In any case, procurement should follow a set of specific procedures that ensure an open and transparent process that supports the six rights.

Inventory management, storage and distribution:

After an item has been procured and received by the health system or program, it must be transported to the service delivery level where the client will receive the products. During this process, the products must be stored until they are sent to the next lower level, or until the customer needs them. Almost all businesses store a quantity of stock for future customer needs.

Integrated Marketing and Distribution

Marketing is the way a company doing their businesses i.e., in customer oriented industry supply chain management begins with information obtained from the customer at checkout counter. Traditionally, the customer order process is initiated by sales personnel, who have an in-depth understanding of the customers' product and service requirements. In electronic commerce, the order process could be initiated by marketing information systems such as point-of-sale systems. Promotion has traditionally been part of the marketing function, which may not see the need to integrate its computer systems with the logistics planning systems to perform supply chain management. Sales, advertising and marketing are fast emerging as hot subjects for technology oriented business professionals. Spurred on by the desire to use information technology more competitively, companies have begun to scrutinise the interface with their customers and are realising that they do not understanding marketing at all in the electronic age. It is apparent that marketing is a virgin territory from a technological viewpoint and is underdeveloped and underutilised as a business weapon in the customisation paradigm. Broadly speaking, technology is changing firms' marketing edge in several areas like in manufacturing and logistics planning, in management analysis of new markets, in identifying and targeting customers, in promotion of the allied areas of direct marketing and telemarketing, and finally in postsales.

Marketing challenges arises from the fact that with unprecedented choice, companies face the end of customer brand loyalty. To combat that threat, they often increase their sales and market forces, throwing costly resources at the market as a way to retain customers the real situation, of marketing must find ways to integrate the customer into the company, to create and sustain a relationship between the company and the customer, and use the information garnered from the customer for downstream activities.

Agile Manufacturing:

Consumers and manufacturers are stressing quality and speed. One of the most influential visions of production goes by the name of agile manufacturing. Promotions must be closely tied to agile manufacturing capability. It calls for flexibility and quick response to changing market conditions, customer demands and competitor actions. In an ever-changing environment, people, processes, units and technology reconfigure to give customers exactly what they want. Managers coordinate independent, capable individuals, and an efficient linkage system is crucial. It results in low cost, high quality, customised standard goods and services.

Agility implies that breaking out the mass-production mold and producing highly customised products, when and where the customer wants them. In a product line context, it amounts to striving for economies of scope, ideally serving ever smaller niche markets, even quantities of one, without the high cost traditionally associated with customisation rather than economies of scale. It also requires an enterprise wide view, whereas lean production is typically associated only with the factory floor. Agility also embodies such concepts as rapid formation of multicompany alliances to introduce new products to the market. The actual manufacturing process is increasingly being absorbed into the larger infrastructure but agile manufacturing requires an integrated applications environment with common access to services to users. Such integration can extend beyond an organisation to include business partners such as customers and suppliers. Agility is essential in a future that requires new and innovative manufacturing practices, among them the following:

- Customers 'Custom design' products such as automobiles and clothing are electronically transmitting their requirements to remote locations capable of quickly manufacturing and distributing these products.

- Companies rapidly and easily form alliances to produce new products, employing advanced manufacturing concepts such as agile and virtual manufacturing.

- Small and medium sized companies advertise their manufacturing capabilities over computer networks and efficiently bid on projects required by other companies.

- 'Software system brokers' connect users who need temporary access to sophisticated manufacturing tools that would normally be too expensive to acquire.

- Manufacturers and suppliers use 'intelligent' procurement systems to facilitate and speed parts procurement, billing and payment transactions, reducing costs, improving accuracy and meeting customer demands in a timely manner.

Agile manufacturing requires companies to have more than just the fast, lean, and proactive virtues. Agility resides in the provision of a product, rather than in any single company. There are various preconditions for success in an agile venture. One is clear communication channels between involved parties. Most important, however, is predictability through management. The essence of agility is sensitivity to time, to knowing a company's capabilities and the time it needs exactly. New factory management technologies make this possible. When a product is being assembled, management must know precisely the dimensions of its parts not in breadth, length, and depth but in terms of such things as process time and quality. At present, a few companies can accurately measure themselves in many of these dimensions. In summary, the agile manufacturing enterprise seeks to achieve the following:

- Greater product customisation or manufacturing to order would come at relatively low unit cost.

- Rapid introduction of new or modified products is some cases, through quick formation of temporary strategic partnerships takes advantage of brief windows of opportunity in the marketplace. These alliances would blend together talents or "core competencies" of the partners, combining pieced of each organisation into a new virtual corporation.

- Interactive customer relationships transform the physical product into a platform for providing an evolving set of value-adding services.

- Dynamic reconfiguration of production processes would accommodate swift changes in product designs or entire new product lines.

ONLINE / INTERNET MARKETING

Marketing is the process of planning and implementing the conception, pricing, advertising, and distribution of goods and services to meet the demands of the market for which the product or service is intended. It is a way of managing a business so that each important business decision is made with full knowledge of the customers. It deals with all the steps between determining customer needs and supplying product and service to them at a profit. It entails drawing a management plan that views all marketing components as part of a total system that requires effective strategic planning, organising, leadership and control. Marketing has two underlying assumptions: (a). all company policies and activities should be aimed at satisfying the customer needs and wants and (b). Profitable sales volume is a better company goal than maximising the sales volume.

The Internet has led to an increasingly connected environment, and the growth of Internet usage has resulted in the declining distribution of traditional media such as television, radio, newspapers, and magazines. Marketing in this connected environment and using that connectivity to market is e-marketing. Internet marketing, often called online marketing or e-marketing is essentially any marketing activity that is conducted through online with the use of internet technologies. It comprises not only advertising that is shown on websites, but also other kinds of online activities like e-mail and social networking. Every aspect of internet marketing is digital, meaning that it is electronic information that is transmitted on a computer or similar device, though naturally it can tie in with traditional offline advertising and sales too. Internet marketing has three cornerstone principles:

1. **Immediacy:**

The web changes at a blistering pace and online audiences, whose attention spans are short, expect on-the-minute updates and information. To keep the favour and attention of this group, you must respond to online messages and interact with communities as quickly as possible.

2. **Personalisation:**

Customers online are no longer faceless members of a broad target audience – they are individuals who want to be addressed personally. Use the wealth of personal information available online to your benefit by targeting the relevant people precisely and personally.

3. Relevance:

Communication online must be interesting and relevant to the reader, otherwise it will simply be ignored. With all the information that is competing for your audience's attention, you must find a way to stand out and engage readers. The best way to do this is by giving them exactly what they want, when they want it.

Online marketing adds more interactivity, customer choices and subtract costs. It adds information value to product and services and takes away barriers to starting a business or extending a business into international markets. Interactive marketing using such new media technologies as computer based online services or CD-ROMs will not supplant, at least initially, conventional marketing techniques, but will augment them as a new, low cost means of reaching customers. The following table summarizes the distinctions among the three approaches to marketing: mass, direct and interactive

	Mass Marketing	Direct marketing	Interactive Marketing
Distribution Channel	Broadcast and print media (customer is passive)	Postal service using mailing lists (consumer is passive)	The Internet (consumer is active and is the catalyst for what is shown on screen)
Market strategy (sample products)	High Volume (food, beer, autos, personal and home-care products)	Targeted Goods (credit cards, travel, autos, subscriptions)	Targeted audience (services and all types of product information)
Enabling Technology	Story boards and desktop publishing	Databases and statistical tools	Information servers, client browsers, bulletin boards, and software agents.
Authors of Marketing Material	Advertising agencies	Advertising agencies and companies	Companies and consumers
Expected Outcome from Successful Implementation	Volume of sales	Bounded sales, data for analysis	Data for analysis, customer relationships, new product ideas, volume sales.

INFORMATION BASED MARKETING

Interactive marketing brought on by electronic commerce will change the roles of small businesses, retailers, manufacturers, and media companies. These changing roles are categorised into four areas: retailers versus manufacturers, target and micromarketing, small business versus large business and regulatory and legal implications of cyberspace marketing.

Retailers versus Manufacturers

The role of retailers and manufacturers are fast reversing in electronic commerce. Nowadays, retailers have an advantage over manufacturers because they can measure customer response and get first crack at the broadest range of information. In this case, Point of Sale (POS) scanning systems have played a major role in shifting power from manufacturers to retailers, as large innovators like Wal-Mart have amply proven. The POS system records each sale in central database, using a scanner which reads the bar code on the product, so the retailer can easily reorder the inventory. Through centralised buying ensures lower prices through volume purchasing and efficient distribution chains.

Information based marketing can offer manufacturers and retailers a means to do market research and customer prospecting, to establish brand loyalty, market presence, and distribute redeemable coupons, and to create customised product bundles.

Market Research and Customer Prospecting

Conventional high-tech methods of collecting prospect data often cost millions of dollars, and that's before the first piece of direct mail gets printed. For a fraction of these costs, companies can put up internet information servers and launch discussion lists on topics that their customers care about. The lesson that advertisers are learning is that these information vehicles must provide genuine value or they simply won't be visited. The feedback alone is worth a fortune in an era when market dynamics are approaching the speed of light and when companies that can be credible will win enormous advantages. Presence and intelligence interaction, not advertising, is the key that will unlock the commercial opportunities online.

In future, marketing research will reward customers for listening to or watching commercials. An inkling of this is evident in a phone service that is dangling money in front of customers to entice them to listen to commercials.

Market Presence

Market presence can be intelligently designed through promotions. Customer information systems that collect detailed consumer purchase patterns will change the practice of promotional discounts, reducing across the board promotions and providing steeper but highly targeted discounts. Procter & Gamble and other manufacturers have already been replacing promotional discounts with 'everyday low prices' in target markets. With emerging customer information technologies, it's possible for both manufacturers and retailers to offer discounts only to those customers for whom it pays, to those who are cost sensitive enough to switch brands or change shopping habits permanently.

Product or services bundling

Bundling is a classic marketing strategy in which two or more complementary products or services are offered as a package at a discounted price. Examples of bundling include two-for-the-price-of-one airline tickets, computer hardware and software combinations, season tickets for sports and meal specials in restaurants.

A seller must choose to adopt one of the following bundling strategies:

➢ **Only components:** the seller prices and offers the component products or services only as separate items

➢ **Only bundles:** the seller prices and offers the component products or services only as a bundle.

➢ **Mixed strategy:** the bundled as well as the individual component products or services are priced and offered as options.

Information based products: pricing and priority

A new commodity, the information product, is emerging enabled in part by the global networking infrastructure. Examples of information products are software, entertainment, electronic books, information databases and product catalogues. Two important information based marketing related issues are pricing and priority. Online customer must pay for both products and services. They also need to pay for the infrastructure services associated with connectivity and for other services such as brokerages providing support for navigating through information space and financial institutions supporting functions like payment and settlements.

Information products will most likely be priced based on speed of availability. For instance, financial information from various sources such as currency, commodity and over the

counter markets may well have different prices associated with them depending on the speed and accuracy that the end user needs. Finally, in many information services it is unrealistic to assume that consumers know the total cost before they buy. However, exact cost is sufficiently difficult to obtain before purchase; consumers might proceed with a consumption of decision in partial ignorance of the cost what they are buying. This often results in 'price shock' when the final bill is shown. For many online services, many customers never returned after getting the first bill. Improved metered information services will require more research to develop better ways of collecting and presenting pricing information about services.

Target and micromarketing

In electronic commerce, technology has put target and micromarketing within the reach of the small business. Computers have armed micro marketers with more knowledge about the business as well as customers in order to develop and exploit niche markets. Traditional mass marketers continue as if the population were homogeneous, whereas micro marketers not only have discovered various segments but are mining these profitable niches by targeting customers. Customer targeting is one way to get closer and sustain a two-way flow of communication between the seller and the buyer. In today's world, getting close to the customer is particularly important when one considers that the average consumer is bombarded with a multitude of commercial messages daily. Direct mail and telemarketing are two fast-growing ways to micro market. Both methods are able not only to find prospects but to qualify them. Because both direct mail and telemarketing can be easily measured and quickly adjusted to appeal to the needs and expectations of a customer, they have been proven to be very effective sales tools. There are two main types of micromarketing:

1. Direct relationship micromarketing is aimed at stimulating sales at retail establishments through direct contact with consumers in their homes
2. Direct order micromarketing is focused on selling products directly to consumers in their homes or businesses. Cataloguers are in this segment of marketing.

Small versus large business

The key distinction between small and large business remains access to national and international markets for advertising purposes. Nowadays advertising costs is the main barrier to reaching the customer effectively. The high costs of advertising have served to ensure that small businesses rarely grow beyond the local market. With the advent of electronic commerce, small businesses can now bridge this gap. The internet advertising has a significant immediate

impact on small to medium sized enterprises. Duo to the empowering effect of internet facilitated advertising, however, the balance of power between large and small business may fundamentally change in the future. Online advertising on public networks is expected to the level the playing field for small to medium sized businesses and enable them to compete with large corporations on a global stage.

Regulatory and legal implications

Many consumer goods firms base their direct marketing and promotional programs on databases of extensive customer information. Some manufacturers, such as tobacco companies, will be able to build substantial customer information systems that may help them to create increased consumer demand for their products. In the case of certain products, this may not meet with legal approval. U.S. cigarette makers cannot advertise on television and are constantly threatened with losing their access to print media. To overcome these market barriers, they have developed some of the most advanced database marketing programs. For many years, the tobacco companies have offered discount coupons, prizes, and free merchandise in exchange for consumer questionnaires. Using this information, cigarette marketers have built extensive databases on the demographics and preferences of most American smokers. This information helps marketers anticipate market-segment changes, test new products, and target promotions aimed at increasing brand loyalty or encouraging competitors' customers to switch.

The rules for regulating cyberspace marketing, advertising and sales are still in the early stages. This is a gray area that will without doubt continue to be the focus of heated exchanges.

Internet Advertising

With the growth in the number of users, the internet is increasingly seen as a commercial medium with immense potential for information sharing, market transactions, advertising and promotions. Many Internet Service Providers (ISPs) now offer internet connectivity to the masses, and this is changing the profile of the users on the internet. The growth of information content providers, such as newspapers, magazines and electronic newsletters has mirrored the growth of internet users. The entry point and the cost of publishing being minimal, many new publications, with a wide audience reach, have only accelerated the process.

Advertising is an attempt to disseminate information in order to influence a buyer and seller transaction. Advertising and promotion are an integral part of any social and economic system. The ability of advertiser depends upon the careful delivery of message to target customers and increase the awareness about the advertised product, program or service, ultimately translating into an increase in the sales volume. Hence, an effective marketing program requires an appropriate advertisement suited for the mission, the message, and the target audience. Traditional advertising on TV or newspaper is non-personal, one-way mass communication,that can transmit a message to large groups of individuals at the same time. Direct-response marketing contacts individuals by means of direct mail or by telephone calls and requires them to respond in order to make a purchase. The direct-response approach personalizes advertising and marketing, but it can be expensive, slow, and ineffective. Internet advertising redefines the process, making it media-rich, dynamic, and interactive. It improves on traditional forms of advertising in a number of ways like internet advertisements can be updated any time at minimal cost, and timely. They can reach a very large number of potential buyers all over the world. Online ads are sometimes cheaper in comparison to print (newspaper and magazine), radio, or television ads. Advertisement in other media are expensive because they are determined by space occupied in printed newspaper and magazines, by how many days (times) they are run, and by the number of local and national stations and print media that run them. Internet advertisement can be interactive and targeted to specific interest groups or to individuals. Finally, the use of the Internet itself is growing very rapidly, and it makes sense to move advertising to the Internet, where the number of viewers is growing. Nevertheless, the Internet as an advertising medium does have some shortcomings, most of which relate to measurement of effectiveness. For one thing, it is difficult to measure the actual results of placing a banner advertisement, and the audience is still relatively small as compared to television, for example. For a summary of the benefits and the limitations of Internet advertising, see the checklist at our Web site.

Advertising supports the marketing program by influencing, through impressions, the "audience". An audience is that part of the target market that can be expected to experience the advertisement or series of advertisements. It is a well defined and measurably quantifiable subset of the target market. The nature of the audience mix in terms of demographics, psychographics and other factors determine the 'composition' of the 'audience'. The size of the 'audience', relative to the target market, is referred to as the advertisement's 'reach', every

time, a member of its audience experiences as advertisement, it is said to have made an 'impression'. These impressions must be effective. The effectiveness of an advertisement is usually measured by recall, i.e., can a member of the advertisements audience remember the advertisement later.

Many an advertisements needs to be seen several times before it can be recalled. The number of times a member of the audience must be exposed to an advertisement before it can be recalled is referred to as the 'effective frequency' of the advertisement. The effective recall frequency falls somewhere between four and seven, for most traditional media advertising

The emergence of the internet as an information exchange and communication medium, though FTP applications such as Archie, Gopher and Veronica, electronic mail facility, have opened up new avenues for advertising. Advertising, through these media, has been in existence for a decade. It is the emergence of the World Wide Web, powered by HTTP and HTML, with multimedia publishing capabilities, that has made it a means for mass communication. The internet advertisers need to attract the internet users to forums, or identify appropriate forums, such as chat rooms, mailing lists, bulletin board services, news groups, FTP archives and websites. They categorise three new market segments seem to have clearly emerged on the horizon.

1. **Net-Surfers:** This segment consists of new internet users, usually young persons with short attention spans. These people tend to hop from site to site, usually trying to discover more and more, if something looks interesting at a site, they may scan it, or download it otherwise move on to next site. People in this segment may be browsing several documents or sites simultaneously. It is the segment that may be very hard to appeal to, but is attractive to marketers and advertisers. The decisions made by this segment tend to be impulsive, and buying right off the net is quite common.

2. **Net-Buyers:** This segment of users spends a lot of time online as a part of their business activity, usually at their workplace. It tends to be dominated by software professionals, academicians, researchers, engineers and others employed in the online service provider industry. According to first IIML web usage survey in 1999 describes that this group consists of nearly 60 percent of the internet user population in India.

3. **Net-Consumers:** This segment consists of users who access the network from their homes. It represents families, and offers the opportunities for the retail industry, entertainment industry and convenience stores. It is the segment that holds the biggest promise, as we move to digital economy. Advertisers and marketers can influence this segment by making

it more convenient to shop online rather than visiting local stores. In India, this segment already constitutes 30 percent of the internet users.

There are two ways by which the internet user can frequent a forum; one is by typing the forum address explicitly into the client-program, such as a web-browser, or by using a referenced link from the current forum. There are several ways to tell a user about a link to a web page. The most obvious way is to have the site can be listed by one, or all of the web search engines. In addition, external marketing and advertising, that forms a part of the broader program or campaign, can also reference the web site. Many newspaper, television or magazine advertisements now include the URL's for advertiser's home pages. Finally, business cards, letter heads, exhibition boards, product wrappers, etc., can all carry the URL alongside the logo.

Models of Internet Advertising

Over the past five years several advertising models have evolved over the internet, these include banner advertisements, sponsored contents, micro sites, interstitial, superstitials and opt-ins. Although, the banner model still remains the most prominent, the interstitial and superstitials are becoming increasingly popular, duo to the rich multimedia experience they deliver, enabling them to be more effective. These models are discussed below

Banner advertisements

A banner advertisement is a small, graphics link placed on the webpage that is clickable. The positioning banner advertisements are of crucial significance. These are usually placed on an eye catching space on the web page. A click on the advertisement brought to the website for the company that is paying for the advertisement. Banners are electronic billboards, and banner advertising is the most commonly used form of advertising on the Internet. Typically, a banner contains a short text or graphical message to promote a product or a vendor. It may even contain video clips and sound. When customers click on the banner, they are transferred to the advertiser's home (ordering) page. For instance, if we open Yahoo mail account the banner advertisements appear before the space for username and password. After having signed in, a broad rectangular banner advertisement opens before the link to inbox appears. Even after clicking on the inbox link, a banner advertisement is displayed prior it the downloading of the mail box. It is estimated that nearly 60 percent of the e-marketing space has been occupied by advertising; the overwhelming majority of it is in the form of banners.

There are two types of banners: **Keyword banners** appear when a predetermined word is queried from the search engine. It is effective for companies who want to narrow their target to consumers interested in particular topics. **Random banners** appear randomly and might be used to introduce new products to the widest possible audience, or to keep a well-known brand, such as Amazon.com or IBM, in the public eye. A major advantage of using banners is the ability to customize them to the target audience. Keyword banners can be customized to a market segment or even to an individual. If the computer system knows who you are, or what your profile is, you may be sent a banner that is supposed to match your interests. However, one of the major drawbacks of using banners is that limited information is allowed. Hence advertisers need to think of creative but short messages to attract viewers. Another drawback is that banners, which were a novelty in late 1990s and so were noticed by viewers, are ignored by many viewers today. Therefore some question their cost effectiveness and instead recommend e-mail advertising.

E-mail advertising: E-mail is emerging as an Internet advertising and marketing channel that affords cost-effective implementation and a better and quicker response rate than other advertising channels (such as print ads). Marketers develop or purchase a list of e-mail addresses, place them in a customer database, and then send advertisements via e-mail. A list of e-mail addresses can be a very powerful tool because the marketer can target a group of people or even individuals. However, there is potential for misuse of e-mail advertising. A major issue related to unsolicited e-mail advertising is *spamming,* the practice of indiscriminate distribution of electronic messages (electronic junk mail) without permission of the receiver.

What will happen when many marketers start inundating prospects and customers with electronic mail? How will consumers deal with it? What areas must marketers focus on to ensure e-mail marketing success? The answers to these and similar questions will determine the success of e-mail advertising. Unfortunately, the answers to these questions are not always known. Market research may help provide some answers to these questions.

Other forms of Internet advertising: Online advertising can be done in several other forms, including non-banner ads or posting advertisements in chat rooms, to newsgroups, and on online kiosks. Advertising on Internet radio is just beginning, and soon advertising on Internet television will commence. Of special interest is advertising to members of *Internet communities*. Community sites are gathering places for people of similar interests and are therefore a logical place to promote products related to those interests. Advertising at a

community site (such as at *geocities.com*; see Web site) might include direct advertising and, frequently, a chance to buy the advertised products at a discount.

Types of Display Advertising

There are many different ways to display messages online, and as technology develops, so does online advertising. Here are some of the most common.

Interstitial Banners

Interstitial banners are shown between pages on a web site. As you click from one page to another, you are shown this advertisement before the next page is shown. Sometimes, you are able to close the advertisement.

Pop-Ups and Pop-Under

As the name suggests, these are advertisements that pop up, or under, the Web page being viewed. They open in a new, smaller window. You will see a pop-up right away but will probably only become aware of a pop-under after you close your browser window. These were very prominent in the early days of online advertising, but audience annoyance means that there are now "pop-up blockers" built into most good Web browsers. This can be problematic as sometimes a Web site will legitimately use a pop-up to display information to the user.

Map Advertisement

A map advertisement is advertising placed within the online mapping solutions available, such as Google Maps.

Floating Advertisement

A floating advertisement appears in a layer over the content, but is not in a separate window. Usually, the user can close this advertisement. These are sometimes referred to as "Shoshkeles," a proprietary technology. Floating advertisements are created with dynamic hypertext markup language (DHTML) or Flash and float in a layer above a site's content for a few seconds. Often, the animation ends by disappearing into a banner ad on the page.

Wallpaper Advertisement

A wallpaper advertisement changes the background of the Web page being viewed. Usually, it is not possible to click through this advertisement.

Banner Advertisement

A banner advertisement is a graphic image or animation displayed on a Web site for advertising purposes. Static banners are graphics interchange format (GIF) or Joint Photographic Experts Group (JPEG) images, but banners can also employ rich media such as Flash, video, JavaScript, and other interactive technologies. Interactive technology allows the viewer to interact and transact within the banner. Banners are not limited to the space that they occupy; some banners expand on mouse over or when clicked on.

When online, advertisements can be interactive. How do you think this can be used to increase the effectiveness of advertising?

- Advertisers have many options when it comes to how to show their messages.
- More and more options appear as technology develops.

The Advantages of Online Advertising

Banner Ads and their Similarity to Traditional Media

E-marketers regularly regret the fact that it's often difficult to educate the market about the value of Internet marketing techniques. Traditional buyers of advertising have been conditioned in a certain fashion and have come to understand advertising in a certain way. Banner advertising goes a long way toward bridging the advertising divide. Online ads have a set size, they can look very similar to print ads, and they occupy a particular bit of real estate in a publication with a particular number of eyeballs looking at it. They're easy to understand, and they do the things buyers expect advertising to do.

Images: Display can offer a Rich, Brand-Building Experience

Some campaigns are better suited to having images rather than the plain text of a PPC (pay-per-click) campaign (although recently PPC image and video ads have been introduced in the United States). Consider the following methods for campaigns:

• **Promoting travel packages**. What stirs more emotion—an image of a tropical paradise or the words "tropical paradise"?

• **Building a brand within a specific sphere**. Use banner advertising to brand the Web sites of every major player in that niche.

• **Running a competition**. Keep the target market's eye on the prize.

• **Launching an exciting new sports car with a** call to action. A possible call to action might be "Test drives it now"—or interactive rich media that highlight all the exciting new features as a user mouse over specific parts of the car on the image.

• **Digital shadowing**. Using banner advertisements that shadow the above-the-fold activity to drive the message both on- and offline.

Interactivity

Since banners can contain rich media, they offer levels of interaction that other forms of advertising cannot achieve. It allows your target market not only to see your banner but also to play with it. Interaction builds a bond and improves the chances of the consumer remembering your brand tomorrow. Cognitive learning is a powerful outcome of interactive display advertising.

Animations, games, video, Flash—modern online advertising is able to bring together a number of other online marketing tactics:

• **Microsites**. A few years ago, Flash microsites were all the rage; now the same functionality can exist right within the ad. This includes filling in a form or playing a game within the ad— no need to be taken to a separate page.

• **Viral marketing**. Clever viral marketing games or "send to a friend" functionality can be accessed all from within the ad.

• **Video**. Viewers can check out video previews or trailers from within the ad.

Measurability and Data Gathering

Banner ads, like all e-marketing tactics, are measurable. Tracking click-through rates, or click tracking, give you an idea of exactly how many people are responding to your call to action. Some publishers even have the ability to do post click tracking—that is, you can track the user all the way to a sale if that is the purpose of the advertisement.

Disadvantages of Online Advertising

Technical Obstacles

The nature of a lot of display advertising are intrusive, so pop-up blockers can often prevent ads from being served as they were intended by the advertisers. Most browsers now block pop-ups. There are also extensions available for the Firefox browser, such as Adblock Plus, that will block advertising on Web pages. Technologically savvy consumers are increasingly using these methods to limit the advertising that they see.

Connection Speed

Bandwidth can also be an issue, although this is a shrinking problem. However, campaigns should be planned around demographics in determining the richness (and investment) of interaction. For example, heart disease medication is likely to appeal to an older community with less money and slower connection speeds.

Advertising Fatigue

Consumers are suffering from advertising fatigue, so while new technologies can provide great results, as soon as the market moves mainstream, it can get saturated. Consumers are increasingly ignoring advertisements.

E-COMMERCE RESOURCE PLANNING AND INFRASTRUCTURE

E-commerce infrastructure is the architecture of hardware, software, content and data used to deliver e-business services to employees, customers and partners. Defining an adequate e-commerce infrastructure is vital to all companies adopting e-business as it affects directly the quality of service experienced by users of the system in terms of speed and responsiveness. A key decision with managing this infrastructure is which elements are located within the company and which are managed externally as third-party managed applications, data servers, and networks. It is also important to be flexible enough to consider new technologies to support changes required by the business to compete effectively.

E-commerce infrastructure requires a variety of hardware, software, and networks. The major components are networks, Web servers, Web server support and software, electronic catalogs, Web page design, construction software, transactional software, and Internet access components. In addition, special software and sometimes hardware is needed for conducting auctions, e-procurement, and m-commerce. The key infrastructures that are needed to support

electronic transactions, communication, and collaboration include: networks; Web servers and supporting software; electronic catalogs; Web page design software; transactional software; and Internet access components. Requirements for a successful e-commerce infrastructure are divided into three categories such as legal, software and hardware perspectives.

1. Legal perspectives:

E-commerce laws and regulations: In European Union countries, E-commerce refers to the carrying out of business using electronic means. This generally means over the internet. However, from a legal perspective, the term is often used to include remote selling by telephone and email, as well as online. It is also frequently used to refer to legal issues generally relating to the internet. There are several types of contracts which are required to exist when a business becomes involved in e-commerce transactions. As a result, laws should regulate each section of those contracts to ensure that online customers' transactions will go smooth and that a judge can have clear regulations to rule with once an online dispute occurs. These include:

1. Website development, content and hosting agreements. When a business wishes to set up a website, it needs to ensure that the design and content of the website do not infringe or violate any third party rights.

2. Internet service provider agreements. Companies who are responsible for developing the ecommerce website can be the same company who provides the hosting service or they can be separate. Similar to the web design companies, web hosting companies should have clear responsibilities regarding their duties and responsibilities.

3. Website usage and privacy policies. This may include the privacy of both owners and customers. Web site design and hosting companies are not supposed to expose their clients' information to their rivals.

4. Website and telephone sales terms and conditions. In some countries, online or telephone sales are governed by the Consumer Protection (Distance Selling) Regulations 2000 and the Electronic

2. Software perspective:

In most e-commerce infrastructures, to secure access to e-commerce websites, we should include two basic components in order to allow users to securely perform online transactions:

1. Digital certificates for web servers, providing guarantees of authentication, privacy and data integrity through encryption. Digital certificates can be issued by mediators called Certificate Authorities (CAs) to authenticate the seller to the buyer and vice versa.

2. Secure e-payment system and management, to allow e-commerce sites to secure and automatically accept, manage and process online payments. This can be usually organized with owners' banks. Websites will be securely connected to the buyers' bank accounts. Once an online transaction is secured executed, the money should be directly transferred from the seller to the buyer account. This process should be performed in a fast, reliable and secure way. Those 3 elements (i.e. reliability, performance and security) are vital to the success of any ecommerce website.

3. Network and hardware perspective; Internet readiness.

A closely related requirement to the software and websites' requirements is the existence of a network or hardware infrastructure. This may include the routers, fiber optics or wireless communication channels, firewalls, etc. Since both (software and hardware perspectives) may include hardware and software elements, we will distinguish them through the location. This perspective represents any requirements outside the user machine.

WORK FLOW MANAGEMENT

Electronic commerce is the future of business enterprises to improve their international competitiveness and expand the market share in an effective way. E-commerce applications are developed and allow companies to communicate with their partners, suppliers and consumers on the internet. The migration from conventional business to electronic commerce requires fundamental changes in business operational systems. It is not sufficient to focus on the development of web-based interfaces only. The front-end of a system for e-commerce should be supported by the back-end infrastructure. A Workflow Management System (WFMS) is important for linking front-end and back-end applications to automate business processes.

The Workflow Management System is a key technology for integrating, automating, and monitoring business and e-commerce processes and for providing the online delivery of services. A WFMS is a technological system in which workflow processes are defined, performed, managed and monitored through the execution of computer software and in which the order of events is driven by processes. A business process is a set of one or more procedures

or activities that realise business objectives or policy goals such as insurance claims process, an order process, or a loan process. An ideal WFMS should support the model-driven design, analysis and simulation of business processes and provide features for monitoring the execution of processes and reacting automatically to exceptional situations. Successful e-commerce companies should develop their e-commerce applications on top of WFMS tools that can help companies to drastically reduce costs, improve the quality of services and time to market and respond to an ever-changing engine containing software models of the business process to be accomplished. The workflow models express the predefined sets of business rules, roles of stakeholders, authorization requirements, routing alternatives, database used, and sequence of tasks required for E-commerce process.

Thus, workflow systems ensure that the proper transactions, decisions and work activities are performed, and correct data and documents are routed to the right employees, customers, suppliers and other business stakeholders. The workflow concept has evolved from the notion of the process in manufacturing and the office. Such processes have existed since industrialisation and are the result of seeking to increase efficiency routine work activities. According to the workflow approach work activities are separated into well-defined tasks, roles (task performers) and rules, which all together create a process. More explicitly the term workflow can be defined as the complete or partial automation of relevant tasks performed by people, machines or a combination, that all together create a business process.

Workflow management is an important component of a business for a variety of reasons.

1. **Improved efficiency:** The primary advantage of workflow management is to improved efficiency within the business

2. **Standardisation of work:** it serves to standardise working methods ensuring that every employee working on the same level is performing the same function.

3. **Customer relationship management:** It also improves customer service, by providing a consistent product or service that is predictable at every level, workflow management allows the customer to feel completely involved in the entire process and capable of getting answers to important questions in a timely manner.

4. **Improved production or service process:** workflow management also helps businesses find ways to improve their production or service process.

5. **Streamlining the organisation:** by streamlining the responsibilities of each employee and clarifying the roles of every employee and machine within the process, the company can more easily determine where improvements can be made to increase efficiency and to improve the quality of the product or service.

Workflow Management System is a system that defines creates and manages the execution of workflows through the use of software. This software is running on one or more workflow engines, which are able to interpret the process definition, interact with workflow participants and where required invoke appropriate IT tools and applications.

This means that a WFMS, according to the defined processes and roles, delivers work items to the defined users, and supports work performance by invoking appropriate applications and utilities. In addition the system provides the ability of monitoring the progress of the tasks through the process and generates statistics on how well the different steps of the process are doing.

We can consequently distinguish three functional levels for WFMS, which are:

- The Process definition level, concerned with defining, and possibly modelling, the workflow process and its constituent activities
- The Run-time control level concerned with managing the workflow processes in an operational environment and sequencing the various activities to be handled as part of each process
- The Run-time interaction level with human users and IT application tools for processing the various activity steps

BASIC TYPES OF WORKFLOW SYSTEMS

There are many different ways of viewing workflow products, their capabilities, and their applicability to improving different types of business activities. A widely accepted taxonomy distinguishes between *administrative*, *ad hoc*, *collaborative* and *production* workflow. The basic parameters of this classification are the similarities among the business processes involved and their value to the associated enterprises. However, it is also possible to organise them according to the task complexity and the task structure.

Administrative:

It refers to bureaucratic processes where the steps to follow are well established and are based on rules known by all participants. Examples are the registration for courses in a university, applying for a degree after finishing the dissertation, registration of a vehicle, and almost any other process in which there is a set of forms to be filled and routed through a series of steps. Note that this type of workflows leads almost naturally to the idea of form processing, a new term for the older concept of the paperless office, and is also associated with large scale systems where the number of processes involved tend to be very high. For instance, a typical billing application may involve several million processes a year.

Ad hoc:

Ad hoc workflows address exceptions and unique situations. It may also be the case that the situation is not exceptional but each particular instance is unique. For example, each journal follows a different protocol for the submission process. Authors, especially given the length in time of these processes, may want to leave the co-ordination of the different steps in the hands of an ad hoc workflow system. This brings an important aspect of ad hoc workflows. While the actual process may be unique, the user will in general be involved in a variety of these processes. The reason for using a workflow system with these characteristics is not the difficulty of tracking each separate process, but the problem of keeping track of all of them simultaneously.

Collaborative:

Collaborative workflow is mainly characterised by the number of participants involved and the interactions between them. Unlike other type of workflows, which are based on the premise that there is always forward progress, a collaborative workflow may involve several iterations over the same step until some form of agreement has been reached or it may even involve going back to an earlier stage. A good example is the writing of a paper by several authors. It would be very difficult to model such a process using tools that are not geared for collaboration since it is almost impossible to predefine the steps to follow. Moreover, collaborative workflows tend to be very dynamic in the sense that they are defined as they progress. Taken to the extreme, it may be questionable whether this type of progresses are in fact workflow systems since most of the co-ordination is done by humans with the system limited to the role of providing a good interface for recording their interactions.

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Production:

Production workflows are the high end of these systems. They can be characterised as the implementation of mission critical business processes, i.e., those directly related to the function of the organisation. Credit and loan applications and insurance claims are the typical examples. However, the difference between administrative and production workflows is sometimes a matter of perspective. Usually, when talking about production workflows, the main points to consider are the large scale, the complexity and the heterogeneity of the environment where they are executed, the variety of people and organisations involved, and the nature of tasks. In particular, production workflows tend to be executed over heterogeneous systems, frequently legacy applications, and it is crucial to have monitoring tools to allow the statistical analysis of the execution of these processes.

Another classification often found in the literature is based on the underlying technology: *mail centric*, *document-centric*, and *process-centric*. *Mail-centric* systems are based on electronic mail and can be roughly associated with collaborative and ad hoc workflows. Given the characteristics of the communication media used, e-mail, these systems are not for production workflows or environments with a large number of processes. *Document-centric* systems are based on the idea of routing documents and the ability to interact with external applications is limited. Many administrative workflows, those based on forms, can be implemented using document-centred systems. *Process-based* systems correspond to production workflows. They generally implement their own communication mechanisms, are built on top of databases and provide a wide range of interfaces to allow interaction with legacy and new applications.

MASS CUSTOMISATION

Mass customisation is a modern management strategy. This concept is best defined as a transaction process, which focuses on individualisation of mass-market products and services to satisfy specific needs of the customer, at an affordable and reasonable price. Therefore, mass customisation should satisfy customers' current needs: regularly new and individual products as well as low prices. Thus, enterprises have to manage short product life cycles, must have a high degree of flexibility within the production process as well as take advantage of efficiency potentials (for example *economies of scale* or *economies of scope*).

Theoretically, there is no restriction concerning the industrial application area of mass customisation. To organise the diversity of this strategy, several classification schemes have been developed and published. They illustrate explicitly that mass customisation could be implemented on different types of products or services and branches (automotive industry, shoe industry *etc*.). Mass customisation as an abstract business model has impact on product design, manufacturing, and assembly processes as well as logistics and information processing, *e.g.*, small lot sizes and increased diversity of variants. Four main issues should be considered (Piller and Stotko, 2002):

1. Split of production process
2. Flexible production control due to ex ante loose specification of products
3. Information on individualisation throughout the value chain
4. Unique identification of each product.

During the production process of mass customised goods, the so-called decoupling point indicates the point within the supply chain, which differentiates customised production from mass production; i.e., after that point each former anonymous order is assigned to a specific customer. Mass customisation is characterised by defining the decoupling point after receiving the customer specific order. Individual configurations are created with regard to width and depth of variation. However, underlying production control processes, e.g., production control, planning and scheduling, have to realise a high degree of flexibility, ensuring robust production processes – even in logistics networks – on the basis of ex ante imperfect product specifications. In consequence, production processes should be defined independently from specific configuration parameters. Furthermore, information of customised orders has to be propagated throughout the network as soon as possible.

Firstly, mass customisation scenarios in general consist of several independent players. For example, a vendor offers mass customisation products in the market, a retailer provides the configuration process, a network of contractually joined enterprises assemble or manufacture the product and a forwarder completes the order by delivering it to the customer. Among the difficulties of distributed production and logistics handling, the management of mass customisation orders throughout the value chain is one of the most relevant efforts. Insufficient coordination between players, exploited autonomy of each player and failure in information transmission are severe problems affecting smooth configuration, production and delivery of mass customisation products. Also, an essential target for mass customisation models is to optimise information management. The importance of information in the field of this concept

is obvious: the customer's requirements have to be integrated in a product specification. In order to realise efficient and effective production of individual products, it is necessary to supply each player of the value chain with information about the product and customer.

KNOWLEDGE MANAGEMENT

Knowledge management is the use of technology to make information relevant and accessible, wherever it may reside. The firm have long known about the increasing knowledge plays in economic process. Knowledge has always been important along with traditional resources of land, labour, capital while determining a firm's competitive edge. Today, more and more organisations are talking about building up strengths in knowledge management practices. Perhaps, the development and deployment of information technology has been the strongest immediate source responsible for such a shift. When one expands the coverage of knowledge management at macro levels, a nation can be considered to be a large enterprise with broader interest in economic health, growth rate, global competitiveness and exploitation of resources. Most of the concept of knowledge management thus become applicable equally well at the enterprise level and national level. Education and advances in knowledge are as important as capital and natural resources in contributing to the economic growth of the nation.

Knowledge management has recently emerged as a powerful concept to provide a firm with sustained competitive advantage. It deals with knowledge as a corporate resource and works around establishing the policies and practices for creating and deploying the firm's intellectual assets. This in turn can improve the whole range of the organisation's performance characteristics over a long period.
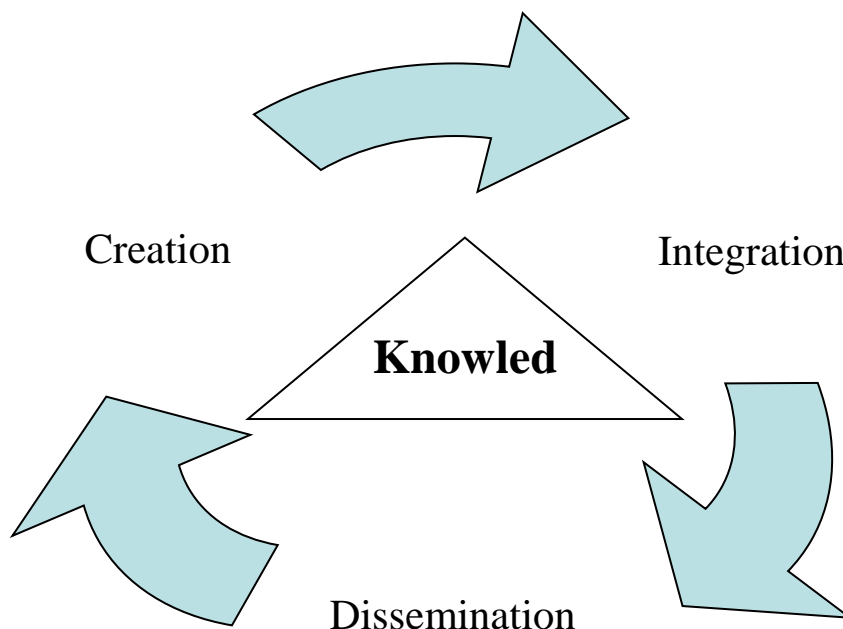
According to Robert S. Seiner, "Knowledge Management is a concept in which an enterprise gathers, organizes, shares, and analyzes the knowledge of individuals and groups across the organization in ways that directly affect performance"

"A cyclical system that enables an organization to efficiently achieve its objectives by having the ability to transform tacit and explicit learning into habits, better planning, and execution".

Knowledge management initiatives in organizations are consequently increasingly becoming important and firms are making significant IT investments in deploying knowledge management systems (KMS). The primary focus of many of these efforts has been on developing new applications of information technology such as data warehousing and document repositories linked to search engines to support the digital capture, storage, retrieval and distribution of an organization's explicitly documented knowledge. KMS also encompass a variety of technology based initiatives such as the creation of databases of experts and expertise profiling and the *hardwiring* of social networks to aid access to resources of non-collocated individuals (Davenport et al. 1998; Pickering and King 1995).

A basic framework

       Knowledge Management is a cyclic process involving three related activities: creation, integration, and dissemination. In this model, computation supports human knowledge activities by manipulating information. An information repository stores information that was created in the past and is disseminated throughout an organization or group. We can classify KM approaches according to how they perform these basic activities. For example, different approaches might store different kinds of information, support different people to create information, or employ different mechanisms and strategies to disseminate information. In traditional KM approaches, management collects and structures an organizational memory's contents as a finished product at design time (before the organizational memory is deployed) and then disseminates the product. Such approaches are top down in that they assume that management creates the knowledge and that workers receive it. Our design perspective is an alternative that relates working, learning, and knowledge creation. In this framework, workers are reflective practitioners, who struggle to understand and solve ill-defined problems. Learning is intrinsic to problem solving, because problems are not given but must be framed and solved as a unique instance. This perspective has two essential aspects. First, workers, not managers, create knowledge at use time. Second, knowledge is a side effect of work.

Creation   Integration

Knowled

Dissemination

Figure: Knowledge management as a cyclic process

Creation

KM approaches exist because work is increasingly information intensive. Traditional KM approaches assume that the critical issue for workers is to find the "answers" in organizational memory that apply to the current problem. A design-based approach assumes that the organizational memory will not contain all the knowledge required to understand and solve such problems. So, workers must create new knowledge.

Integration

In the design perspective, an organizational memory plays two roles. First, it is a source of information to help workers understand the problems they face. Second, it is a receptacle for new information and products created during work. In traditional KM approaches, knowledge engineers carefully craft a knowledge base that will periodically be updated. In a design-based approach, organizational memory is a continuously evolving information space that is fed directly by the knowledge created during work. Hence, information repositories and organizational memories are not huge, impenetrable "write-only" stores. They are actively integrated into the work process and social practices of the community that constructs them.

Although the problems workers solve are unique in some aspects, they are also are similar to those previously solved. The challenge for knowledge integration is to make the connections between old and new knowledge so that the organizational memory improves its ability to inform work. In the traditional KM approaches, this was the knowledge engineer's job. In a design-based approach, users do it at use time.

Knowledge integration comprises two tasks:

• *Conceptual generalization*—relating information from one context to information from another.

• *Representational formalization*—putting information in a form such that computational mechanisms can access and interpret it.

Both tasks require effort beyond what most workers consider their core responsibility. Conceptual generalization requires an understanding of the domain, while formalization requires the ability to map from domain concepts into the formalizations the system requires. A major concern for our design based approach is to capture information from the work process without extra effort by the users and then to help them formalize the captured information incrementally, rather than at the time of capture.

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Dissemination

This activity makes information in the organizational memory available to workers to help their problem solving. Traditional KM approaches assume that workers perform repetitive and predictable tasks, so they disseminate knowledge through classroom training or printed reference documents. These approaches separate learning and working. They typically use information technology to broadcast information (for example, email) or to provide searchable databases. As we mentioned earlier, the information that workers receive or access comes from management (or the creator of the training materials) rather than from co-workers. In the design perspective, the specific information needs of workers are unpredictable. The need for information results from particular situations that arise from a worker's struggle to understand a problem. The context of problem solving dictates the information demand and provides the context for learning. On-demand information integrates working and learning, because the need for learning comes from work, and the learning takes place within the context of the work situation.

Review Questions

1. Describe various business models of electronic commerce.

2. Explain various types of electronic commerce?

3. What is supply chain management? and discuss its role in the business organisation

4. Discuss briefly about internet advertising and its types.

5. Explain e-commerce infrastructure resource planning.

6. Describe briefly about work flow management and mass customization

7. What is knowledge management and explain its framework.

UNIT – III ELECTRONIC PAYMENT SYSTEM

In this unit we will learn

- Electronic Payment System

- Types of E-Payment Systems

  - E – Cash and Currency Servers
  - Credit card
  - Debit card
  - Smart card
  - E – Cheques
  - Digital Token Based Credit Cards
  - Digital wallets

- Implications of electronic payment system

- Types of Risk involved in E – Payment System

- Risk Management Options in E – Payment System

- Components of an Effective Electronic Payment System

Electronic Payment System

Electronic commerce provides the capability of buying and selling products, information and services on the internet and other online environment. Payment is the integral process in the mercantile process; the issue of safe and reliable money exchange between transacting parties is essential. Electronic payment system is the integral part of the electronic commerce and one of its most critical aspects. The emergence of e-commerce has effectively created many new financial needs that in some cases cannot be efficiently fulfilled by traditional payment systems. An e-commerce payment system facilitates the acceptance of electronic payment for online transactions. E-commerce technology offers a number of possibilities for creating new payment systems that substitute for existing systems, as well as for creating enhancements to existing systems. Generally defined, electronic payment is a form of a financial exchange that takes place between the buyer and seller facilitated by means of electronic communications. An e-commerce electronic payment is a financial exchange that takes place in an online environment. Electronic Payment Systems (EPSs) enable a customer

to pay for the goods and services online by using integrated hardware and software systems. The main objectives of EPS are to increase efficiency, improve security, and enhance customer convenience and ease of use. Although these systems are in their immaturity, some significant development has been made. There are several methods and tools that can be used to enable EPS implementation.

Electronic payment systems are summoned to facilitate the most important action after the customer's decision to pay for a product or service, to deliver payments from customers to vendors in a most effective, efficient and problem-free way. Electronic payment systems and e-commerce are intricately 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. Everyone agrees that the payment and settlement process is a potential bottleneck in the fast-moving electronic commerce environment. If the payment to the company and customer are not done in time, the entire business gets interrupted. The conventional payment instruments are too slow for micropayments and the high transaction costs involved in processing them add greatly to the overhead. Therefore new methods of payment instruments are needed to meet the emerging demands of e-commerce. Electronic payment system talks about settling of various payment transactions electronically or online where no physical or conventional methods like cheque or DD are used, rather virtual cash is transferred to various entities. EPS is transfer of funds initiated through electronic terminal, telephonic instrument, computer or magnetic tape so as to order, instruct or authorise a financial institution to debit or credit an account. Electronic payment system phrase comprises of many different kinds of electronic and online payment methods for the processing of transactions and their applications among online merchants and commercial websites. Electronic payment systems are becoming central to on-line business process innovation 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. The role of e-commerce electronic payment systems is pivotal for future of e-commerce, whose further growth depends on the timely development of EPSs.

The current state of on-line electronic payments is in many ways significant of the medieval ages. The merchants of Asia and Europe faced a similar problem while trying to unlock the commercial potential of the expanding marketplace. Those ancient traders faced a number of obstacles that restricted trade. To circumvent some of these problems, traders invented various forms of payment instruments like promissory notes, bill of exchange, gold

coins and barter system. The merchants also developed commercial law surrounding the use of these instruments that proved to be one of the turning points in the history of trade and commerce. The development of new types of e-commerce purchasing relationships and business models has created the need for new ways of money exchange and new EPSs. For instance, online auctions, has urged the necessity for person-to- person payment systems to allow online money exchange between individuals. Certain types of information products and services require small payments and micropayments. Businesses would like to sell information content that costs very little, accumulating revenues with high turnover. E-commerce EPSs can be designed for selling specific types of products, for example for trading copyrighted online content, such as music. Another unforeseen earlier requirement is conducting e-commerce using wireless mobile devices, such as mobile phones or Personal Digital Assistants (PDA). The need for paying with mobile devices has urged the development of payment systems for mobile electronic commerce. In addition, e-commerce provides the possibility to enhance current payment systems or substitute them with online variants. The need for online payments was first addressed by using extant payment methods of the offline world for online payments. For example credit cards, originally intended as an offline credit instrument, have become the major payment instrument for ecommerce.

Special Features Required in Payment Systems for E – Commerce

Various methods have been used for online payments. In general, the various payment mechanism can be broadly classified in to three categories namely cash, cheques and credit cards. Irrespective of the type of payment mechanism adopted, digital payment mechanisms have to exhibit certain characteristics, to meet the basic requirements becoming a viable alternative to traditional payment mechanism. These requirements include broad acceptability of the digital currency across the commercial world, anonymity, intractability, reliability, scalability, convertibility, and efficiency. The important basic requirements are discussed below:

- ❖ Security
- ❖ Interoperability
- ❖ Convertibility
- ❖ Divisibility
- ❖ Acceptability
- ❖ Flexibility
- ❖ Reliability
- ❖ Efficiency

❖ Usability
❖ Scalability

Security

One of the most crucial and well-researched issues in payment systems is security. This is concerned with whether it is easy to find out the flaws like forged payment, etc. Since the Internet is an open network with no centralised control, the infrastructure, supporting electronic commerce and payment systems in particular, must be resistant to attacks in the Internet environment. Digital currency should be stored in a form that is resistant to replication, double-spending, and tampering.

Security can be viewed as a two-fold issue. On the one hand, users would like to be sure that their money is safe when paying online. On the other hand, banks and payment services organisations would like to protect themselves so that no money, financial, or personal information can be stolen or misused. Security of electronic cash systems has an aspect of counterfeiting: no one should be able to produce electronic tokens on their own, otherwise banks or governments will have to pay for such counterfeiting. Another aspect of security of electronic cash is *double spending*. What cash transactions achieve by the physical nature of cash is that money can be spent only once. In the computing environment, where copying information and modifying records is easy, this property becomes a challenge for engineers. An EPS operator should ensure that electronic cash cannot be spent twice. In this aspect, security is often viewed in connection to anonymity, cryptography, and unforgeability.

Interoperability

A payment system is interoperable if it is not dependent on one company, but is open and allows other interested parties to join. This can be achieved by means of open standards for data transmission protocols and infrastructure. An interoperable system can faster gain the necessary customer base for future development and will have a higher level of applicability. It is natural, though, that companies that implement new technologies treat them as know-how, because of the added value they create by investing in new technologies; therefore, it is not always sensible to demand interoperability. Examples of theoretical interoperable initiatives are the SEMPER project (www.semper.org), CEPS (www.cepsco.org), and the CAFÉ project. For instance, the last two initiatives were conceived to facilitate interoperability between diverse electronic purse systems.

Convertibility

Naturally, users will select payment mechanisms as financial instruments according to their needs. Numerous payment schemes have emerged up to this date and users can expect new systems to appear, all providing an assorted variety of services and applications for various purposes. Funds represented by one payment mechanism should be easily convertible into funds represented by other payment systems. The electronic currency should be interoperable and exchangeable with other forms of electronic cash, paper currencies, and deposits in bank accounts, bank notes or any other financial instrument. This refers to whether the payment can be made without the involvement if a third party such as the bank.

Divisibility

This refers to whether the payment could be divided into small payments which is equivalent to original payment.

Acceptability

This refers to whether the payment is acceptable globally. The added value of a payment mechanism is dependent upon how useful it is for buying something. Acceptability of a payment system is defined as the extent to which it is accepted for payments at points of sale, or at online e-commerce sites in this case. The payment infrastructure should not only be robust, but also available and accessible to a wide range of consumers and sellers of goods and services. The value stored in the digital cash should be honoured and accepted by other banks and financial institutions for reconciliation. For instance, cash is accepted widely and virtually everywhere in the offline world and thus has a very high level of acceptability. Debit cards and credit cards have a very high applicability, as one can pay with them in a variety of places. The applicability of a payment system may vary from country to country.

Flexibility

Payment systems should be in a position to accept several forms of payments rather than limiting the users to a single form of currency.

Reliability

The payment system should be ensure and infuse confidence in users. In nature, users and businesses want a system that is reliable, because the availability of services and the smooth running of an enterprise will depend on the availability and successful operation of the payment infrastructure. Whether in the result of a hackers' attack or simply poor engineering, the costs of breakdowns can be substantial, and the failure to maintain reliable operations can be unrecoverable

Efficiency

It refers mainly to the cost overheads involved in the operation of digital payments. The cost of payment per transaction should be ideally close to zero. This assumes added significance in the case of micro payments that are typically in the range of fraction of a currency unit. Small payments are amounts less than one euro; micropayments are amounts of a fraction of a cent. A system which entertains the characteristic of efficiency should be able to process small payments and micropayments without performance degradation, and without imposing the high transaction costs. The costs per transaction should be reasonable for processing small amounts. Adherents of small payment promote numerous applications, from paying for articles, news and stock reports to pay-per-view sites.

Usability

The user of payment mechanism should be able to use it as easily as real currency. It should not be a sophisticated or complex task to pay online, payments are to be done in an easy and user-friendly way. This requires that the payment system should be well integrated with the existing applications and processes that acquire the role of transacting parties in electronic commerce. This requirement can be manifested in *ease of use* of the system. In such a responsible task as a payment process, users should have minimum factors that make paying complicated or distract them. An overly complex payment process, accompanied by other complications associated with EPSs or an e-commerce payment environment, can turn customers away from a financial transaction and even future ecommerce activities. For example, the processes of paying when you have to fill in a lengthy form with name, address details, a 16-digit credit card number plus expiration date cannot be called an easy one when compared with cash payments. This is the very process that most Internet shoppers have to go through to make their online credit card payments. Poor usability of a web shop or a payment method could also discourage spontaneous purchases. Certain e-commerce companies demonstrate understanding of the importance of this issue. Usability is an important characteristic of an interactive product and is defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use", (ISO 9241, 1996).
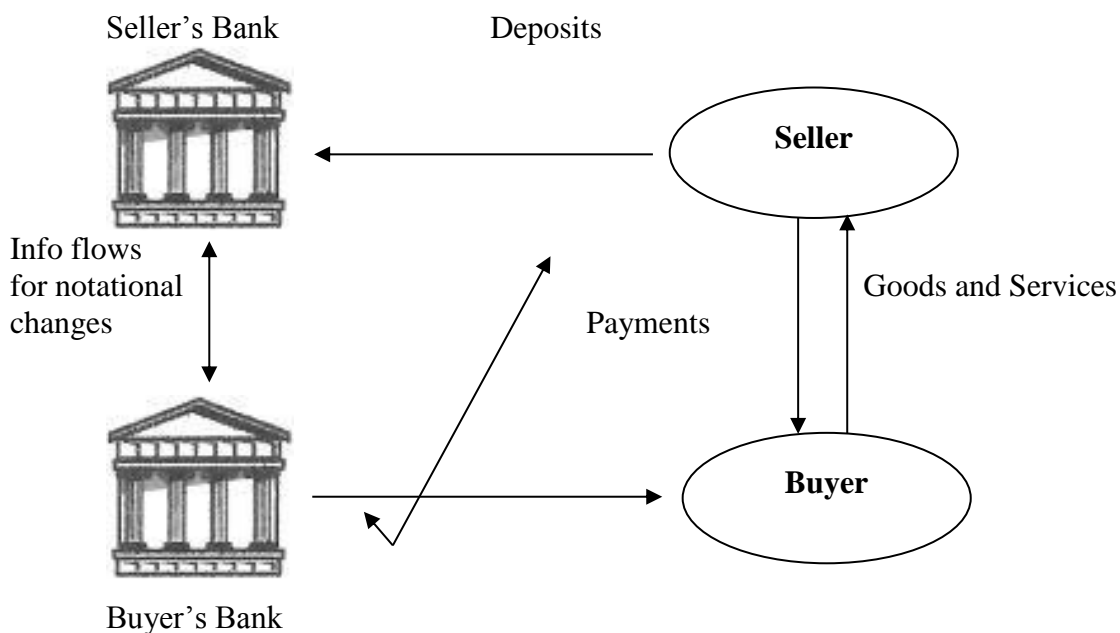
Scalability

As the commercial use of the internet grows, the demands placed on payment infrastructure will also increase. The payment infrastructure should be scalable, to be able to handle the addition of new users and merchants, so that systems will perform normally without performance degradation and maintain the required quality of service. Although, ideally a payment system's scalability should range from micro payments to business payments, the differing nature of demands placed by these two ranges are difficult to reconcile in a single payment system. In the case of micro payment it is the overhead cost per transaction that is of paramount importance, while in business payments it is security that requires the highest level of effort.

Conventional vs. Electronic Payment System

To get into the depth of electronic payment process, it is better to understand the processing of conventional or traditional payment system. A conventional process of payment and settlement involves a buyer-to-seller transfer of cash or payment information (i.e., cheque and credit cards). The actual settlement of payment takes place in the financial processing network. A cash payment requires a buyer's withdrawals from his/her bank account, a transfer of cash to the seller, and the seller's deposit of payment to his/her account. Non-cash payment mechanisms are settled by adjusting i.e. crediting and debiting the appropriate accounts between banks based on payment information conveyed via cheque or credit cards.

Figure 3.1: Conventional/Traditional Payment System

The above figure is simplified diagram for both cash and non-cash transactions. Cash moves from the buyers'' bank to sellers'' bank through face-to-face exchange in the market. If a buyer uses a non-cash method of payment, payment information instead of cash flows from the buyer to the seller, and ultimate payments are settled between affected banks, who notationally adjust accounts based on payment information.

Limitations of traditional payment systems in the context of online payments

Online shopping is important because it offers buyers convenience that has never before been achievable. The technology allows customers to shop on the internet 24 hours a day and seven days in a week, without having to leave their homes or offices. Merchants can offer any goods and services to the customers throughout the world. The customer can also compare prices from a variety of different retailers with greater ease, compared to them physically going to shop in a built shopping centre to check prices.

The most important feature of any shopping system is the payment system. Three factors are stimulating the development of electronic payment systems: reduced operational and payments processing costs, growing online commerce and decreasing the costs of technology. Reduction of costs is one of the major reasons for research and development of EPSs. The central impetus for ecommerce and e-business is to provide a more efficient service, primarily in terms of costs. In this light, paying online with traditional payment systems such as credit cards is rather paradoxical, given that credit cards are one of the most expensive of all available mainstream payment means for both end consumers and merchants, defeated perhaps only by paper checks. Several limitations of traditional payment systems in the context of e-commerce can be outlined are listed below:

- ❖ Lack of usability
- ❖ Lack of security
- ❖ Lack of trust
- ❖ Lack of applicability
- ❖ Lack of eligibility
- ❖ Lack of efficiency
- ❖ High usage costs for customers and merchants

Lack of usability:

Existing payment systems for the Internet require from the end user to provide a large amount of information, or make payments using complex elaborated web site interfaces. For instance, credit card payments via a web site are not the easiest way to pay, as these require entering extensive amounts of personal data and contact details in a web form.

Lack of security:

Existing payment systems for the Internet are an easy target for stealing money and personal information. Customers have to provide credit card or payment account details and other personal information online. This data is sometimes transmitted in an un-secured way. In practice this happens even in spite of introduction of secure transactions mechanisms, such as Secured Socket Layer. Providing these details by mail or over the telephone also entails security risks.

Lack of trust:

Users tend not to trust existing systems with the long history of fraud, misuse or low reliability, as well as novel systems without established positive reputation. In the present situation, money loss by customers is quite possible when using existing payment systems, such as credit cards, for Internet payments. Potential customers often mention this risk as the key reason why they do not trust a payment service and therefore do not make Internet purchases.

Lack of applicability:

Not all web sites support a particular payment method, thus limiting customers' ability to pay. Credit cards work only with merchants who have signed-up to the services of the corresponding credit card company, and do not support direct business-to-business or interpersonal payments.

Lack of eligibility:

Not every potential customer with money and intention to pay can make use of certain payment methods. Not all potential buyers can obtain credit cards due to credit history limitations, low income or other reasons.

Lack of efficiency:

Some payments over the Internet can be too small to be handled by existing payment systems, because of overheads included in the processing of payments and transaction. Credit cards are too expensive for effecting small payments and are unsuited for small transactions. The minimum fixed fee charged to the retailer for processing a transaction could even surpass the value of the goods sold.

High usage costs for customers and merchants:

Existing payment systems use a rather expensive infrastructure to facilitate the payment process. Credit cards are very expensive for end users, not in the least because of the enormous and growing size of fraud, which amounts to billions dollars per year. This loss is invisibly re-financed by users by the higher costs of credit card services. In addition, credit card payments are still heavily paper-dependent. Most credit card bills are sent in a paper form to customers by post, and the bills are mostly settled by posting paper documents, like checks of giro payments, which makes the whole cycle rather expensive. As mentioned above, this means that resources employed in processing of credit cards transactions render them rather ineffective for small payments, because the high overhead of credit cards.

In online credit card payments credit cards are not physically available for inspection by the payee, (this situation is referred as 'card not present'). This imposes higher charges for merchants, because the chance of fraud is higher. Credit cards have low finality of payments because users can refute or repudiate credit cards payments in certain situations. Moreover, financial regulations in certain countries, e.g. in the USA and the UK, place the risks of repudiation, fraud, or non-payment largely on the merchant and issuing banks. These issues make credit cards less attractive to merchants. *Electronic Payment Systems: a User-Centered Perspective and Interaction Design* and Secure Code from MasterCard allow shifting fraud liability from merchant to credit cards issuing banks, and can ease this burden for merchants, (see www.verifiedbyvisa.com and www.mastercard.com). However, end users can found themselves paying more for the cards issued by the banks to refinance bank's losses due to fraud.

Types of Electronic Payment System

Electronic Commerce sites use electronic payment where electronic payment refers to paperless monetary transactions. With the rapid growth in the electronic commerce need for the payment systems are increased as that of e-commerce by which dozens of payments systems are came in to existence and also they are already in practice. Electronic payment has revolutionized the business processing by reducing paper work, transaction costs, labour cost. Being, user friendly and less time consuming than manual processing, helps business organization to expand its market reach/expansion. Grouping of these payments systems are made based upon the information being transferred online.

Period	Innovation
700 BC	Earliest coins produced in western Turkey to pay mercenaries or taxes
1400	First banks open, in Italy and Catalonia, honouring checks against cash reserves
1694	The Bank of England opens, creating deposits on the principle that not all deposit receipts will be presents for redemption simultaneously. The bank monopolises the issuing of bank notes.
1865	A sample of payments into British banks shows that 97 percent are made by check.
1887	The phrase credit card is coined in looking backward, a novel by Edward Bellamy.
1880-1914	Heyday of the gold standard as major currencies to gold via their fixed parties with the U.S dollar
1945	Bretton Woods agreement links currencies are pegged to gold at fixed rates
1947	Flatbush National Bank issues first general-purpose credit card, for use in select New York shops.
1950	Diners Club Charge Card introduced
Mid 1950s	The development of magnetic ink character recognition (MICR), facilitating more timely processing of checks, sealed the check's standing as the preferred noncash payment option.

1958	Bank America, in Fresno, California, executes the first mass mailing of credit cards.
1967	Westminster Bank installs first automated teller machine at Victoria, London branch.
1970	The New York Clearing House launches CHIPS- the Clearing House Interbank Payment System- which provides U.S. – dollar funds to transfer and transaction settlements online and in real time.
Late 1970s	Chemical Bank launches its Pronto system providing 3000 computer terminals to customers home linked to its central computers by telephone. It offers a range of facilities: balance inquiries, money transfers between Chemical Bank accounts, and bill payments to selected local stores. The stumbling block for first-generation home-banking systems in general was who is to pay for the terminals at home.

Table 3.1: Timeline of innovations in payment systems

Research into electronic payment systems for consumers can be traced back to the 1940s, and the first applications - credit cards - appeared soon after. In the early 1970s, the emerging electronic payment technology was labeled electronic funds transfer (EFT). EFT is defined as "any transfer of funds initiated through an electronic terminal, telephonic instruments, or computer or magnetic tape so as to order, instruct, or authorize a financial institution to debit or credit an account. EFT utilizes computer and telecommunication components both to supply and to transfer money or financial assets. Transfer is information-based and intangible. Thus EFT stands in marked contrast to conventional money and payment modes that rely on physical delivery of cash or checks (or other paper orders to pay) by truck, train, or airplane. Various types of electronic payment system are discussed below

- ❖ Electronic cash (e-cash)
- ❖ Debit card
- ❖ Credit card
- ❖ Smart card
- ❖ Cyber cash
- ❖ Electronic Cheque
- ❖ Electronic Fund Transfer

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- ❖ Digital Wallet (Electronic wallet):

- ❖ Net Banking

- ❖ PayPal

- ❖ Mobile Payment

Electronic cash (e-cash):

Cash is still the most prevalent and dominant form of consumer payment even after thirty years of continuous developments in electronic payment systems for three reasons: (a). Lack of trust in the banking systems, (b). Inefficient clearing and settlement of non-cash transaction, and (c). Negative real interest rates paid on bank deposits. To really displace cash, the electronic payment systems need to have some qualities of cash that current credit and debit cards lack. For example, *cash is negotiable*, meaning it can be given or traded to someone else. *Cash is legal tender*, meaning the payee is obligated to take it. *Cash is a bearer instrument*, meaning that possession is primary factor of ownership. Also, cash can be held and used by anyone even those who don't have a bank account, and cash places no risk on the part of the acceptor that the medium of exchange may not be good.

Comparing cash to credit and debit cards, first, they *can't be given away* because, technically, they are identification cards owned by the issuer and restricted to one user. *Credit and debit cards are not legal tender*, given that merchants have the right to refuse to accept them. They *are not bearer instruments*; their usage requires an account relationship and authorization system. Similarly, checks require either personal knowledge of the payer or a check guarantee system. Hence, to really create a novel electronic payment method, we need to do more than recreate the convenience that is offered by credit and debit cards. We need to develop e-cash that has some of the properties of cash.

Electronic cash (e-cash) is a new concept in on-line payments systems because it combines computerized convenience with security and privacy that improve on paper cash. Its versatility opens up a host of new markets and applications. E-cash presents some interesting characteristics that should make it an attractive alternative for payment over the Internet. E-cash focuses on replacing cash as the principal payment mode in consumer-oriented electronic payments.

Money which is exchanged electronically is referred to as electronic cash or e-cash. E-cash transaction refers to situation where payment is done over the network and amount gets transferred from one financial body to another financial body without any involvement of a middleman. It is similar to regular cash; e-cash enables transactions between customers without the need for banks or other third parties. E-cash is transferred directly and immediately to the participating merchants and vending machines. An E-cash transaction is faster, convenient and saves a lot of time. Electronic cashes a secure and convenient alternative to bills and coins. E-cash usually represents several types of products such as debit or credit cards, smart cards or other transactions such as purchasing, money transfer, etc. which is done electronically, and does not involve paper cash. When e-cash created by one bank is accepted by other reconciliation must occur without any problem cash must be storable and receivable. Most E-cash is transferred directly from the customer's desktop to the merchant's site. Therefore, e-cash transactions usually require no remote authorization or personal identification number (PIN) codes at the point of sale.

Properties of Electronic Cash

E-cash must have the following four properties:

- Monetary value
- Interoperability
- Retrievability and
- Security

Monetary value

E-cash must have a monetary value i.e. currency value, bank-authorized credit, or a bank-certified cashier's check must back it. When e-cash created by one bank, is accepted by others, reconciliation must occur without any problems. Stated another way, e-cash without proper bank certification carries the risk that when deposited, it might be returned for insufficient funds.

Interoperability

E-cash, must be interoperable - that is, exchangeable as payment for other e-cash, paper cash, goods or services, lines of credit, deposits in baking accounts, bank notes or obligations,

electronic benefits transfers, and the like. Most e-cash proposals use a single bank. In practice, multiple banks are required with an international clearinghouse that handles the exchangeability issues because all customers are not going to be using the same bank or even be in the same country.

Retrievability

E-cash must be storable and retrievable. Remote storage and retrieval (e.g., from a telephone or personal communication device) would allow users to exchange e-cash from home or office or while travelling. The cash could be stored on a remote computer's memory, in smart cards, or in other easily transported standard or special-purpose devices. Because it might be easy to create counterfeit cash that is stored in a computer, it might be preferable to store cash on a dedicated device that cannot be altered. This device should have a suitable interface to facilitate personal authentication using passwords or other means and a display so that the user can view the card contents. One example of a device that can store e-cash is the Mondex card - a pocketsize electronic wallet.

Security

E-cash should not be easy to copy or tamper with while being exchanged; this includes preventing or detecting duplication and double spending. Counterfeiting poses a particular problem, since a counterfeiter may, in the Internet environment, be anywhere in the world and consequently be difficult to catch without appropriate international agreements. Detection is essential in order to audit whether prevention is working. Then there is the tricky issue of double spending. For instance, you could use your e-cash simultaneously to buy something in Japan, India, and England. Preventing double spending from occurring is extremely difficult if multiple banks are involved in the transaction. For this reason, most systems rely on post-fact detection and punishment.

Electronic Cash in Action

Electronic cash is based on cryptographic systems called "digital signatures". This method involves a pair of numeric keys (very large integers or numbers) that work in tandem: one for locking (or encoding) and the other for unlocking (or decoding). Messages encoded with one numeric key can only be decoded with the other numeric key and none other. The encoding key is kept private and the decoding key is made public. By supplying all customers

(buyers and sellers) with its public key, a bank enables customers to decode any message (or currency) encoded with the bank's private key. If decoding by a customer yields a recognizable message, the customer can be fairly confident that only the bank could have encoded it. These digital signatures are very secure and have proved over the past two decades to be more resistant to forgery than handwritten signatures. Before e-cash can be used to buy products or services, it must be procured from a currency server.

Purchasing E-cash from Currency servers

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

- Establishment of an accounts and

- Maintaining enough money in the account to back the purchase.

Some customers might prefer to purchase e-cash with paper currency, either to maintain anonymity or because they don't have a bank account. Currently, in most e-cash trials all customers must have an account with a central on-line bank. This is overly restrictive for international use and multicurrency transactions for customers should be able to access and pay for foreign services as well as local services. To support this access, e-cash must be available in multiple currencies backed by several banks. A service provider in one country could then accept tokens of various currencies from users in many different countries, redeem them with their issuers, and have the funds transferred back to banks in the local country. A possible solution is to use an association of digital banks similar to organizations like VISA to serve as a clearinghouse for many credit card issuing banks.

And finally, consumers use the e-cash software on the computer to generate a random number, which serves as the "note". In exchange for money debited form the customer's account, the bank uses its private key to digitally sign the note for the amount requested and transmits the note back to the customers. The network currency server, in effect, is issuing a "bank note", with a serial number and a dollar amount. By digitally signing it, the bank is committing itself to back that note with its face value in real dollars.

This method of note generation is very secure, as neither the customer (payer) nor the merchant (payee) can counterfeit the bank's digital signature (analogous to the watermark in paper currency). Payer and payee can verify that the payment is valid, since each knows the

bank's public key. The bank is protected against forgery, the payee against the bank's refusal to honour a legitimate note, and the user against false accusations and invasion of privacy.

Using the Digital Currency

Once the tokens are purchased, the e-cash software on the customer's PC stores digital money undersigned by a bank. The user can spend the digital money at any shop accepting e-cash, without having to open an account there first 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.

Two types of transactions are possible: bilateral and trilateral. Typically, transactions involving cash are bilateral or two-party (buyer and seller) transactions, whereby the merchant checks the authenticity of the note's digital signature by using the bank's public key. If satisfied with the payment, the merchant stores the digital currency on his machine and deposits it later in the bank to redeem the face value of the note. Transactions involving financial instruments other than cash are usually trilateral or three-party (buyer, seller, and bank) transactions, whereby the "notes" are sent to the merchant, who immediately sends them directly to the digital bank. The bank verifies the validity of these "notes" and that they have not been spent before. The account of the merchant is credited. In this case, every "note" can be used only once.

In many business situations, the bilateral transaction is not feasible because of the potential for double spending, which is equivalent to bouncing a check. Double spending becomes possible because it is very easy to make copies of the e-cash, forcing banks and merchants to take extra precautions.

To uncover double spending, banks must compare the note passed to it by the merchant against a database of spent notes. Just as paper currency is identified with a unique serial number, digital cash can also be protected. The ability to detected double spending has to involve some form of registration so that all "notes" issued globally can be uniquely identified. However, this method of matching notes with a central registry has problems in the on-line world. For most systems, which handle high volumes of micropayments, this method would simply be too expensive. In addition, the problem of double spending means that banks have to carry added overhead because of the constant checking and auditing logs.

Double spending would not be a major problem if the need for anonymity were relaxed. In such situations, when the consumer is issued a bank note, it is issued to the person's unique license. When he or she gives it to somebody else, it is transferred specifically to that other person's license. Each time the money changes hands, the old owner adds a tiny bit of information to the bank note based on the bank note's serial number and his or her license. If somebody attempts to spend money twice, the bank will now be able to use the two bank notes to determine who the cheater is. Even if the bank notes pass through many different people's hands, whoever cheated will get caught, and none of the other people will ever have to know. The downside is that the bank can tell precisely what your buying habits are since it can check the numbers on the e-cash and the various merchant account that are being credited. Many people would feel uncomfortable letting others know this personal information.

One drawback of e-cash is its inability to be easily divided into smaller amounts. It is often necessary to get small denomination change in business transactions. A number of variations have been developed for dealing with the "change" problem. For the bank to issue users with enough separate electronic "coins" of various denominations would be cumbersome in communication and storage. So would a method that required payees to return extra change. To sidestep such costs, customers are issued a single number called an "open check" that contains multiple denomination values sufficient for transaction up to a prescribed limit. At payment time, the e-cash software on the client's computer would create a lot of the transaction value form the "open check".

Business issues and Electronic Cash

Electronic cash fulfills two main functions as a medium of exchange and as a store of value. Digital money is perfect medium of exchange. By moving monetary claims quickly and by effecting instant settlement of transaction, e-cash may help simplify the complex interlocking credit and liabilities that characterize today's commerce. For instance, small businesses that spend month waiting for big customers to pay their bills would benefit hugely from a digital system in which instant settlement is the norm.

The controversial aspects of e-cash are those that relate to the other role, as a store of value. Human needs tend to require that money take tangible form and be widely accepted, or "legal tender". The enormous currency fluctuations in international finance pose another problem. On the Internet, the buyer could be in Mexico and the seller in the United States. How

do you check that the party in Mexico is giving a valid electronic currency that has suitable backing? Even if it were valid today, what would happen if a sudden devaluation occurs overnight?

From a banker's point of view, e-cash would be a mixed blessing. Because they could not create new money via leading in the digital world, banks would see electronic money as unproductive. They might charge for converting it, or take a transaction fee for issuing it, but on-line competition would surely make this a low-profit affair. In the short term, banks would probably make less from this new business than they would lose from the drift of customers away from traditional services. It seems unlikely that e-cash would be allowed to realize its potential for bypassing /the transaction costs of the foreign-exchange market.

Operational Risk and Electronic Cash

Operational risk associated with e-cash can be mitigated by imposing constraints, such as limits on

- The time over which given electronic money is valid,

- How much can be stored on and transferred by electronic money,

- The number of exchanges that can take place before a money needs to be re-deposited with a bank or financial institution, and

- The number of such transactions that can be made during a given period of time

The objective of imposing constraints is to limit the issuer's liability. A maximum upper limit could be imposed on the value that could be assigned to any single transaction or that could be transferred to the same vendor within a given period of time.

Legal Issues and Electronic Cash

Electronic cash will force bankers and regulators to make through choices that will shape the form of lawful commercial activity related to electronic commerce. As result of the very features that make it so attractive to many, cash has occupied an unstable and uncomfortable place within the existing taxation and law enforcement systems.

Anonymous and virtually untraceable, cash transactions today occupy a place in a kind of underground economy. This underground economy is generally confined to relatively small-scale transactions because paper money in large quantities is cumbersome to use and

manipulate-organized crime being the obvious exception. As long as the transactions are small in monetary value, the government tolerates them as an unfortunate but largely insignificant by-product of the modern commercial state. As transactions get larger the government becomes more suspicious and enlists the aid of the banks, through the various currency reporting laws, in reporting large disbursements of cash so that additional oversight can be ordered.

Issues regarding E-Cash

Though the advantages of e-cash transactions are many, there exist some serious issues such as the chances of double spending and paying extra charges for every transaction.

Double Spending

There is a possibility with e-cash that the same e-coin numbers could be spent at various places, as there are possibilities that the internet or instrument may not work properly, and the swapper interprets that e-coin have been deducted.

Extra charges

Whenever card is swapped some extra charges are taken by the bank for every transaction. Nowadays come banks are charging extra money for using ATM.

Other problems:

The other problems of e-cash transactions are

- The validity of smartcard, credit card is to be renewed at regular periods.
- There is a limit for storing and transferring e-cash from any e-payment instrument
- Every business institution does not use the electronic payment mode
- The minimum balance to be maintained is higher than the normal account.

Credit Card

Credit card is used to borrow money, buy product and services on credit. These are issued by financial institutions. In e-commerce credit cards are most prevalently used. Payment using credit card is one of most common mode of electronic payment. Credit card is small plastic card, 3-1/8 inches by 2-1/8 inches in size that carries information with a unique number

attached with an account. Every credit card has same shape and size as specified by ISO 7810 standard. These standards also specifies that credit card number, since each digit used in the credit card has its own meaning – the first digit in the series will always be a 3, 4, 5, or 6. This number designates the type of the card. For instance 3 means, it is a travel and entertainment card (American Express of Diners Club credit card). 4 denote VISA and VISA –branded debit cards (cash cards), 5 are given for MASTER CARD and MASTER CARD – branded debit cards. The remaining numbers in the series are used for other purposes depending upon the card type and issuer. It has also a magnetic strip embedded in it which is used to read credit card via card readers. To avoid the complexity of digital cash and electronic cheques consumers and vendors look for credit payments on the internet as an alternative. When a customer purchases a product or service via credit card, credit card issuer bank pays on behalf of the customer and customer has a certain time period after which he/she can pay the credit card bill. It is usually credit card monthly payment cycle.

It seeks to extend the functionality of existing credit cards for use as online shopping payment tools. This payment system has been widely accepted by consumers and merchants throughout the world, and by far the most popular methods of payments especially in the retail markets. This form of payment system has several advantages, which were never available through the traditional modes of payment. Some of the most important are: privacy, integrity, compatibility, good transaction efficiency, acceptability, convenience, mobility, low financial risk and anonymity. Added to all these, to avoid the complexity associated with the digital cash or electronic-cheques, consumers and vendors are also looking at credit card payments on the internet as one of possible time-tested alternative. But, this payment system has raised several problems before the consumers and merchants. Online credit card payment seeks to address several limitations of online credit card payments for merchant including lack of authentication, repudiation of charges and credit card frauds. It also seeks to address consumer fears about using credit card such as having to reveal credit information at multiple sites and repeatedly having to communicate sensitive information over the Internet.

Basic process of Online Credit Card Payment System is very simple. If consumers want to purchase a product or service, they simply send their credit card details to the service provider involved and the credit card organization will handle this payment like any other. Following are the actors in the credit card system.

Merchant:

It refers to the seller of product who can accept credit card payments.

Card holder:

This is refers to the buyer, who is authorised purchaser.
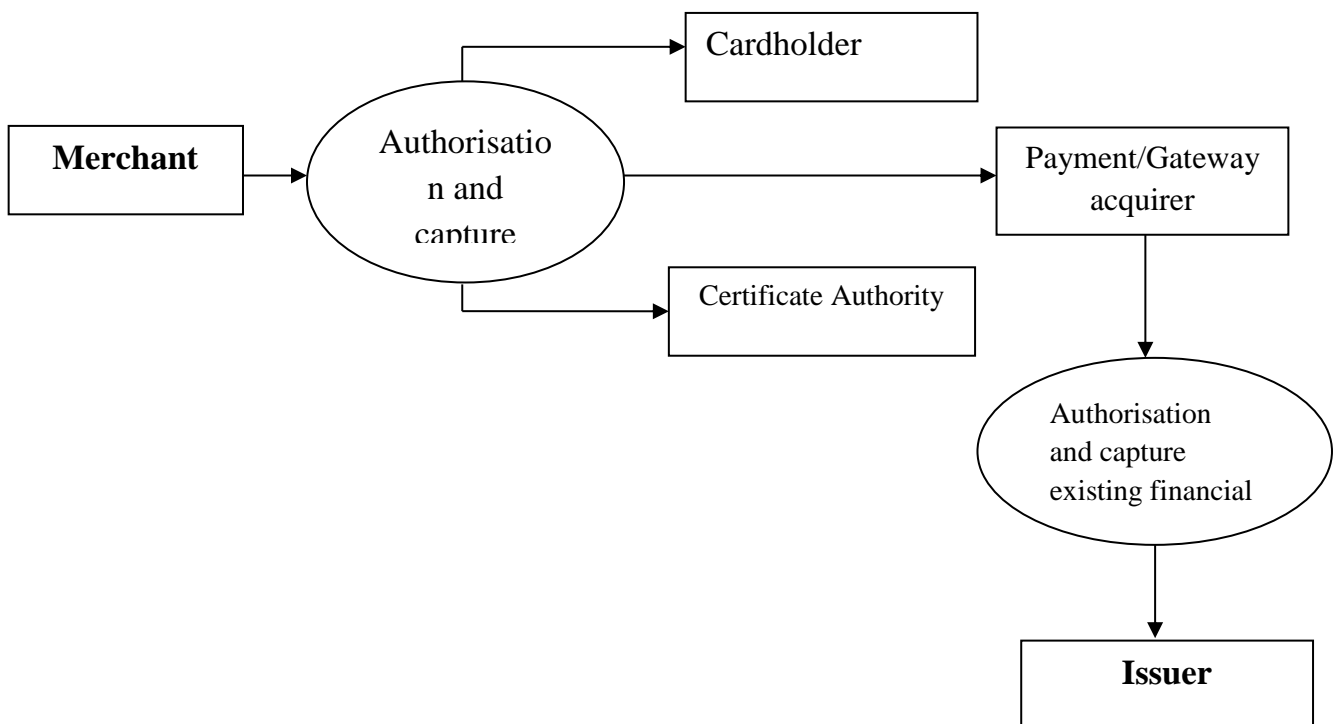
Card issuer bank:

This is refers to bank, that issues the credit card to cardholders.

Acquirer:

This refers to bank, that serves as an agent to like a merchant to multiple issuers. By doing so a merchant can process various credit cards through single acquirer has "payment gateway" through which it can process authorisation and other necessary transactions.

Payment Gateway:

This is connected with acquiring the payment gateway and is situated between SET system and financial network of current card system for processing the credit card payment

Figure 3.2: Credit Card in Action

Types of Credit Cards

- Premium credit cards (ICICI bank platinum credit card, ICICI signature credit card, HDFC bank VISA signature credit card)
- Cash back credit cards
- Gold credit cards (SBI gold credit cards, ICICI bank solid gold master card, and credit card)
- Airline credit cards (Diners club, British Airways Credit Card)
- Silver Credit card
- Business credit cards
- Balance transfer credit cards
- Co-branded credit cards
- Low interest credit cards (ICICI bank platinum credit card)
- Lifetime free credit cards
- Rewards

Credit card payment can be broadly divided into three parts:

1) Payment using plain credit card details
2) Payment using encrypted credit card details
3) Payment using third party verification

Payment using plain credit card details:

The easiest method of credit card payment is the exchange of unencrypted credit cards over a public network such as telephone lines or the internet. These cards inherent low level of security as any hacker can read credit card number easily by intruding with software of these credit cards have no encryption. Authentication is also a significant problem in these cards and the vendor conforms that the person using the credit card is its owner.

Payment using encrypted credit card details

Even if credit card details are encrypted before they are sent over the internet, there are still certain factors to consider before sending them out. One such factor is cost of a credit card transaction itself which might prohibit low-value payments i.e. micropayments.

Payment using third party verification

One solution to security and verification problems is the introduction of a third party (bank and financial institutions) to collect and approve payments from one client to another.

Advantages

- The knowledge of consumers increases as they become technology savvy
- Payment mode is simple irrespective of the currency types, thus matching the global reach of internet
- The credit issuing company shares the risks involved in the transaction thus helping to overcome consumers fear

Disadvantages

- The transaction cost is high. 10 percent is deducted on every transaction
- They cannot be used directly by individuals to make payment to other individuals
- Security issues are not only related to interception but to authentication.

Debit Card

Debit card also known as check card. Debit card look like a credit card, is a small plastic card with a unique number mapped with the bank account number. Debit card is a prepaid card and also known as ATM card. An individual has to open an account with the issuing bank which gives debit card with a personal id number, when the customer makes a purchase he/she enter his pin number on shop pin pad. When the card is slurped through the electronic terminal it dial the acquire a banking system either master card or visa card that validate the pin and finds out from the issuing bank whether to accept or decline the transaction the customer can never overspend because the system reject any transaction which exceeds the balance in his account the bank never face a default because the amount spent is debited immediately from the customer account with almost every bank account you are issued a debit card. The major difference between debit card and credit card is that in case of payment through debit card, amount gets deducted from card's bank account immediately and there should be sufficient balance in bank account for the transaction to get completed, whereas in case of credit card there is no such compulsion. Debit cards free customer to carry cash, cheques and even merchants accepts debit card more readily. Having restriction on amount being in bank account also helps customer to keep a check on his/her spending.

The difference between credit cards and debit cards is that in order to pay with a debit card you need to know your personal identification number (PIN) and need a hardware device that is able to read the information that is stored in the magnetic strip on the back.
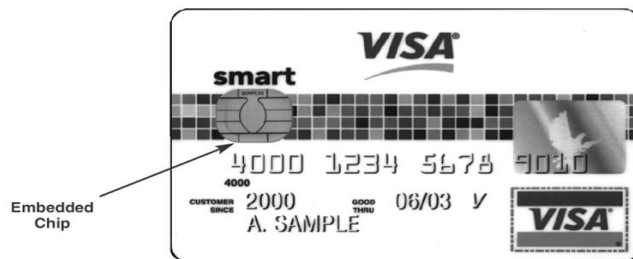
Debit cards task similar to checks in that the charges will be taken from the customer's checking account. The benefit for the customer is the easiness of use and convenience. These cards also keep the customer under his or her budget because they do not allow the customer to go beyond his or her resources. The advantage to the merchant is the speed at which the merchant collects these charges.

Smart Card

Smart card was first introduced in Europe most of these methods are known as stored value card. Smart card is again similar to credit card and debit card in appearance but store information on a microprocessor chip instead of magnetic strips, embedded in it that holds important financial and personal information. A microchip can hold significantly more information than a magnetic strip and periodically recharged. Because of this capacity, a single smart card can be used for many different purposes. Unlike magnetic strip cards which can be read by any magnetic reader, and are therefore vulnerable to loss or theft, a smart card can be password-protected to guarantee that it's only used by the owner. In addition to these pieces of information, systems have been developed to store cash onto the chip. The money on the card is saved in an encrypted form and is protected by a password to ensure the security of the smart card solution. In order to pay via smart credit is necessary to introduce the card into a hardware terminal. The device requires a special key from the issuing bank to start a money transfer in either direction. Smart cards can be disposable or rechargeable. Smart card is also used to store money which is reduced as per usage. Smart card can be accessed only using a PIN of customer. Smart cards can run RSA encryption and can be programmed to generate a pair of public/private keys. The public key is made publicly readable, but the private key is be stored on the card without anyone being able to copy it. Therefore, to use the private key, the user must physically possess the card.Smart cards are secure as they stores information in encrypted format and are less expensive/provide faster processing. Mondex and Visa Cash cards are examples of smart cards.

"Smart cards" are receiving renewed attention as a mode of online payment. They are essentially credit card sized plastic cards with the memory chips and in some cases, with

microprocessors embedded in them so as to serve as storage devices for much greater information than credit cards34 with inbuilt transaction processing capability (Chakrabarti and Kardile, (2002).

Figure 3.3: Smart Card

This card also contains some kinds of an encrypted key that is compared to a secret key contained on the user's processor. Some smart cards have provision to allow users to enter a personal identification number (PIN) code. Smart cards have been in use for well over the two decades now and have been widespread mostly in Europe and Asian Countries. Owing to their considerable flexibility, they have been used for a wide range of functions like highway toll payment, as prepaid telephone cards and as stored value debit cards. However, with the recent emergence of e-commerce, these devices are increasingly being viewed as a particularly appropriate method to execute online payment system with considerably greater level of security than credit cards.

Compared with traditional electronic cash system, smart cards based electronic payment systems do not need to maintain a large real time database. They also have advantages, such as anonymity, transfer payment between individual parties, and low transactional handling cost of files. Smart cards are also better protected from misuse than, say conventional credit cards, because the smart card information is encrypted. Currently, the two smart cards based electronic payment system- Mondex and Visa Cash are incompatible in the smart cards and card reader specification. Not knowing which smart card system will become market leader; banks around the world are unwilling to adopt either system, let alone other smart card system. Therefore, establishing a standard smart card system, or making different system interoperable with one another is critical success factors for smart card based payment system.
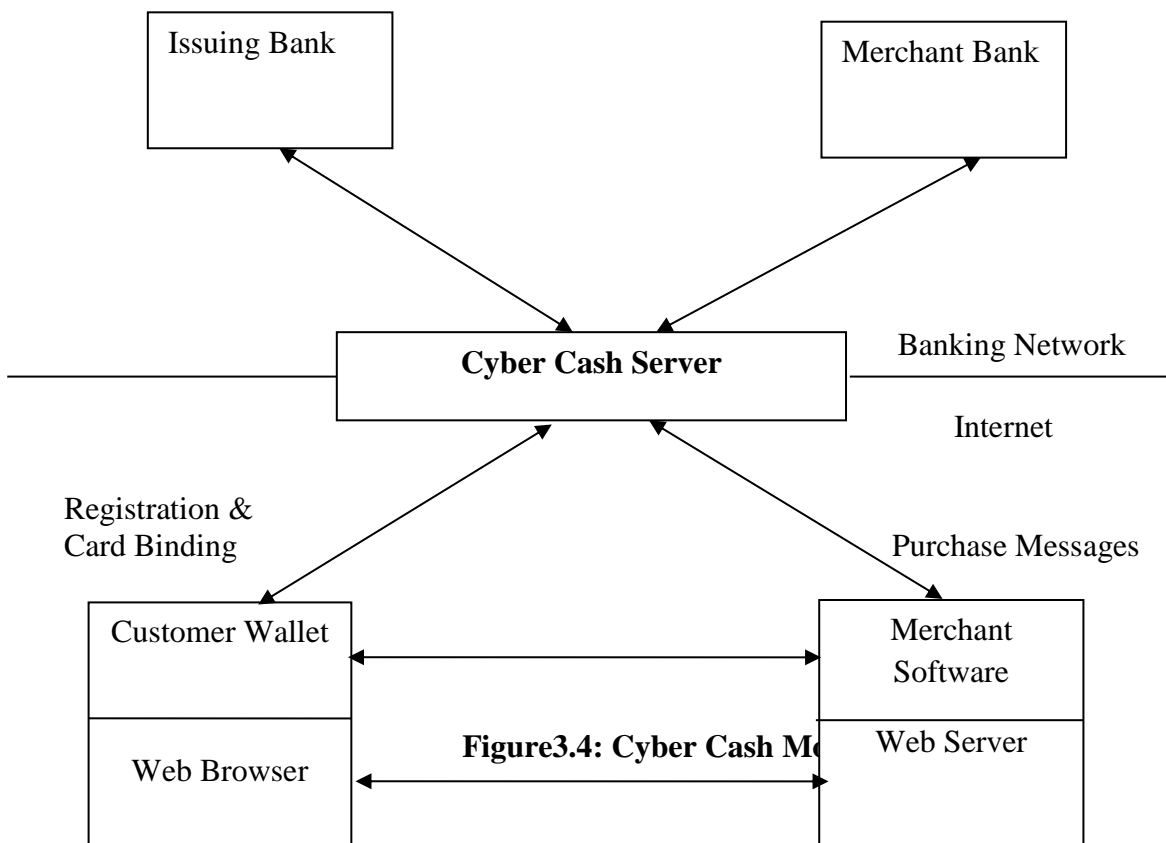
Kalakota and Whinston (1996), classified smart cards based electronic payment system as (1) relationship based smart cards and electronic purses. Electronic purses, which may replace money, are also known as debit card. Further Diwan and Singh (2000) and Sharma and

Diwan (2000), classified smart cards into four categories they are: (1) memory cards: this card can be used to store password or pin number. Many telephone cards use these memory cards (2) shared key cards: it can store a private key such as those used in the public key cryptosystems. In this way, the user can plug in the card to a workstation and workstation can read the private key for encryption or decryption (3) signature carrying card: this card contains a set of pre-generated random numbers. These numbers can be used to generate electronic cash (4) signature carrying cards: these cards carry a co-processor that can be used to generate large random numbers. These random numbers can then be used for the assignment as serial numbers for the electronic cash.

Cyber Cash

Cyber Cash, Inc of Reston, VA was founded in August 1994 to provide software services and solutions for secure financial transactions over the Internet. The Cyber Cash secure Internet Payment System, which uses special wallet software, enables consumers to make secure purchases using major credit cards from Cyber cash affiliated merchants. The Cyber cash payment system was launched in 1995 and by mid 1996 over half a million users of Cyber cash were present. The system is mainly used to sell tangible goods.

The figure below describes the payment steps in a Cyber Cash system

Figure3.4: Cyber Cash M

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Cyber Cash Wallet software is the front-end application of Cyber Cash that is installed on the buyer's machine that has a web browser. The corresponding merchant software called Cyber Cash Register is installed on the merchant's machine that has the web server. When the consumer clicks the "Pay" button on the web browser, this message is sent across to the merchant's server. The merchant software sends a summary of the item, price and transaction id to the consumer's web browser. This message also launches the wallet software on the client. The wallet maintains a list of credit cards owned by the buyer and prompts the buyer to choose from the list. The buyer chooses the credit card that he wishes to use to pay and click's the wallet's pay button. This initiates Cyber Cash payment protocol. The card details are securely sent to the merchant. The merchant authorizes the payment with the financial network via Cyber Cash payment server. If the authorization is successful, goods are delivered to the buyer. The cash register software also does a capture in a batch mode every day. This will result in transfer of funds from the cardholder's account to the merchant through the Cyber case payment server gateway.

Cyber cash provides more secure payment method than First Virtual. First Virtual does not make use of a payment protocol. This makes Cyber Cash more complex than First Virtual. Cyber Cash has a larger user base than First Virtual. First Virtual is mainly used for low-value and informative goods. Cyber Cash is used for medium to high value goods since it is less prone to frauds. Both the software follows the auth and capture steps. Cyber Cash is a clear leader in the Credit card processing software.

Electronic Cheque:

Electronic checks are typically used in orders processed online and are governed by the same laws that apply to paper checks. Electronic checks offer protective measures such as authentification and digital signatures to safeguard digital transactions. Electronic cheques address the electronic needs of millions of businesses, which today exchange traditional paper cheques with the other vendors, consumers and government. The e-cheque method was deliberately created to work in much the same way as conventional paper cheque. An account holder will issue an electronic document that contains the name of the financial institution; the payer's account number, the name of payee and amount of cheque. Most of the information is in uncoded form.

Electronic cheque is messages that contain all the information that is found on an ordinary Cheque but it uses digital signature for signing and endorsing and has digital certificate to authenticate bank account. There are many websites that accept Electronic Cheque. An electronic payment process,that resembles the function of paper cheques but offers great security and more features. Like a paper cheques e-cheques also bear the digital equivalent of signature: a computed number that authenticates the cheque from the owner of the account. Digital chequing payment system seeks to extend the functionality of existing chequing accounts for use as online shopping payment tools. Electronic cheque system has many advantages: (1) they do not require consumers to reveal account information to other individuals when setting an auction (2) they do not require consumers to continually send sensitive financial information over the web (3) they are less expensive than credit cards and (4) they are much faster than paper based traditional cheque. But, this system of payment also has several disadvantages. The disadvantage of electronic cheque system includes their relatively high fixed costs, their limited use only in virtual world and the fact that they can protect the users' anonymity. Therefore, it is not very suitable for the retail transactions by consumers, although useful for the government and B2B operations because the latter transactions do not require anonymity, and the amount of transactions is generally large enough to cover fixed processing cost. The process of electronic chequing system can be described using the following steps.

Step 1: a purchaser fills a purchase order form, attaches a payment advice (electronic cheque), signs it with his private key (using his signature hardware), attaches his public key certificate, encrypts it using his private key and sends it to the vendor.

Step 2: the vendor decrypts the information using his private key, checks the purchaser's certificates, signature and cheque, attaches his deposit slip, and endorses the deposit attaching his public key certificates. This is encrypted and sent to his bank.

Step 3: the vendor's bank checks the signatures and certificates and sends the cheque for clearance. The banks and clearing houses normally have a private secure data network.

Step 4: when the cheque is cleared, the amount is credited to the vendor's account and a credit advice is sent to him.

Step 5: the purchaser gets a consolidated debit advice periodically.

E-cheque in action

An account holder will issue an electronic document that contains the name of the payer, the name of the financial institution, the payer account number, the name of the payee and the amount of cheque. Most of the information is not in a coded form. These are more like a paper cheque. The difference is only that an electronic cheque bears digital signature. Digital signatures are the computer encrypted codes that authenticate the cheques as issued by the owner of the account. Properly signed cheques are further electronically exchanged through electronic clearing houses of banks.

Benefits of Electronic Cheques

Some benefits of electronic cheques are:

- Well suited for clearing micro payments. Conventional cryptography of e-cheques makes them easier to process than systems based on public key cryptography (digital cash)
- They can serve corporate markets. Firms can use them in more cost-effective manner.
- They create float and the availability of float is an important requirement of commerce.

Disadvantages of Electronic cheque

- The e-cheques are not prevalent today. There are miles to go ahead as using e-cheques is a very cumbersome task. Though financial institutions (FIs) are providing authentication software but the risk is always there and no one is liable for the leakages.
- E-cheques are useful only for small transactions.

Digital Token-based Electronic Payment Systems

None of the banking or retailing payment methods is completely adequate in their present form for the consumer-oriented e-commerce environment. Their deficiency is their assumption that the parties will at some time or other be in each other's physical presence or that there will be a sufficient delay in the payment process for frauds, overdraft, and other undesirables to be identified and corrected. These assumptions may not hold for e-commerce and so many of these payment mechanisms are being modified and adapted for the conduct of business over networks.

Entirely new forms of financial instruments are also being developed. One such new financial instrument is "electronic tokens" in the form of electronic cash/money or checks. Electronic tokens are designed as electronic analogs of various forms of payment backed by a

bank or financial institution. Simply stated, electronic tokens are equivalent to cash that is backed by a bank.

Electronics tokens are of three types:
- ❖ Cash or real-time
- ❖ Debit or prepaid
- ❖ Credit or post paid

Cash or real-time

Transactions are settled with the exchange of electronic currency. An example of on-line currency exchange is electronic cash (e-cash).

Debit or prepaid

Users pay in advance for the privilege of getting information. Examples of prepaid payment mechanisms are stored in smart cards and electronic purses that store electronic money.

Credit or post paid

The server authenticates the customers and verifies with the bank that funds are adequate before purchase. Example of post paid mechanisms is credit/debit cards and electronic checks.

The following points must be considered to understand the different viewpoints that these payment instruments bring to electronic commerce.

The nature of the transaction for which the instrument is designed:

The tokens need to be specifically designed to handle various types of transactions like, payments for small pieces of information (micropayments), payments for more traditional products, specific transactions and more general transactions. The key is to identify the parties involved, the average amounts, and the purchase interaction.

The means of settlement used:

Tokens must be backed by cash, credit, electronic bill payments (prearranged and spontaneous), cashier's checks, IOUs, letters and lines of credit, and wire transfers, to name a few. Each option incurs trade-offs among transaction speed, risk, and cost. Most transaction settlement methods use credit cards, while others use other proxies for value, effectively creating currencies of dubious liquidity and with interesting tax, risk, and float implications.

Approaches to security, anonymity, and authentication:

Electronic tokens vary in the protection of privacy and confidentiality of the transactions. Some may take care of privacy, while others may not. Encryption can help with authentication, non-reputability, and asset management.

The question of risk:

The tokens might suddenly become worthless and the customers might have the currency that nobody will accept. If the system stores value in a smart card, consumers may be exposed to risk as they hold static assets. Also electronic tokens might be subject to discounting. Risk also arises if the transaction has long lag times between product delivery and payments to merchants. This exposes merchants to the risk the buyers don't pay or vice - versa that the vendor doesn't deliver.

Internet Monetary Payment and Security Requirements

For consumers and merchants to be able to trust one another, prevent transmitted payment information from being tampered with, and complete transactions with any valid party, the following issues need to be addressed.

- Confidentiality of payment information
- Payment Information Integrity
- Account holder and merchant authentication
- interoperability

Confidentiality of payment information

Payment information must be secure as it travels across the Internet without security, payment information could be picked up by hackers at the router, communication-line possibly resulting in the production of counterfeit cards of fraudulent transactions. To provide security, account information and payment information will need to be encrypted. This technology has been around for decades.

Payment Information Integrity

Payment information sent from consumers to merchants includes order information, personal data, and payment instructions. If any piece of the information is modified, the transaction may no longer be accurate. To eliminate this possible source of error or fraud, an

arithmetic algorithm called hashing, along with the concept of digital signatures is employed. The hash algorithm generates a value that is unique to the payment information to be transferred. The value generated is called a hash value or message diges. A helpful way to view a hash algorithm is as a one-way public cipher, in that:

- It has no secret key
- Given a message digest, there is no way to reproduce the original information
- It is impossible to hash other data with the same value.

To ensure integrity, the message digest is transmitted with the payment information. The receiver would then validate the message digest by recalculating it once payment information is received. If the message digest does not calculate to the same value sent, the payment information is assumed to corrupted and is therefore discarded. The hash algorithm, however, is public information; therefore, anyone may be able to alter the data and recalculate a new, "correct" message digest. To rectify this situation, the message digest is encrypted using a private key of the sender. This encryption of the message digest is called a digital signature.

Because a digital signature is created by using public-key cryptography, it is possible to identify the sender of the payment information. Since the encryption is done by using the private key of a public/private key pair, this means only the owner of that private key can encrypt the message digest. Therefore, if the decrypted digital signature equals the message digest calculated by the receiver, then the payment information could not have come from anyone but the owner of the private key.

Note that the roles of the public/private key pair in the digital signature process are the reverse of that used in ensuring information confidentiality. In the digital signature process, the private key is used to encrypt the information and the public key is used to decrypt.

Account holder and merchant authentication

Similar to the way card accounts are stolen and used today, it is possible for a person to use a stolen account and try to initiate an electronic commerce transaction. To protect against this a process that links valid account to a customer's digital signature needs to be established. A way to secure this link is by use of a trusted third party who could validate the public key and account of the customer. This third party could be one of many organizations, depending upon the type of account used.

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In any instance, the best way for a third party to validate the public key and account is by issuing the items to the customer, together under the digital signature of the third party. Merchants would then decrypt the public key of the customer and, by definition of public-key cryptography, validate the public key and account of the customer. For the preceding to transpire, however, the following is assumed:

- The public key(s) of the third party(ies) is widely distributed.

- The public key(s) of the third party(ies) is highly trusted on face value.

- The third party (ies) issue public keys and accounts after receiving some proof of an individual's identity.

So far, it has been assumed that error or fraud takes place only on the customer end of payment information transport. However, the possibility exists that a fraud agent may try and pose as a merchant for a purpose of gathering account information to be used in a criminal manner in the future. To combat this fraud, the same third party process is used for merchants.

Interoperability

For electronic commerce to take place, customers must able to communicate with any merchant. For this reason, security and process standards must support any hardware or software platform that a customer or merchant may use and have no preferences over another. Interoperability is then achieved by using a particular set of publicly announced algorithms and processes in support of electronic commerce.

Payment and Purchase Order Process

For an electronic payment to occur over the internet, the following transactions/processes must occur

- Account Holder Registration
- Merchant Registration
- Account holder ordering
- Payment authorization

1. Account Holder Registration

Account holders must register with a third party (TP) that corresponds to a particular account type before they transact with any merchant. In order to register, the account holder

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must have a copy of the TP's public key of the public or private key set. The manner in which the account holder receives the public key could be through various methods such as e-mail, Web-page download, disk, or flashcard. Once the account holder receives the public key of the TP, the registration process can start. Once the account holder's software has a copy of the TP's public key, the account holder can begin to register his or her account for Internet use. To register, the account holder will most likely be required to fill out a form requesting information such as name, address, account number, and other identifying personal information. When the form is completed, the account holder's software will do the following:

1. Create and attach the account holder's public key to the form

2. Generate a message digest from the information

3. Encrypt the information and message digest using a secret key

4. Encrypt the secret key using the TP's public key

5. Transmit all items to the TP.

When the TP receive the account holder's request, it does the following

1.   Decrypts the secret key

2.   Decrypts the information, message digest, and account holder's public key

3.   Computes and compares message digests.

Assuming the message digests compute to the same value, the TP would continue the verification process using the account and personal information provided by the requesting account holder. It is assumed the TP would use its existing verification capabilities in processing in personal information. If the information in the registration is verified, the TP certifies the account holder's public key and other pertinent account information by digitally signing it with the TP's private key. The certified documentation is then encrypted using a secret key, which is in turn encrypted with the account holder's public key. The entire response is then transmitted to the customer.

Upon receipt of the TP's response, the account holder's software would do the necessary decryption to obtain the certified documentation. The certified documentation is then verified by the account holder by using the public key of the TP, thus checking digital signature.

Once validated, the certified documentation would be held by the account holder's software for future use in electronic commerce transactions.

2. Merchant registration:

Merchants must register with TPs that correspond to particular account types that they wish to honour before transacting business with customers who share the same account types. For example, if a merchant wishes to accept visa and MasterCard, that merchant may have to register with tow TPs or find a TP that represents both. The merchant registration is similar to the account holder's registration process. Once merchant information is validated, certified documentation is transmitted to the merchant from the TP(s). The certified documentation is then stored on the merchant's computer for future use in electronic transactions.

3. Account holder (customer) ordering:

To send a message to a merchant the customer must have a copy of the merchant's public key and a copy of the TP's public key that corresponds to the account type to be used. The order process starts when the merchant sends a copy of its CD to the customer. At some point prior to sending the CD, the merchant must request the customer to specify what type of account will be used so that the appropriate CD will be sent. After receipt of the appropriate merchant CD, the customer software verifies the CD by applying the TP's public key, thus verifying the digital signature of the TP. software then holds the merchant's CD to be used later in the ordering process. Once the order from is completed, the customer software does the following

- Encrypts account information with the TP's public key
- Attaches encrypted account information to the order form
- Creates a message digest of the order form and digitally signs it with the customer's private key.
- Encrypts the following with the secret key: order form
- Encrypts secret key with the merchant's public key from the merchant's CD
- Transmits the-secret-key-encrypted message and encrypted secret key to the merchant

When the merchant software receives the order it does the following

- Decrypts the secret key using the private key of the merchant
- Decrypts the order form, digital signature, and customer's CD using the secret key

- Decrypts the message digest using the customer's public key obtained from the customer's CD

- Calculates the message diges from the order form and compares with the customer's decrypted message digest

4. Payment authorization

During the processing of an order, the merchants will need to authorize the transaction with the TP responsible for that particular account. This authorization assures the merchant that the necessary funds or credit limit is available to cover the cost of the order. Also, note that the merchant has no access to the customer's account information since it was encrypted using the TP's public key; thus, it is required that this information be sent to the TP so that the merchant can receive payment authorization from the TP so that the merchant can receive payment authorization from the TP and that the proper customer account is debited for the transaction. It is assumed that the eventual fund transfer from some financial institution to the merchant and the debit transaction to the customer account takes place through an existing re-established financial process.

It requesting payment authorization, the merchant software will send the TP the following information using encryption and the digital signature processes previously described:

- Merchant's CD
- Specific order information such as amount to be authorized, order number, date
- Customer's CD
- Customer's account information

After verifying the merchant, customer, and account information, the TP would then analyze the amount to be authorized. Should the amount meet some established criterion, the TP would send authorization information back to the merchant.

Electronic Purses and Debit Cards

Despite their increasing flexibility, relationship-based cards are credit based and settlement occurs at the end of the billing cycle. There remains a need for a financial instrument to replace cash. To meet this need, banks, credit card companies, and even government institutions are arching 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 from buying food, to making photocopies, to paying subway fares.

The electronic purse works in the following manner. After the purse is loaded with money, at an ATM or through the use of an inexpensive special telephone, it can be used to pay for, say, candy in a vending machine equipped with a card reader. The vending machine need only verify that a card is authentic and there is enough money available for a chocolate bar. In one second, the value of the purchase is deducted from the balanced on the card and added to an e-cash box in the vending machine. The remaining balance on the card is displayed by the vending machine or can be checked at an ATM or with a balance-reading device. Electronic purses would virtually eliminate fumbling for change or small bills in a busy store or rush-hour toll both, and waiting for a credit card purchase to be approved. This allows customers to pay for rides and calls with a prepaid card that makes note of each transaction.

When the balance on an electronic purse is depleted, the purse can be arranged with more money. As for the vendor, the receipts can be collected periodically in person-or, more likely, by telephone and transferred to a bank account. While the technology has been available for a decade, the cards have been relatively expensive.

Electronic Fund Transfer

It is a very popular electronic payment method to transfer money from one bank account to another bank account. Accounts can be in same bank or different bank. Fund transfer can be done using ATM (Automated Teller Machine) or using computer. Now a day, internet based EFT is getting popularity. In this case, customer uses website provided by the bank. Customer logins to the bank's website and registers another bank account. He/she then places a request to transfer certain amount to that account. Customer's bank transfers amount to other account if it is in same bank otherwise transfer request is forwarded to ACH (Automated Clearing House) to transfer amount to other account and amount is deducted from customer's account. Once amount is transferred to other account, customer is notified of the fund transfer by the bank.

Digital Wallet (Electronic wallet):

A digital wallet or electronic wallets being very useful for frequent online shoppers are commercially available for pocket, palm-sized, handheld, and desktop PCs. They offer a

secure, convenient, and portable tool for online shopping. They can store personal and financial information such as credit cards, passwords, PINs, and much more. To facilitate the credit-card order process, many companies are introducing electronic wallet services. Once the software is installed on your digital wallet, enter your personal information, such as your name and billing address, and then connect it to your banking information so you can use it to withdraw funds from your account(s) when making on-line purchases. E-wallets allow you to keep track of your billing and shipping information so that it can be entered with one click at participating merchants' sites. E-wallets can also store e-checks, e-cash and your credit-card information for multiple cards.

Net Banking

This is a system, well known in India, which does not involve any sort of physical card. It is used by customers who have accounts enabled with Internet Banking. Instead of entering card details on the purchaser's site, in this system the payment gateway allows one to specify which bank they wish to pay from. Then the user is redirected to the bank's website, where one can authenticate oneself and then approve the payment. Typically there will also be some form of two-factor authentication.

- It is typically seen as being safer than using credit cards, with the result that nearly all merchant accounts in India offer it as an option.

- A very similar system, known as iDEAL, is popular in the Netherlands.

PayPal

PayPal is a global e-commerce business allowing payments and money transfers to be made through the Internet. Online money transfers serve as electronic alternatives to paying with traditional paper methods, such as cheques and money orders. It is subject to the US economic sanction list and other rules and interventions required by US laws or government. PayPal is an acquirer, a performing payment processing for online vendors, auction sites, and other commercial users, for which it charges a fee. It may also charge a fee for receiving money, proportional to the amount received. The fees depend on the currency used, the payment option used, the country of the sender, the country of the recipient, the amount sent and the recipient's account type. In addition, eBay purchases made by credit card through PayPal may incur extra fees if the buyer and seller use different currencies. On October 3, 2002, PayPal became a

wholly owned subsidiary of eBay. Its corporate headquarters are in San Jose, California, United States at eBay's North First Street satellite office campus. The company also has significant operations in Omaha, Scottsdale, Charlotte and Austin in the United States; Chennai in India; Dublin in Ireland; Berlin in Germany; and Tel Aviv in Israel. From July 2007, PayPal has operated across the European Union as a Luxembourg-based bank

Google Wallet

Google Wallet was launched in 2011, serving a similar function as PayPal to facilitate payments and transfer money online. It also features a security that has not been cracked to date, and the ability to send payments as attachments via email.

Mobile Payment

This is also called "Mobile internet access". Mobile payment can be done through each and every card available in the market whether it is pre-paid or post-paid. Instead of paying with cash, cheque or credit cards a consumer can use a mobile phone to pay for wide range of services such as:

- Downloading music, videos, ringtones, online game subscription or items, wallpapers and other digital goods.
- Booking train, bus tickets etc.
- Buying books, goods and other things

But for all these services a consumer should have internet transaction rights. As mobile companies are providing the facility to download music, videos, etc. the parameters of mobile payment remains still more to be explored. HDFC bank is the first in India to provide the services of transferring of money from one's account to another through mobile.

There are three modes of payments through mobiles

1. **SMS based transactional payments**

This includes multimedia messaging service to pay the purchased music, ring tones, wallpapers, etc. a premium charge is added to the consumer's mobile bill.

2. **Direct mobile billing**

This option is used by consumer's who use mobile billing option during utilisation of a facility on any e-commerce site, such as an online gaming site, to make a payment. It involves two-factor authentication involving PIN and One-Time-Password. This is most prevalent and popular in Asia not in India.

3. Mobile Web Payments

The consumer uses web pages displayed or additional tools downloaded and installed on the mobile phone to make a payment. It uses Wireless Application Protocol (WAP) technology. It takes full advantage of all the features offered by GSM and GPRS enabled cellular phone.

Secure Electronic Transaction (SET)

Secure Electronic Transaction (SET) was incorporated in 1995, by Visa (Secure Transaction Technology) and MasterCard (Secure E-Payment Protocol) with participation from several technology companies including IBM and Microsoft. SET, the new standard would not only encrypt transactions but also link them with a digital signature that would fulfill the same role as the physical signature used in stores. This means that your entire credit card number is never travelling across the net- rather pieces of it are and that no human eye sees the entire card number. SET supports electronic commerce security based on Certificate Authority (CA). SET protocol includes a payment section which is able to deal with different credit cards, and it applies an acquirer payment gateway which is able to authorize the usage of existing bankcard networks. In the authorization request sent by the merchant to the acquirer, the purchase instruction of the customer enables the acquirer to verify that the merchant and the buyer agree as to what is purchased and how much is authorized. SET made possible the work of information integration, verification of all financing data and coding of sensitive data. It realized the financing payment safety work of attesting cardholders, supplier, payment request, payment authorization and records of payment by use of advanced technology like data coding and digital signature.

More traditional and safe way (if one does not trust internet security) is that Consumer can just order and payment is by cash upon the delivery (i.e. postal office) of the physical goods or paying directly to given bank account. More modern solutions are for example e-cash which is short for electronic cash, computer based system which allows item to be purchased credit card or money order providing secure on transaction and processing. A popular e-cash provider is i.e. PayPal. Consumer can also have a digital wallet (e-wallet) which can hold digital money that is purchased similar to traveller's checks or to a prepaid account. The wallet may reside in the user's machine or on the servers of a Web payment service. When stored in the client machine, the wallet may use a digital certificate that identifies the authorized card holder. Microsoft's Passport and Yahoo! Wallet are examples of digital wallets.

To secure credit card payment Secure Electronic Transaction (SET) is used. SET is developed by Microsoft and VISA. Secure electronic transaction assures the following features.

Confidentiality

To facilitate and encourage financial transactions, it will be necessary for merchants and banks to assure consumers that their payment information is safe and accessible only by the intended recipient. Therefore credit card account and payment information must be secured as it travels across the network, preventing interception of account numbers and expiration dates by unauthorised individuals. SET provides confidentiality by the use of message encryption.

Integrity

SET ensures that message content is not altered during the transmission sent from consumers to merchants includes order information, personal data and payment instructions. If any component is altered in transit, the transaction will not be processed accurately. In order to eliminate this potential source of fraud and/or error, SET provides the means to ensure that the contents of all order and payment messages received match the contents of messages sent information integrity is ensured by the use of digital signatures.

Authentication

1. **Customer authentication**

Merchants need a way to verify that a consumer is a legitimate user of a valid account number. Digital signature and digital certificates ensure consumer account authentication by providing a mechanism that links a consumer to a specific account number. SET designates a third party called a certificate authority to authenticate the sender and receiver.

2. **Merchant authentication**

The SET specifications provide a way for consumers to confirm that a merchant has a relationship with a financial institution that allows that merchant to accept bank card payments. Merchant authentication is ensured by the use of digital signatures and merchant certificates.

SET participants

SET is a common secure electronic commerce payment protocol where five parties, namely, (1) cardholder, (2) merchant, (3) issuer, (4) acquirer and (5) payment gateway, are involved in the payment process. Although SET is secure for making online electronic transactions, it is not recommended for micropayment because it is consider being time consuming, because of the several parties involved. Besides, all parties may have to authenticate themselves, for security reasons, introducing more penalties performance wise.

Cardholder

They want to buy goods and services from a merchant on the Internet. The authorized holder of payment card issued by an issuer (bank)

Merchant

Merchants sell their goods and services via a Web site or by e-mail and they have a relationship with an acquirer (bank)

Issuer

Issuer issues the payment cards and they are responsible for the payment of the dept of the cardholders

Acquirer

Acquirer maintains accounts for merchants. It processes payment card authorizations and payments. They transfers money to the merchant account, reimbursed by the issuer

Payment gateway

It interface between the Internet and the existing credit-card payment network

Disadvantages of SET

There are some cons of SET also:

Too slow:

Because each SET transactions involves up to 16 transactions, they are compute intensive and slow on today's computer technology.

Too expensive:

While Visa and MasterCard have begun to reduce their transaction fees, banks are still wary that signing up customers for SET will be expensive. Telco's may charge banks as much as $1 per digital certificate.

Too cumbersome:

Banks have yet to figure out how to distribute the software consumers will need to use SET.

Even if the SET adoption rate starts to pick up, without 100 percent consumer adoption, merchants must still have alternative fraud methods as crooks can simply move over to non-SET transactions.

Implication of e-commerce in India

The implication of e-commerce includes various issues such as economic, legislative, technological and social. E-commerce has outstanding growth prospective and it contributes directly to economic development of the country. Actually, e-commerce has created a phenomenon in almost all economic activities. It is one of the most important technological breakthroughs of the new millennium. As under WTO responsibilities, member countries are providing tariff-free access to their markets resulting in greater competition. Transactions through e-commerce take less time and are economically viable too. This would help increase the growth and for this a strong and a stable legal system is required. It is a fact that in liberal and open markets, e-commerce would dominate. The other important essential features of electronic commerce are privacy and security. There should be suitable guidelines to establish them to ensure confidence among the players who transact through e-commerce.

Emergence and growth of E-commerce in India recently, is the effect of liberalization and globalization actually this is the impact of transition from close network system to an open network platform like internet. India has made significant efforts in modernizing the area of E-commerce. In May 1997 ministry of information and technology, Government of India prepared an Action Plan to setup a National Information Infrastructure component of this Action Plan among others are setting up of the National High speed back born network and inter connection of networks. Several studies designate that ICT has a Positive and Considerable Impact on Capital Deepening, Labour productivity and total factor productivity this promotes productivity growth in Economy. Growth of ICT as a basic infrastructure for E-commerce is the growth of E-commerce in India. ICT has achieved remarkable success in last ten years.

Key reasons for the success of e-commerce in India

Research studies have indicated several Key reasons for the success of e-commerce in India such as:

i.   Growing broadband Internet, 3G diffusion and smart phone

ii.   Upward trend of standards Living in middleclass

iii.   Obtainability of much wider product range

iv.   Busy lifestyles and lack of time for offline shopping

iv.   Increased usage of online categorized sites

v.   Lower prices related to brick and mortar retail, driven by disintermediation and reduced inventory and real estate costs.

vi.   Increased customer service

vii.   Increased information transparency and Knowledge

viii.   Increased usage of online classified sites, with more consumer buying and selling second-hand goods

ix.   Evolution of the online marketplace model with sites like Jabong.com, Flipkart, Snapdeal, and Infibeam.

Risk Associated with Electronic Payment System

E-commerce systems are based upon internet use, which provides open and easy communications on a global basis. However, because the internet is unregulated, unmanaged and uncontrolled, it poses a wide range of risks and threats to the systems operating on it. The growth of electronic payments and wider array of payment vehicles now in common use has made managing the risks associates with these payments more important than ever to consumer, businesses, financial institutions and the economy as a whole.

The notion of security of payment is clearly insufficient to provide appropriate conceptual framework for technical and institutional design of internet payment system. There is a need for broader approach of risk management. Such approach recognizes that electronic payment entails a series of interrelated risks namely, financial risks, technological risks, technological risks, operational risks and legal risks. Some of these risks are generic to banking businesses; others are specific to electronic payments, such as interception of messages, break-in into security infrastructure.

Operational Risks:

Operational risk arises from the potential for loss due to significant deficiencies in system reliability or integrity. Security considerations are paramount, as banks may be subject to external or internal attacks on their systems or products operational risks can also arise from customer misuse, and from inadequately designed or implemented electronic banking and electronic money systems many of the specific possible manifestations of these risks apply to both electronic banking and electronic money.

Credit Risk:

Credit risk occurs when the counterparty will not settle an obligation for full value, either when due or at any time thereafter. Banks engaging in electronic banking activities may extend credit via non-traditional channels, and expand their market beyond traditional geographic boundaries. Inadequate procedures to determine the credit worthiness of borrowers applying for credit via remote banking procedures could heighten credit risk for banks. Banks engaged in electronic bill payment programs may face credit risk if a third party intermediary fails to carry out its obligations with respect to payment. Banks that purchase electronic money from an issuer in order to resell it to customers are also exposed to credit risk in the event the issuer defaults on its obligations to redeem the electronic money.

Legal Risks:

Legal risk arises from violation of, non-conformance with laws, rules, regulations, or prescribed practices or when the legal rights and obligations of parties to a transaction are not well established. The new nature of many retail banking and electronic money activities, rights and obligations parties' to such transactions are uncertain in some cases. For instance, application of some consumer protection rules to electronic banking and electronic money activities in some countries may not be clear. In addition, legal risk may arise from uncertainty about the validity of some agreements formed via electronic media.

Electronic money schemes may be attractive to money launderers because of the systems offer liberal balance transaction limits, and provide for limited auditability to transactions. Application of money laundering rules may be inappropriate for some forms of electronic payments. Because electronic banking can be conducted remotely, banks may face increased difficulties in applying traditional methods to prevent and deduct criminal activity.

Banking engaging in electronic banking and electronic money activities can face legal risks with respect to customer disclosures and privacy protection. Customers who have not been adequately informed about their rights and obligations may bring suit against a bank. Failure to provide adequate privacy protection may also subject a bank to regulatory sanctions in some countries.

Banks choosing to enhance customer service by linking their internet sites to other sites also can face legal risks. A hacker may use the linked site to defraud a bank customer, and the bank could face litigation from the customer.

As electronic commerce expands, banks may seek to play a role in electronic authentication systems, such as those using digital certificates. The role of a certification authority may expose a bank to legal risk. For instance, a bank acting as a certification authority may be liable for financial losses incurred by parties relying on the certificate. In addition, legal risk could arise if bank participate in new authentication systems and rights and obligations are not clearly specified in contractual agreements.

Risk Management Options in E – Payment System

The rapid pace of technological innovation is likely to change the nature and scope of the risk banks face in electronic money and electronic banking. Supervisors expect banks to have processes that enable bank management to respond to current risks, and to adjust to new risk. One essential challenge of electronic commerce is to manage the risks. A risk management process includes three basic elements viz assessing of risks, controlling of risk exposure and monitoring risks will help banks and supervisors attain these goals. Banks may employ such a process when committing to new electronic banking and electronic money activities, and as they evaluate existing commitments to these activities.

Risk management

For an increasing number of banks there may be a strategic reason for engaging in electronic banking and electronic money activities. In addition, greater use of electronic banking and electronic money may increase the efficiency of the banking and payment system, benefiting consumers and merchants. At the same time, as the preceding discussion indicates, there are risks for banks engaging in electronic banking and electronic money activities. Risks must be balanced against benefits; banks must be able to manage and control risks and absorb

any related losses if necessary. Risks from electronic banking and electronic money activities should also be evaluated in the context of other risks the bank faces. Even though electronic banking and electronic money activities may represent a relatively small portion of the overall activities of banks currently, supervisors may still require senior management's assurance that critical systems are not threatened by the risk exposures banks take.

The rapid pace of technological innovation is likely to change the nature and scope of risks banks face in electronic money and electronic banking. Supervisors expect banks to have processes that enable bank management to respond to current risks, and to adjust to new risks. A risk management process that includes the three basic elements of *assessing* risks, *controlling* risk exposure, and *monitoring* risks will help banks and supervisors attain these goals. Banks may employ such a process when committing to new electronic banking and electronic money activities, and as they evaluate existing commitments to these activities.

It is essential that banks have a comprehensive risk management process in place that is subject to appropriate oversight by the board of directors and senior management. As new risks in electronic banking and electronic money activities are identified and assessed, the board and senior management must be kept informed of these changes. Prior to any new activity being commenced, a comprehensive review should be conducted so that senior management can ensure that the risk management process is adequate to assess, control and monitor any risks arising from the proposed new activity.

Assessing risks

Assessing risks is an ongoing process. It typically involves three steps. First, a bank may engage in a rigorous analytic process to identify risks and, where possible, to quantify them. In the event risks cannot be quantified, management may still identify how potential risks can arise and the steps it has taken to deal with and limit those risks. Bank management should form a reasonable and defensible judgement of the magnitude of any risk with respect to both the impact it could have on the bank (including the maximum potential impact), and the probability that such an event will occur.

A second step in assessing risk is for the board of directors or senior management to determine the bank's risk tolerance, based on an assessment of the losses the bank can afford to sustain in the event a given problem materialises. Finally, management can compare its risk

tolerance with its assessment of the magnitude of a risk to ascertain if the risk exposure fits within the tolerance limits.

Managing and controlling risks

Having made an assessment of risks and its risk tolerance, bank management should take steps to manage and control risks. This phase of a risk management process includes activities such as implementing security policies and measures, co-ordinating internal communication, evaluating and upgrading products and services, implementing measures to ensure that outsourcing risks are controlled and managed, providing disclosures and customer education, and developing contingency plans. Senior management should ensure that staffs responsible for enforcing risk limits have authority independent from the business unit undertaking the electronic banking or electronic money activity. Banks increase their ability to control and manage the various risks inherent in any activity when policies and procedures are set out in written documentation and made available to all relevant staff.

Security policies and measures

Security is the combination of systems, applications, and internal controls used to safeguard the integrity, authenticity, and confidentiality of data and operating processes. Proper security relies on the development and implementation of adequate security policies and security measures for processes within the bank, and for communication between the bank and external parties. Security policies and measures can limit the risk of external and internal attacks on electronic banking and electronic money systems, as well as the reputational risk arising from security breaches.

A *security policy* states management's intentions to support information security and provides an explanation of the bank's security organisation. It also establishes guidelines that define the bank's security risk tolerance. The policy may define responsibilities for designing, implementing, and enforcing information security measures, and it may establish procedures to evaluate policy compliance, enforce disciplinary measures, and report security violations.

Security measures are combinations of hardware and software tools, and personnel management that contribute to building secure systems and operations. Senior management should regard security as a comprehensive process that is only as strong as the weakest link in the process. Banks can choose from a variety of security measures to prevent or mitigate

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external and internal attacks and misuse of electronic banking and electronic money. Such measures include, for example, encryption, passwords, firewalls, virus controls, and employee screening. Encryption is the use of cryptographic algorithms to encode clear text data into cipher text to prevent unauthorised observation.8 Passwords, pass phrases, personal identification numbers, hardware-based tokens, and biometrics are techniques for controlling access and identifying users.

Firewalls are combinations of hardware and software that screen and limit external access to internal systems connected to open networks such as the Internet. Firewalls may also separate segments of internal networks using Internet technology (Intranets). Firewall technology, if properly designed and implemented, can be an effective means of controlling access and safeguarding data confidentiality and integrity. Because this technology is complex to design and can be costly, its strength and capabilities should be proportionate with the sensitivity of the information being protected. A well-planned design should include enterprise-wide security requirements, clear procedures for operation, separation of duties, and selection of trusted personnel who are responsible for the configuration and operation of the firewall.

Monitoring risks

Ongoing monitoring is an important aspect of any risk management process. For electronic banking and electronic money activities, monitoring is particularly important both because the nature of the activities are likely to change rapidly as innovations occur, and because of the reliance of some products on the use of open networks such as the Internet. Two important elements of monitoring are system testing and auditing.

System testing and surveillance

Testing of systems operations can help detect unusual activity patterns and avert major system problems, disruptions, and attacks. Penetration testing focuses upon the identification, isolation, and confirmation of flaws in the design and implementation of security mechanisms through controlled attempts to penetrate a system outside normal procedures. Surveillance is a form of monitoring in which software and audit applications are used to track activity. In contrast to penetration testing, surveillance focuses on monitoring routine operations, investigating anomalies, and making ongoing judgements regarding the effectiveness of security by testing adherence to security policies.

Auditing

Auditing (internal and external) provides an important independent control mechanism for detecting deficiencies and minimising risks in the provision of electronic banking and electronic money services. The role of an auditor is to ensure that appropriate standards, policies, and procedures are developed, and that the bank consistently adheres to them. Audit personnel must have sufficient specialised expertise to perform an accurate review. An internal auditor should be separate and independent from employees making risk management decisions. To augment internal audit, management may seek qualified external auditors, such as computer security consultants or other professionals with relevant expertise, to provide an independent assessment of the electronic banking or electronic money activity.

Components of an Effective Electronic Payment System

E-commerce integrates e-market, e-data inter-change and internet buying and selling of goods and services. The E-commerce also involves using all round electronic methods and procedures to conduct business activities to achieve the organizational goal. It uses different technologies and hugs a wide range of financial firms such as electronic banking, electronic trading, electronic cataloguing, video conferencing, and multi-media communications, electronic data interchange (EDI), electronic mail (E-mail), facsimile (fax) and all forms of messaging between enterprises. It combines technologies (Internet, EDI, electronic forms, electronic cash, Barcodes), information technology standards (such as EDIACT, EAN/UPC), strategies (Just-in-time inventory management, efficient consumer response).

1. **Commercial cards**

Starting with the component that gives businesses the most return on the time and effort it takes to migrate to e-payments, the core products that make up a commercial card program are each useful for different reasons:

A purchasing card (p-card)

It goes beyond a traditional business credit card with advanced features like virtual card numbers (VCNs). These are single-use, unique credit card numbers generated in real time for a specific purchase amount, date and supplier. VCNs enable a company to use a p-card with greater confidence for larger purchase amounts. In 2007, the average p-card purchase was under $1,000; in 2013, many companies used p-cards for purchases up to $2,500. In addition, p-cards are being used for a wider variety of purchases, with some companies using p-cards to

pay for goods and services in 59% of purchase categories. A big part of the reason for growth is improved efficiencies: p-card use eliminates the requisition, purchase order and invoice parts of the purchasing process.

Travel and entertainment (T&E) cards

These are effective for companies that don't want their employees to purchase items on their own credit cards or for employees who don't want to worry about receiving timely reimbursement. According to RPMG, 68 percent of corporations expect travel card spending to increase through 2015. Spending controls, continuous monitoring and detailed reporting are key program features that improve employee compliance and curtail misuse.

1. **Electronic Accounts Payable (EAP)**

It accounts are non-plastic purchasing accounts used to pay for invoiced goods and services. EAP accounts can be integrated with a direct file transmission platform which centralizes all payments processing (virtual card numbers, ACH and wires). EAP accounts can also enable different departments to issue distinct credit card numbers (through the use of ghost card accounts) that roll up to one corporate account. This allows finance to easily assign costs to departments and allows suppliers to charge the account directly (e.g., when a plastic p-card can't be used), while providing the company with payment float, insight and controls. EAP accounts also allow you to set dynamically adjustable spending limits that are assigned to match the transaction amount. According to RPMG, the number of companies using EAP accounts is expected to rise from 18 percent in 2013 to 43 percent in 2016. RPMG also revealed that the average EAP transaction was $4,727 in 2013, over 10 times larger than a typical purchasing card account transaction. Research shows that EAP use complements p-card spend, with 73 percent of EAP-using organizations indicating that EAP spending will not cannibalize purchasing card spending.

2. **ACH payments**

The Automated Clearinghouse (ACH) network was originally established in the 1970s to provide an alternative to using paper checks. The ACH uses a batch process, in which the individual transactions are created/initiated and then batched as one or many for release to the bank. These transactions typically take a few days to process. Today ACH payments are used for large volumes of credit and debit batched transactions, including regular direct deposit payroll and vendor payments. In fact, in 2013, $38.7 trillion was transferred over the ACH

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Network, an increase of nearly 5% over the previous year. According to the Electronic Payments Association (NACHA), the types of ACH transactions seeing increased use include online payments, business-to-business (B2B) payments (CTX and CCD transactions), consumer-initiated payments (CIE transactions) and recurring payments (PPD transactions) such as direct deposit via ACH.

3. Bill payments

A bill payments solution makes sense for regular or one-time small to mid-sized payments managed and distributed online, including recurring expenses, such as rent and equipment leases. Conveniently, web-based bill pay enables companies to view, manage and pay bills online and set up future and recurring payments from anywhere, any time. Companies also can define multiple users and establish various approval limits.

4. Wire transfers

Wire transfers are used to make domestic and international high value and rapid direct bank-to-bank payments, including ad-hoc and one-time payments. Businesses typically use wire transfers to pay or receive funds same day—benefitting from nearly immediate and guaranteed availability of funds via secure, non-reversible transactions. This can be important for businesses that need to make an immediate purchase or cover an urgent business need.

5. The backend stuff

Supporting all of these solutions are several essential backend systems, including an automated payment platform that integrates bill payment and accounting systems, a purchase control portal that securely generates virtual accounts for purchase requests, and a direct file transmission platform that centralizes all payments processing and that integrates with your ERP systems.

Why commercial cards make e-payments migration worth the effort

It's all about the data. Commercial card use provides companies with rich transaction data, as detailed as item description and quantity, which businesses can use to support various strategic initiatives. For example, many businesses analyze spending patterns across departments in order to negotiate better terms with suppliers. In fact, 27 percent of businesses leverage p-card data to get higher discounts for goods or services. Additionally, detailed

reporting helps businesses identify account misuse and fraud quicker through automated reconciliation and the ability to monitor the spending patterns of employees over time.

Although migration to e-payments (including commercial cards) may seem like a daunting process, the benefits are clear. There are many resources available to help your company transition as smoothly as possible. For example, at Silicon Valley Bank, we can analyze our clients' supplier base and provide a detailed roadmap on how to best convert from paper to e-payments. We handle the time-consuming supplier enablement process in close collaboration with our clients. We also work with our clients to design effective commercial card program controls and guidelines.

Review Questions

1. Discuss the features required for an effective electronic payment system.

2. What are all the problems with traditional payment systems?

3. Explain the following types of electronic payment system in brief:

   (a) Electronic cash

   (b) Electronic cheque

   (c) Credit card

   (d) Debit card

4. What are the problems in implementing electronic payment system?

5. Explain various types of risk associated with electronic payment system.

6. Discuss briefly about SET.

UNIT- IV

BUSINESS TO BUSINESS E-COMMERCE

In this unit we will learn

- 🔸 Business to Business E-Commerce model

- 🔸 Need for B2B electronic commerce

- 🔸 Alternative Models of B2B electronic commerce

- 🔸 Electronic Data Interchange

    - EDI Architecture

    - EDI Standards

    - EDI model

- 🔸 Value Added Networks (VANs)

- 🔸 Internet based EDI

- 🔸 FTP based Messaging

- 🔸 Legal, Security and Privacy issues of EDI

Business to Business E-Commerce

Electronic commerce is an emerging concept that describes the process of buying and selling or exchanging products, services and information via computer networks including the Internet. E-Commerce can be mainly divided into Business-to-Business (B2B) electronic commerce and Business-to-Consumer (B2C) electronic commerce. Business-to-business e-commerce may be defined as the buying and selling of goods and services between companies through online. Therefore, B2B electronic commerce implies that both sellers (suppliers) and buyers are business corporations, while B2C electronic commerce implies that the buyers are individual consumers. B2B e-commerce is a slightly more evolved version of commerce. This type of e-commerce is the electronic exchange of business documents among businesses for the purpose of conducting commerce. This began with the Electronic Data Interchange (EDI), which started in the 1960s. In the past, EDI was conducted on a direct link of some form between the two businesses whereas today the most popular connection is the internet. The two business firms pass information electronically to each other. B2B e-commerce currently makes

up about 94 percent of all e-commerce transactions. Business to Business electronic commerce has been in use for quite a few years and is more commonly known as Electronic Data Interchange (EDI). Typically in the B2B environment, e-commerce can be used in the following processes:

- Procurement
- Order fulfilment
- Managing trading-partner relationships.

The leading items in B2B e-commerce are computing electronics, utilities, shipping and warehousing, motor vehicles, petrochemicals, paper and office products, food and agriculture. B2B e-commerce is the electronic support of business transactions between companies and covers a broad spectrum of applications that enable an enterprise or business to form electronic relationships with their distributors, resellers, suppliers, and other partners. B2B electronic commerce does not just comprise the transaction via the internet, but also the exchange of information before and the service after a transaction. From the purchasing company's point of view, B2B electronic commerce is a medium for facilitating procurement management by reducing the purchase price and the cycle time. For many organisations, B2B e-commerce is synonymous with the vision of integrated supply chain. E-commerce technologies have allowed even the smallest business to improve the processes for interfacing with customers. They are now able to develop services for individual clients rather than provide a standard service.

Business models are the collections of processes and activities that enable organizations to achieve their goals. E-commerce is the activity of conducting business over the Internet. The collection of business models, enhanced by technology that generates revenue from online activity and creates and promotes electronic sharing of information among vendors, suppliers and customers in this setting, is known as business-to-business (B2B) e-commerce. The activities involved in Business to Business e-commerce are discussed below

Materials Acquisition

Materials acquisition is the process that facilitates (or supports) the purchase of raw materials or goods for resale. Within this activity, materials are ordered from various suppliers, and tracked and purchased using Electronic Data Interchange (EDI). EDI is a fundamental

component of the procurement process in many organizations. Procurement activities include items such as vendor selection qualification, price negotiation, shipment certification and acceptance, all of which are enabled through the activities of EDI within e-commerce.

Product Conversion

Conversion of raw materials and labor into finished goods occurs in the manufacturing process. Within B2B e-commerce, suppliers and vendors share information about raw materials and products as they transform them through the assembly, finishing, testing and packing process. Utilization of secured and expanded networks (extranets) enables each business partner in the supply chain system to share detailed information about product identification, progression and status at any given time.

Transportation and Logistics

Activities that categorize, store, distribute and ship the final product are recognized as logistics management. Both EDI and Electronic Fund Transfer (EFT) assist companies in performing the activities that facilitate warehousing, shipping and monitoring the delivery of products to businesses within the value chain. Internet technologies also assist members of the supply chain system in reducing costs by evaluating various routing options for materials, comparing costs between shipping vendors, and enabling efficiency and accuracy in inventory control with concepts like Kanban (inventory replenishment triggers) or just-in-time inventory management.

Marketing

Marketing activities that support revenue models are achieved by sharing information with customers about products and services available for purchase. These marketing processes involve the creation of product catalogs, description of features, information regarding purchasing discounts and promotions, and details regarding loyalty programs. Electronic storefronts (or marketing websites) create inducements to attract consumers, inform them of current promotions and help promote selling activities.

Need for Business to Business E-commerce

A successful B2B company will use all the tools at its disposal to recruit new clients and tap into new markets. Therefore it is surprising when B2B companies with the well-known good head on their shoulders voluntarily shy away from delving into e-commerce, because they should be doing just the opposite - embracing e-commerce as a way to invest in their business's future. E-commerce is a powerful force that can help any B2B company drive sales, and here are five reasons why your B2B business will benefit from using it.

1. E-commerce sales are growing:

Net e-commerce sales in the US have gone from $127 billion in 2007 to $165.4 billion in 2010. That is a 30 percent increase, indicating major growth, and it shows no signs of slowing anytime soon. Growth of e-commerce sales means growth of your B2B business - but that will happen if and only if you're engaged in e-commerce.

2. Clients want e-commerce:

Using online portals to do business cuts costs and makes transactions much more efficient for your clients. They are demanding e-commerce for their business needs, and if your business can't meet them, you will be left in the dust.

3. Other B2B companies are rushing to meet this growing need:

They say if you can't beat 'em, join 'em - but that's not how it works in the business world. If you can't beat them, you're beat, plain and simple. Ignoring e-commerce means letting the competition pass your business by.

4. Increased online presence:

Even if you're not doing a ton of sales online at first, the more you engage in e-commerce efforts, the more your business will be visible on the internet, returning in search results on Google, Bing, and the like. Higher visibility means more future business for your company. Your business's search engine rankings can be further helped by starting a business blog, and adding new content to your blog 3-5 times a week.

5. Investment in business future:

You will find that updating your systems and getting everything online might take a lot of effort at first, but it will pay off in the long run and save you money. Add this point to the 4 before it, and you'll realize that your B2B business can't afford NOT to make the jump to e-commerce. So what are you waiting for? Start integrating e-commerce into your B2B business immediately, and soon you'll be enjoying increased rate of growth of your business.

Models of B2B Electronic Commerce

The three models of B2B Electronic Commerce are classified depending on who controls the marketplace: the buyer, the supplier or the intermediary.

- In a Supplier-Oriented Marketplace many buyers face few suppliers.

- In a Buyer-Orientated Marketplace few buyers face many suppliers.

- In an Intermediary-Oriented Marketplace many buyers face many suppliers.

1. Supplier-Oriented Marketplace (Sell-Side-Solution)

Supplier-Oriented Marketplaces offer a group of customers with a wide spectrum of products and services and also support them in their own business. In addition, there are large potentials through customer communities, individualized products and direct customer relationships. By using Supplier-Oriented Marketplaces, suppliers are offered new types of market channels in marketing and distribution of products. Products can be sold directly to the customer without using intermediaries. According to Turban, Lee, King and Chung, the cultivation of customer relationships is also possible. Most manufacturer-driven electronic stores use this form of marketplace. Successful examples of this business model are Dell and Cisco. Dell sold 90 percent of their computers directly to business buyers and Cisco sold US$ 1 billion worth of routers, switches and other network interconnection devices mainly to business customers in 1997. Both Dell and Cisco sold and sell their products via the Internet. However, not only Dell and Cisco use the Supplier-Oriented Marketplace, there are thousands of other companies using this model. The major issue especially for small companies is how to find buyers for their products. Excellent reputation and a group of loyal customers are necessary for the success of the sites using this model. Another application of the Supplier-Oriented Marketplace is auction sites, for instance the computer reseller Ingram Micro.

Companies can sell their surplus goods and business customers can therefore realize large discounts.

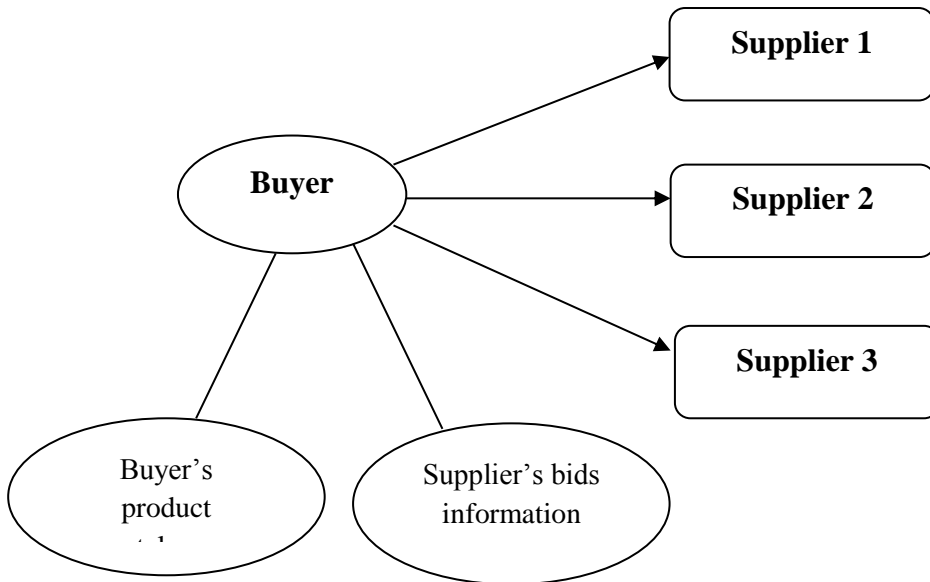

Figure 4.1: Supplier oriented Marketplace

Buyer-Oriented Marketplace (Buy-Side-Solution)

By using Supplier-Oriented Marketplaces, buyers would have to search electronic stores and electronic malls to find and compare suppliers and products. This would be very costly and time consuming for big buyers, who purchase thousands of items on the Internet. As a result, such big buyers prefer to open their own marketplace, which is called a Buyer-Oriented Marketplace. By supporting transactions and procurement processes, these marketplaces offer great potentials in cost savings. Buyer-Oriented Marketplaces are found in industrial sectors with few and dominant buyers.

Essential elements of the marketplace are:
- Guidelines for transactions
- Internet-based product and supplier catalogue
- Availability check
- Informational support of negotiations
- Invitation to bid in auctions and submissions
- Catalogue ordering

- Support of transactions

- Delivery inspection

- Quality management

Figure 4.2: Buyer's Oriented Marketplace

Potentials of Electronic Procurement

In many companies, procurement has become one of the most important functions in the last years. Companies realized the existence of great potentials in cost savings by supporting procurement electronically. Product cost, process cost and inventory costs can be reduced by using electronic procurement (E-Procurement). E-Procurement is mostly realized in Buyer Oriented Marketplaces.

(a) Product Costs

Lower product costs can be realized by reducing purchase prices through E-Procurement. This is achieved mainly by the following points:

- Access to small companies located in foreign countries is facilitated

- Procurement systems aimed at key-suppliers can efficiently be expanded to other suppliers

- Procurement cycles can be shortened and also be supported by e.g. auctions

- Purchase volume can be bundled up from internal business departments and from partner companies

These points are mainly applicable for suppliers who sell products like bolts, nuts and stationeries. Suppliers of highly specialized products are less affected.

(b) Process Costs

Reducing the process costs is the greatest potential of E-Procurement. Up to now, one order has caused costs on average DM 200-300. Internal bureaucracy is responsible for a large part of the costs. E-Procurement can reduce process costs up to 90 percent. These cost savings are realized through the following improvements:

- More effective handling of administrative tasks like e.g. delivery inspection or order forms through electronic support

- Faster and more efficient internal coordination like e.g. signatures that are necessary for an authorization

- Better information by e.g. updating product catalogues and descriptions regularly

- Avoiding errors (e.g. wrong article numbers)

- Faster searching for products

(c) Inventory Costs

Long delivery times and poor transparency of orders cause higher inventory levels, which lead to higher capital costs and to partial loss of the inventory's value. This affects the profitability of the company negatively. E-Procurement can decrease the inventory levels by 20-40 percent.

Intermediary-Oriented Marketplace

This business model is established by an intermediary company which runs a marketplace where business buyers and sellers can meet. There are two types of Intermediary-

Oriented Marketplaces: horizontal and vertical marketplaces. Vertical marketplaces concentrate on one industrial sector whereas horizontal marketplaces offer services to all industrial sectors. The Intermediary-Oriented Marketplace is a neutral business platform and offers the classical economic functions of a usual market. The difference is that the participants do not have to be physically present. There are thousands of Intermediary-Orientated Marketplaces and many of them are very different in the services they offer. These marketplaces can contain a "virtual catalogue of the industrial sector". Companies have the possibility to present themselves in this virtual catalogue. On an Internet based "notice board" single offers or requests of companies can be found. An Intermediary-Oriented Marketplace can also contain catalogues where information on products and prices can be presented. By offering search functions, the marketplace makes the comparison and transparency of products possible. Marketplaces can also offer auctions. These auctions can be organized by sellers (products are sold) or by buyers (orders are sold). Furthermore is it possible to offer electronic functions where participants can negotiate in real time. The intermediary company running the marketplace can generate profits through provisions for successful transactions and for negotiation of services (e.g. a logistical company to deliver the products). The company can also charge fees for membership and for presenting information, offers or requests. Profits can furthermore be generated by advertising (e.g. banners). The company can also distribute its own products through the marketplace profiting from more buyers entering the site than e.g. a normal e-store.

Figure 4.3: Intermediary oriented Marketplace

The Business of B2B Ecommerce Requirements

In nature, B2B e-commerce is more complex than B2C e-commerce, replete with business rules around stock, credit, payments, delivery, re-ordering, and discounts that are bound up by customer contracts and in order to expose them your ecommerce platform will require a typically much tighter ERP integration. The challenge then is to include the business complexity in the solution, while maintaining simplicity in the customer journey.

Therefore, if the company is running a B2B business and are considering opening an online channel to their customers put together a 'non-exhaustive' list which will help form the basis of a successful functional requirements process.

Figure 4.4: Building B2B E-commerce Solution

1. Multiple logins for single customer's business

B2B customers businesses will typically have multiple user persons (order creators, finance procurement etc.) with varying levels of authority to interact with the B2B platform. The B2B ecommerce platform should facilitate login management and permissions (add, delete, update) for all these users under a single business account.

2. One customer account for multiple businesses

One customer account may purchase for many different businesses. For example a customer may own a chain of retail outlets dispersed in several locations and they will want to place orders for all of them using a single account and login instance.

3. Personalised Catalogue

It is not uncommon for B2B customer businesses to only want to view the relevant products which they buy frequently. For instance the customer only wants to buy from a particular product range or brand in the catalogue. If this is required the company needs to ensure B2B ecommerce website allows to configure catalogue per business, customer to ensure those frequently bought products are more visible or available as part of a re-order or favorites list.

4. Personalised Pricing

Typically each customer will have a specific, and sometimes complex set of pricing rules applied to the product catalogue, including negotiated prices, volume discounts and payment / delivery terms which affect the final order price. There are some questions to consider;

- Is there a need to display catalogue pricing after login only. If this is the case, then it is very likely the business will need to personalize the prices for each customer.

- Each product may have more than one price type (trade price, retail price, sale price). What price type does the business want to display to the customer?

- Is the price type configurable per customer type, or per individual customer?

5. Personalised/Customised Promotions

This feature ties in closely with the previous one and allows B2B sellers the ability to provide customer specific promotions, landing page banners, sale icons and so on. This feature can also include customised banners and promotions based on rules such as the value of a previous transaction or the customers' transaction history.

6. Order Approval Workflow

B2B ecommerce transactions typically involve values that are significantly higher than B2C and therefore can require an order workflow and approval process. In a lot of cases we've seen , when an order is placed by any user of the B2B customer, an email is generated to and sent to an approver user (in most cases a finance or business owner) of same business who will then login and validate and then approve the order.

7. Repeat Orders

Repeat orders are a very common piece of functionality for almost all B2B e-commerce websites. Repeat orders can be a manual process such that the B2B customer needs to login into their dedicated account area and see a history of previous orders or a favorites list and then place a replenishment order or it can be fully automated using scheduled orders. An option can be provided to your customers to opt for one or the other.

8. B2B Payment Methods

A lot of B2B ecommerce focuses more on offline payment methods than online methods such as debit and credit card payments. The offline methods include;

- Purchase Orders
- Partial payment of invoices and account receivable ageing
- Invoice Me Credit limits

. Credit limits is a relatively new online payment option where your business may set a credit limits for its business customers. This payment option can be based on certain factors such as Frequency of Order, Average Order Total, and Average Payment Period. Find out if there are any other payment methods which need to be offered in addition to previously

mentioned offline payment methods and ensure that your payment methods functionality is configurable per customer on your B2B ecommerce website

9. Personalised Scheduled Deliveries

Whether company is operating a B2C or B2B ecommerce website, delivery options are a key battleground to gain a competitive edge. Delivery is an incredibly important part of B2B ecommerce offering and customers need reassurance that an online shopping experience will deliver on its delivery promises. Unlike other ecommerce business models, B2B must be able to provide a personalised delivery experience e.g. date and time selection during checkout.

10. External System Integration

B2B ecommerce typically requires complex integrations with existing Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), Warehouse Management, Fulfilment Systems and/or Manufacturing Systems. These external systems may be supporting many parts of the business and will likely be integral to supporting your ecommerce operations. Integrating data and business intelligence from these systems into your ecommerce platform at various touch points during the shopping journey will ensure a personalised experience for your business customers.

These integrations can share information one-way or two-way. The most common method is bi-directional data integration where the ERP will send frequent updates about the product catalogue and stock levels and customer specific pricing and promotions, and the B2B e-commerce site will send sales orders and customer data to the ERP.

There are two key questions you should ask your business

- What is the *single source of truth* for your information on customers, products, stock, and pricing?

- Where in the B2B ecommerce customer journey does your ecommerce platform need to communicate with your ERP in real time; such as the product listing page, details page, cart page, checkout page and so on.

Common external ERP's include SAP (Business, ECC), Microsoft Dynamics (Navision) all of which drive all data updates into your B2B ecommerce website.

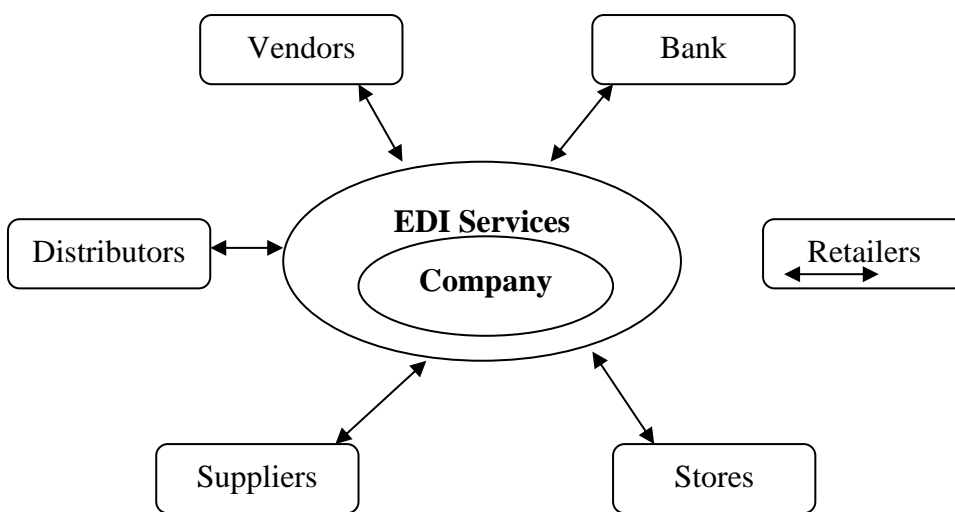**11. Cross-channel management**

B2B ecommerce websites may also need to be able to support MOTO orders (Mail Order/Telephone Order). If your business needs this feature ensure that the entire order, customer, product information flows into the ERP and/or customer management system. You'll need to identify any specific MOTO workflows and ensure that your customer services team can log in and make and process orders for your customers.

So this covers most of the major themes you'll need to consider before bringing your B2B business online. There are often plenty more business specific business rules to consider and a workshop driven requirements gathering process will seek out all those edge cases to help you decide what will be part of your ecommerce offering and what you'll want to save for those important face to face engagements.

Electronic Data Interchange

Electronic Data Interchange (EDI) is commonly defined as the direct computer-to-computer exchange of standard business forms. In simple terms EDI is paperless trading. EDI is the electronic movement of data between or within organizations in a structured, computer-retrievable data format that permits information to be transferred from a computer program in one location to a computer program in another location without rekeying. The exchange of business information takes place electronically between business partners, intermediaries, public authorities and others in a structured format, without any need for human interpretation. The key idea involved is the exchange of documents that allow a business application to take place without human intervention. The ability to send business documents between machines simplifies and expedites the business process itself. Many businesses choose EDI as a fast, inexpensive, and safe method of sending purchase orders, requests for quotations, invoices, payments, and other frequently used business documents. EDI includes the direct transmission of data between locations; transmission using an intermediary such as a communication network; and the exchange of computer tapes, disks, or other digital storage devices. In many cases, content-related error checking and some degree of processing of the information are also involved. EDI differs from electronic mail in that an actual transaction is transmitted electronically, rather than a simple message consisting primarily of text.

EDI is used for electronic funds transfer (EFT) between financial institutions facilitate common transactions as the direct deposit of payroll checks by employers, the direct debit of consumer accounts to make mortgage or utility payments, and the electronic payment of federal taxes by businesses. Another common application of EDI involves the direct exchange of standard business transaction documents such as purchase orders, invoices, and bills of lading from one business to another via computer. EDI is also used by retail businesses as part of their electronic scanning and point-of-sale (POS) inventory replenishment systems. Overall, EDI offers a number of benefits to businesses and recognition to the rapid evolution of the related technology is becoming more readily available to small businesses all the time.

Figure 4.5: EDI between Company and its Trading Partners

The term EDI has evolved from placing EDI under the e-commerce umbrella, EC being the broad view of electronic trading. EDI is defined as the inter process (computer application to computer application) communication of business information in a standardized electronic form. E-commerce includes EDI, but recognizes the need for interpersonal (human to human) communications, the transfer of moneys, and the sharing of common databases as additional activities that aid in the efficient conduct of business. By incorporating a wide range of technologies, e-commerce is much broader than EDI. However, the focus of this document is on EDI, not e-commerce.

An EDI document is the electronic equivalent of a paper document such as a purchase order or invoice. Standards govern how EDI documents are structured, and define the rules for their use. North American companies follow the X.12 standard, while other parts of the world

follow the EDIFACT standard. The X.12 standard is made up of hundreds of documents called 'Transaction Sets'. Transaction sets are made up of 'Data Segments' and 'Data Elements', of which there are hundreds, and thousands respectively, in the standards dictionary. By putting various combinations of data segments and data elements together in a structures format, you end up with a transaction set that has meaning.

Historical Background of EDI

For several hundred years, commerce has been based upon the movement of written documents. These documents contained the information that one company needed to convey to another company in order to do business. Over a period of time the documents started to take on standard names such as Invoice, Credit Note and Order. However, the documents were certainly not of any standard layout. They did not need to be because the recipient was always a human being and humans have the ability to read, interpret and rationalise. About all that could be said of an invoice document, for example, was that it would contain header information about the parties involved, detail lines about the products, quantities and prices, and finally some totalling information.

In the early 1950s, computers started to be used by large companies for their accounting and payroll needs. Various forms of electronic file exchange have been using since the 1960s in the mid 1980s, what's now known as Electronic Data Interchange (EDI) was first introduced. It formalized the process of exchanging files in a structured and standard format. Overtime, EDI has evolved to include a broader range of technologies under the umbrella of Electronic Commerce (EC).

EDI is used to some degree in nearly every industry. It has become widely adopted because it offers companies the ability to become more efficient and productive, and thereby more competitive. EDI gained wide acceptance during the 1990s, backed by strong mandates from the retail, manufacturing and transportation industries. Some industries have forced EDI compliance on their trading partners, while others are more casual about adopting the technology. Today's global economy is putting more pressure on everyone to bring their costs down, and EDI is one way to reduce those costs. While EDI is the backbone of EC technology, it is by no means the only technology available for increasing productivity.

EDI throughout the decades		
Pre 1980s	-	Exchanging files electronically only realistic for large companies
Mid 1980s	-	PC technology makes EDI possible for any sized company
Early 1990s	-	EDI or DIE
Late 1990s	-	The internet changes everything
Early 2000s	-	EDI thrives once again
Today	-	Still more to come

Pre-1980s – Before there was EDI

Prior to the mid-1980s, electronic computer file exchange was realistic only for large companies with mainframe computers and knowledgeable IT staff. It only made economic sense to exchange files electronically if you had large trading partners with high volumes of data. Data-transmission lines were expensive, which made reel-to-reel tapes the most practical medium. The structure of the files being exchanged was determined by one or both parties, with no standards as a guide.

For all other companies who did not have the computing power, expertise, or resources to exchange files electronically, paper was the only option for conducting business.

Mid-1980s – EDI attracts attention

The first EDI standards emerged in the early 1980s. The advent of the personal computer (PC) made EDI a possibility for companies of any size. The first EDI translation software vendors and Value Added Networks (VAN) began offering services to help large companies bring their smaller suppliers onto EDI. It seems trivial today, but using a PC, modem, EDI translation software and an electronic mailbox instead of paper was a drastic step. The startup cost for suppliers easily reached $10000 or more. Most ended up doing 'rip and read' EDI, which entailed receiving a document electronically, printing it on paper, and re-keying it into their business application. To send a document back to a customer, the data would then be keyed into the EDI translation software. This process turned EDI into a glorified fax machine, and integrating EDI into a company's business application was the furthest thing from anyone's mind.

Early to mid-1990s – EDI or DIE

Various industries, especially retail, continued to drive the adoption of EDI. Retailers were hungry for more and their suppliers reluctantly complied. The phrase "EDI or DIE" was coined as a warning for companies to adopt EDI technology or face the consequences of losing customers and falling behind their competitors.

Large companies who had integrated EDI with their business applications from the outset were growing weary of the 'rip and read' habits of smaller companies. As the number of transactions made by small companies increased, thoughts of integrating EDI surfaced, and new vendors offering software and services began to emerge.

Late 1990s – The internet changes everything

EDI was no longer views as the only technology for doing business electronically. It had become not good to some, and was perceived as overly complicated and costly for small companies. The internet and the dot-com era spawned hundreds of new companies that were developing revolutionary applications for the internet, some of which were going to replace 'old' technologies like EDI with XML. These applications were touted as drastically changing the way companies would do business.

The reality was that the companies who invested heavily in EDI were not about to throw away their investment and start all over again because of XML. Instead, new options including XML-emerged from the internet, and made it possible for companies to achieve 100 percent adoption of e-commerce with their trading partners. Files could be transported through the internet, and web forms were an economic alternative available to small companies.

Two significant developments in the late 1990 were:

- The realization that integrating EDI into business applications was a necessity

- The development of HIPAA EDI standards

Large customers in the retail industry started imposing fines on their suppliers who made rekeying or other errors in their EDI data. This affected the profit margins of suppliers, and one way to reduce errors was to integrate EDI.

The Health Insurance Portability and Accountability Act (HIPAA) of 1996 resulted in a set of EDI transactions being developed for the large healthcare industry. This had a significant impact on the adoption of EDI in healthcare.

Early 2000s – EDI thrives once again

EDI survived the dot-com crash, and showed no signs of going away anytime soon. The internet helped take EDI to a new level, much as the PC did in the 1980s. Initiatives such as web EDI, EDI-INT and integrating EDI made significant gains. The developers of the most popular business applications also recognised the importance of allowing EDI and other data formats to be integrated with their products.

A new service that developed during this time was EDI outsourcing. Some companies had become increasingly frustrated with EDI because they were always playing catch-up with new developments and demands from their trading partners. Costs were escalating, as a result, EDI outsourcing grew in popularity. Companies preferred to pay someone else to deal with their EDI headaches.

Today – still more to come

The electronic commerce/ Electronic Data Interchange technology developments of the past two decades have made it possible to conduct business in ways that couldn't have been imagined prior to the 1980s. The internet had the greatest impact, making it possible for a company for any size to do business anywhere in the world. With the number of technology options available, there is no reason why any company, large or small, cannot use e-commerce EDI technology in their business. In fact, it has become mandatory if a business is going to survive.

Paperless Trading and EDI

EDI differs from electronic mail because it transmits an actual structured transaction in contrast to an unstructured text message such as a letter. By minimizing the amount of time used in the inventory, it also helps in minimizing the costs. In the case of working with EDI, physical movements of paper are avoided and time per each movement can be reduced since all these activities are computer to computer exchange.

EDI is most commonly applied in the Execution and settlement phases of the trade cycle. In the execution of a simple trade exchange, the customer's order can be sent by EDI and the delivery notification from the supplier can also be electronic. For settlement the supplier can use EDI to send the invoice and the customer can finish the cycle with an electronic funds transfer via the bank and an EDI payment notification to the supplier.

EDI can be used for Pre-Sales transaction; there have been EDI messages developed for transactions such as contract. EDI can also be used for after-sales transactions but only if they were in a standardized format and frequent enough to justify the system costs; transactions such as a dealer claiming payment for warrantee work could be a possible.

Organisations can most benefit from EDI when they integrate the data supplied by EDI with applications such as accounts payable, inventory control, shipping and production planning. For proper working of EDI model, there are four key requirements:

- Transaction formats and data should be standardized
- Special software should be developed for converting the messages into a form suitable to other companies.
- There should be value added network with mail box facilities among the companies following the EDI. It would allow the message to be sent, sorted and held until they are needed by the receiving computer.
- Certain transaction would still require the writing in hard copy form. This may be due to legal requirement.

Company uses EDI to automate price, shipping, receiving and payment transactions with its customers as an example. Price updates and shipping notices are entered by the appropriate departments directly into company's computer system, which then transmit to the customer's computer systems. Similarly customer's material releases, receiving reports and payment data are also transmitted directly through the computer systems back to the company. EDI has replaced paper for these transactions.

Difference between EDI and E-mail: The relationship between EDI and e-mail can be ambiguous as e-mail systems become very sophisticated and incorporate more and more form based features.

EDI	E-Mail
• EDI is used for computer-to-computer transmission without human intervention.	• E-mail is meant to be read by the person and is addressed to the person.
• EDI converts companies' data into an agreed format through access in a set of protocol type.	• It encompasses many different message types relating to all sorts of business transactions and there are many different versions of the messages
• Digital certificate for verification is required in EDI services. Therefore EDI services prevent bulk mails and virus data which occur in e-mail delivery.	• This is a United Nations sanctioned file format.

Benefits of EDI

Reduces lead time

In the EDI environment, the exchange of documents among trading partners happens electronically through interconnected computers the process of transferring the documents or information is instantaneous, offering weeks of time savings compared to the traditional environment that used postal/courier based exchange of printed documents. Also, the direct electronic transfer of documents between inter-organisational systems eliminates the chances of error due to re-entry of data printed on paper from one system to another system. As it streamlines the information flow, the cycle time is reduced drastically. In the EDI environment, order-processing, shipping of goods, and invoice-preparation and transmission can all be done within a matter of a few hours compared to the days or weeks it takes in a non-EDI environment.

Improves coordination with suppliers

Traditional trading environments are often burdened with the problem of mismatched invoices, un-matching terms in quotations and purchase orders, missing invoices even after the bill for payment is received and many similar inter-business problems. On careful examination, it will be evident that much of these problems are caused either by delays in the transmission if printed documents, loss of documents in transition, or due to errors in the transcription of the printed information into electronic form. The instantaneous transfer of business documents over the internet in electronic form and confirmation of the same addresses the first problem,

thereby making nearly impossible for documents to arrive in wrong sequence. Also, the need to re-enter the same data is not there and, as a result, transcription errors are totally eliminated.

Reduces redundancy

As all the documents exchanged between trading partners are stored in an electronic mailbox, documents can be accessed, retrieved and examined at any point of time. Either trading partner can access, examine, and make a copy of the document from the electronic box instantly. Contrast it with the non-EDI system; it may take hours, or even days, to locate and retrieve a printed business document from the past. Many a time, trading partners file copies of the same document at multiple places. The EDI environment eliminates the need for multiple copies and reduces redundancy without compromising the accessibility and retrieval of old documents.

Expand the market reach

Most large manufacturers like General Motors deal with Edi enabled suppliers only. In the process of streamlining the purchase process they often institute a value-added network. By being part of their value added network, many opportunities open up for supplying the material to some other large suppliers who are also a part of the network. Also, with the growth of electronic commerce and further integration of EDI with electronic commerce, the creation of an electronic marketplace by large manufacturers who buy supplies from many large and small suppliers, has become a reality. By, participating in this large market place you are likely to pick many orders from other suppliers who are a part of the market or place or network. The General Electric initiated Trade Process Network (tpn.com) is a prime example of such a marketplace.

Increases Revenue and Sales

Many large organisations use EDI and trade with other EDI-enabled suppliers. The efficiency brought about by EDI reduces the total transaction friction by eliminating paperwork and related errors that ensue. It also leads to quicker settlement of accounts. The reduced transaction friction saves money and the supplier is in a better position to offer the items at cheaper costs, leading to improved revenue realizations and sales.
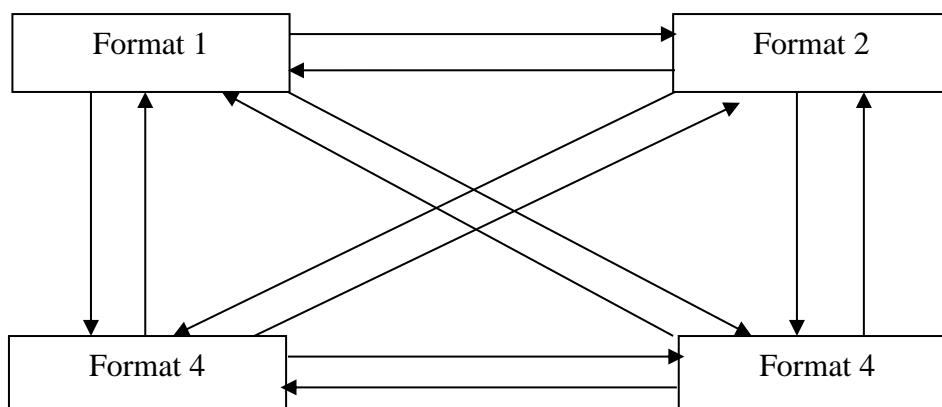
EDI Architecture: The architecture of EDI system consists of four layers namely application conversion layer, standards translation layer, data transport layer and the physical network infrastructure layer.

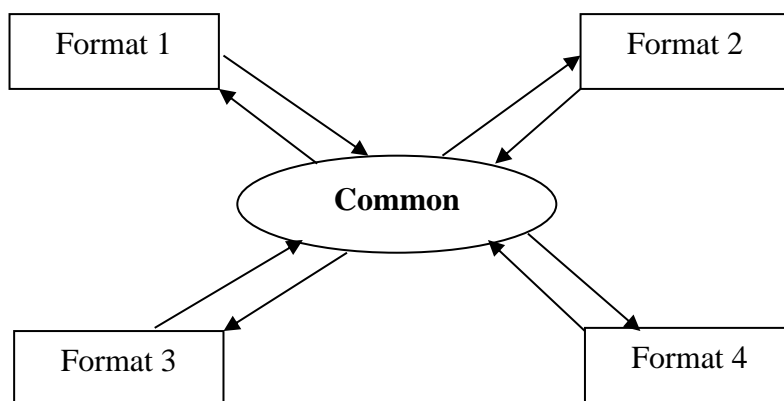| |
|---|
| **Application Conversion Layer** |
| **Standards translation Layer**
EDIFACT or ANSI X12 |
| **Data Transport Layer**
Email, FTP, Telnet, HTTP, X.435 (MIME) |
| **Physical Network Infrastructure**
Dial-up lines, internet, I-way and WAN |

Layered Architecture of EDI system

1. Application Conversion Layer

The first layer of EDI defines the business applications that are used by EDI. This layer consists of the actual business applications that are going to be connected through the EDI systems for exchange of electronic information. These applications may use their own electronic record format and document formats for storing, receiving, and processing the information within each company's systems. Since each company's system may have its own proprietary format, which would be used by their systems, for EDI to operate, they need to convert the internal company document format to a format that can be understood by the system used by the trading partner. When the trading partners are small in number, converters for various partner formats can be built. But as the number of partners with different internal formats increase, the task of building converters for each proprietary format to other formats becomes overwhelming.

Figure 4.6: Converters between formats

The above figure shows a number of converters for four trading partners with four different proprietary message formats. In case a need arises to handle a new proprietary format for an additional partner, four new format conversion programs have to be built. Thus, the approach is markedly unsuitable for the general purpose EDI system. The problem of heterogeneity of formats can be better addressed cuing a common standard format for documents or messages transferred within the EDI system. The internal processing systems continue to use the proprietary formats, but for transmission over wire, they adopt a common document or message format to the proprietary message format used by a system, and vice-versa. The approach greatly simplifies the problem posed by heterogeneity of proprietary message formats, as depicted in fig.4.6. Operational EDI systems follow the second approach, in which all the documents that need to be transmitted to the other systems are translated into the standard format. The receiving systems accept the input in the standard format and convert it into the native format used internally by the local system.

Figure 4.7: Common Formats Approach

It describes the business application that is driving EDI. For a procurement application, this translates into requests for quotes, price quotes, purchases orders, acknowledgements & involves.

The information seen at this layer must be translated from a company specific from to a more generic form so that it can be send to various trading partners, who could be using a variety of software applications at this end.

When a trading partner sends a document, the EDI translation software converts the proprietary format into a standard mutually agreed on by the processing system. When a company receivers the document, their EDI translation software automatically changes the

standard format into proprietary format of their document processing software so that company can manipulate the information in whatever way it chooses to.

2. Standard transaction layer

This application layer of EDI systems rely on common agreed formats for operation. Thus, the second important and critical building block of the EDI system is standards for business documents/forms. Since, the sender and receiver in the EDI systems have to exchange business documents that can be interpreted by all parties; it has necessitated the development of form standards in EDI. EDI form standards are basically data standards in that they lay down the syntax and semantics of the data being exchanged. Some of the early and dominant adopters of EDI, like the transport industry in US, took the lead in developing these standards. The large retailers also saw the benefits of adopting EDI and went on to develop unique standards suited to their individual requirements.

The grocery industry sector created the Uniform Communication Standard (UCS) for addressing the EDI standards requirement for their segment, which were later adopted by many other retail sectors. Many independent or industry specific efforts resulted in a plethora of standards devised to address the requirements of each industry segment. It became obvious that the proliferation of so many standards is not going to be beneficial for the overall EDI community, as a large number of businesses may eventually have to operate across various industry segments. The need for an industry-wide EDI standard was widely felt and this lead to the formation of a standard committee X12 under the auspices of American National Standards Institute (ANSI).

Document Standards

The cross industry standardization of documents is at the core smooth functioning of EDI systems. The interconnection among trading partners only serves the purposing of exchanging information, but a document exchanged between tow trading partners needs to be recognized and interpreted correctly by the corresponding software systems running at various partners' computers.

For instance, a purchase order needs to identify by all the EDI application running on trading partners' computers being a purchase order from a particular organisation. Over a period of

time, tow major EDI standards have evolved. The first, commonly known as X12, was developed by the Accredited standards X12 committee of American National Standards Institute (ANSI) and the second, the international standard, was developed by the United Nations EDI for Administration, Commerce and Trade (EDIFACT).

ANSI X1: The Accredited Standards Committee (ASC) X12 was set up by the American National Standards Institute (ANSI) in 1979 to develop cross-industry standards for exchanging electronic documents for use by all businesses in the United States. The committee developed ANSI ASCX12, commonly referred to as the X12 standard. Today, EDI standards are firm but not static, because the development of EDI is a continuing effort. Specific industry groups are continuing to evolve new transaction sets that may be better suited to standardization. The X12 standard sets the framework and rules for electronic data interchange. It describes the format for structuring the data, the types of documents that should be transmitted electronically, and the content of each document. The identification numbers for various forms, codes for a variety of fields, and types of information is also defined in the standard. The standard also defines the sequence of information flow.

The X12 devised the standards to deal with transactions such as purchase order placement, order processing, shipping, invoicing, and payments, to name a few. In the X12 standard, paper documents related to particular business activities are mapped into a transaction set. It assigns a numeric code to each of these transaction sets, in a manner very similar to the numbering of business forms followed at many organisations.

EDIFACT an international standard

In 1987, the United Nations announced an international standard called EDI for Administration, Commerce and Transport (EDIFACT). The EDIFACT standard is promoted by the United Nations Economic Commission, which is responsible for the adoption and standardization of messages. The International Standards Organisation (ISO) has been entrusted with the responsibility of developing the syntax and data dictionary for EDIFACT. EDIFACT serves the purpose of trans-border standardization of EDI messages. EDIFACT combines the efforts of American National Standards Institute's ASC X12, Trade Data Interchange (TDI) standards deployed by much of Europe and United Kingdom.

The GE.1 group of UNECE/EDIFAC deals with data element and rules and formats for automated data exchange. The GE.1 group also coordinates the six EDIFACT boards setup for Western Europe, Eastern Europe, Pan America, Australia/New Zealand, Asia and Africa. The Asia EDIFACT board (AEB) consists of members like India, Japan, Korea, Hong Kong, China, Singapore, Taiwan and Malaysia. The basic unit of communication among EDI trading partners, defined by EDIFACT, is an interchange.

3. Data Transport Layer

The data transport layer consists of services that automate the task of electronic transfer messages. In a typical purchase process, once a purchase order has been prepared and printed in the standard format, it is placed in an envelope and dispatched through postal or courier services to the supplier. The content and structure of the purchase order is defined in the standards layer and is separate from the transport /carrier mechanism. The layer utilizes any of the available network transport services such as electronic mail, file transfer protocol; telnet based remote connection and transfer or even the Hypertext Transfer Protocol (HTTP) that drives the World Wide Web.

Electronic mail has emerged as the dominant means for transporting EDI messages. EDI documents or messages are exchanged through the network infrastructure as electronic mail messages. Electronic mail is used only as a carrier for transporting formatted EDI messages by the EDI Document Transport Layer. The structured message delivered by the electronic mail, is interpreted by the receiving software, which is capable of comprehending the structure of EDI standard information. ITU-T has adopted X.435 (X.400-based) standards to support electronic data interchange messaging. Unlike the normal electronic mail message transfers, EDI messages are used for business transactions and security acquires paramount importance. The integrity of the message ensuring that the message has not been tampered with, intentionally or inadvertently, during the transit and the non-repudiation-ensuring that neither party can deny sending the EDI business form once it has been sent or received have to be in-built in the transport standards, structure and processes.

In order to achieve the equivalence of the security control offered by paper-based systems, X.435 has three types of notifications.

A positive notification:

It indicates that the recipient has received the document and accepts the responsibility for it.
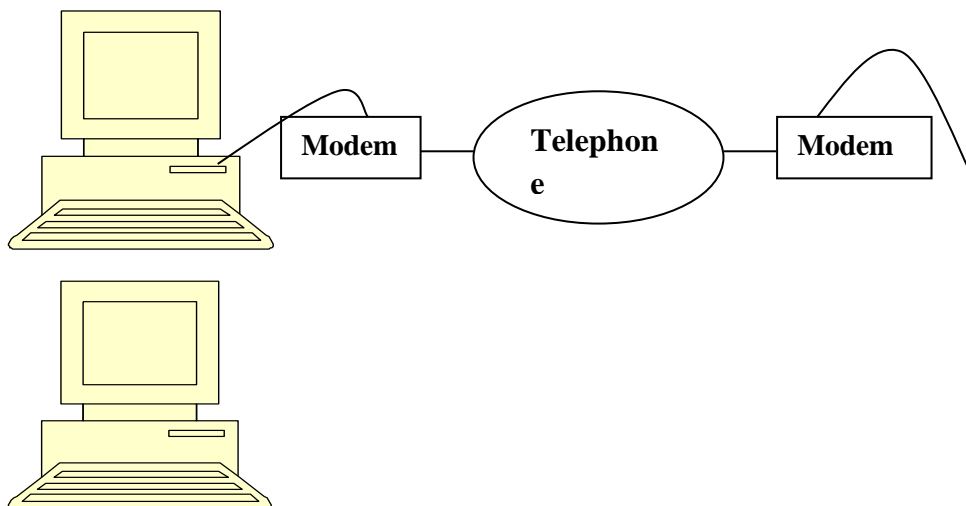
A negative notification:

It indicates that recipient received but refused to accept the document. The reason for refusal is attached with the notification.

A forwarding notification:

It indicates that the document was received, and forwarded to another recipient.

4. Physical Network Infrastructure Layer:

This interconnection layer refers to the network infrastructure that is used for the exchange of information between trading partners. In the simplest and most basic form it may consist of dial-up lines, where trading partners dial-up through modems to each other and connect to exchanges, as illustrated in the following figure

Figure 4.8: Dial-up interconnection

In case of the direct dial-up connections, partner computers have to be available for online connectivity and ready to receive the data at all times. Additionally, direct connections between partners have further problems as each partner has to establish a number of direct connections with all the partners. Also, from each partner a variety of messages may originate, intended for other partners and of no relevance to a specific partner. Thus, in practice, the partner to partner connection is rarely a direct one. Leased lines and I-way, internet or any reliable network infrastructure that can provide interconnection can be used. Through interconnection, EDI partners are able to achieve document exchange between them.

EDI in Action

The idea behind EDI is very simple. EDI seeks to take manually prepared form or a form from a business application, translate that into a standard electronic format, and transmit it. At the receiving end, the standard format is 'understand' into a format that can be read by the recipient application. Hence output from one application becomes input to another through the computer-to-computer exchange of information. The result is an elimination of the delays and the errors inherent in paper-based transactions.
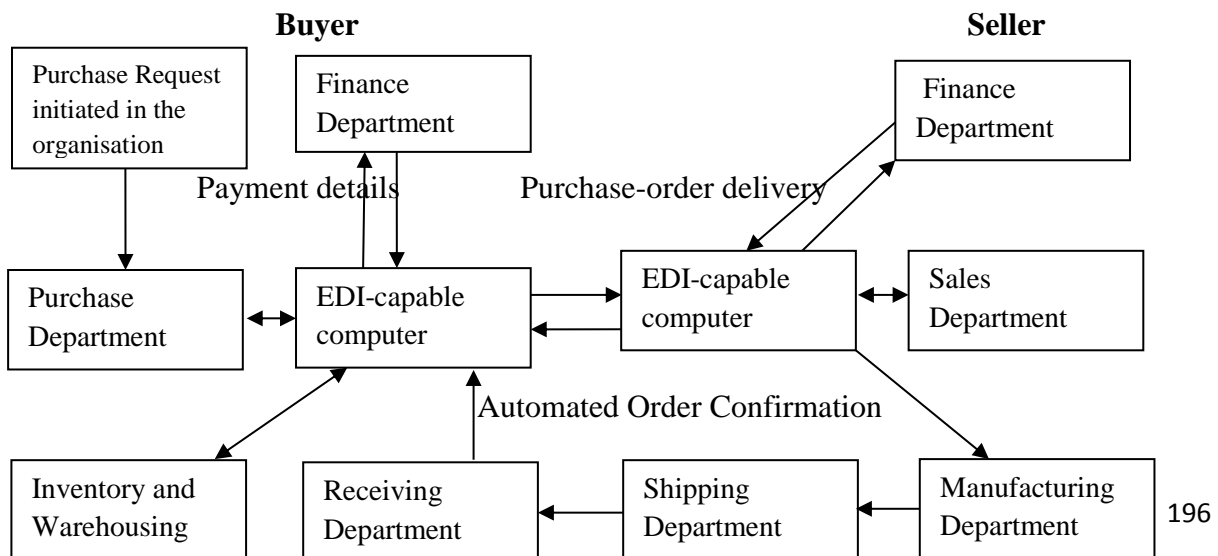
Benefits of EDI can be seen by comparing the flow of information between organisations before and after its implementation. For this purpose the purchasing application provides an ideal scenario. In general, EDI has been used extensively in the procurement function to streamline the interaction between the buyer and seller. Other uses for EDI are also prevalent. Universities use EDI to exchange transcripts quickly. Auto manufacturers use EDI to transmit large, complex engineering designs created on specialised computers. Large multinational companies' uses EDI to send online price catalogues to customers listing product, price and terms. EDI facilitates businesses can compare prices and terms and make direct orders by EDI.

Figure 4.9: Information Flow without EDI

The pervasive practice of converting digital data into hard copy data that is reconverted into electronic information again on the receiving end generates unnecessary costs. It is quite possible to exchange the information in its electronic format means of other carriers. Such carriers include magnetic tapes and diskette and, more recently, the EDI third-party services. The use of EDI carriers saves substantial administration costs by eliminating the bulk of circulating paper work. Furthermore, the accessibility of the information is improved manifold, which enables a more efficient audit of the operations.

EDI can substantially automate information flow and facilitate management of the business process, as illustrated in the following figure.

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Product Delivery

Figure 4.10: Information Flow with EDI

The EDI transactions for a purchase, shipment and corresponding payment are as follows:

Step 1: buyer's computer sends *Purchase Order* to seller's computer

Step 2: seller's computer sends Purchase order Confirmation to buyer's computer

Step 3: seller's computer sends Booking Request to transport company's computer

Step 4: Transport Company's computer sends Booking Confirmation to seller's computer

Step 5: seller's computer sends Advance Ship Notice to buyer's computer

Step 6: Transport company's computer sends Status to seller's computer

Step 7: buyer's computer sends Receipt Advice to seller's computer

Step 8: seller's computer sends Invoice to buyer's computer

Step 9: buyer's computer sends Payment to seller's computer

The purchase order confirmation is the seller's acceptance of the price terms of sale. Note that the various internal departments are aggregated and called buyer and seller to simplify the description. All the interactions occur through EDI forms and in most cases are generated automatically by the computer.

In sum, firms are adopting EDI as a fast, inexpensive, and safe method of sending invoices, purchase orders, customs documents, shipping notices, and other frequently used business documents. Hence EDI as a strategic tool that enhance the competitiveness of the companies involved. The improved ability to exchange huge amounts of data in a fast and effective manner tends to speedup business processes. Furthermore, these processes can be closely monitored, providing the companies with the ability to trace, manage and audit the operations. Such flexibility allows firms to adopt business techniques aimed at removing the bottlenecks and making the business processes more efficient.

EDI Standards

Standards are a necessary part of EDI. Every business has application files that are used to manipulate their data in ways that are familiar to the business. All software, hardware and networks must work together so that information flows from one source to another. The problem is that most businesses, though using the same types of data, do not use the same application programs or hardware and software platforms. If businesses are to be able to communicate their data to one another, they must have a common ground to meet on to allow the exchange of the information. Standards are the solutions to this problem. All business that conforms to specific standards can share data in the formats delineated by those standards. The results has been slow deployment and restricted implementation of EDI between companies.

The advantages of standardization are numerous. One field that has benefited immensely from standardization is the electronics industry. In the 1960s and 1970s electronic components were designed without concern of compatibility. This created a lot of confusion and spurred the Institute of Electrical and Electronics Engineers (IEEE) to issue guideline standards for capacitors, resistors, power supplies and all other components. As components became substitutable, production boomed, competition increased and price deflated. Likewise, standardization is expected to promote 'interoperability' between EDI implementations.

Two major EDI standards exist: the American National Standards Institute (ANSI) X.12 committee and the United Nations EDI for Administration, Commerce and Trade (EDIFACT) standards for international usage.

ANSI ASC X12

The American National Standards Institute (ANSI) chartered the Accredited Standards Committee (ASC) in 1979 to research and develops standards for business documents. The X.12 committee develops standards to facilitate EDI relating to such business transactions as order payment and processing, shipping and receiving, invoicing, payment, and cash application processing for products and services. One of the requirements placed on the committee was and is to keep the standard open to inter-industry applications. This requirement makes the standard more complex than an industry-specific standard, but the advantages easily overcome the disadvantage of complexity. The X.12 transaction sets generally map a traditional paper document to an electronic format that can move easily over
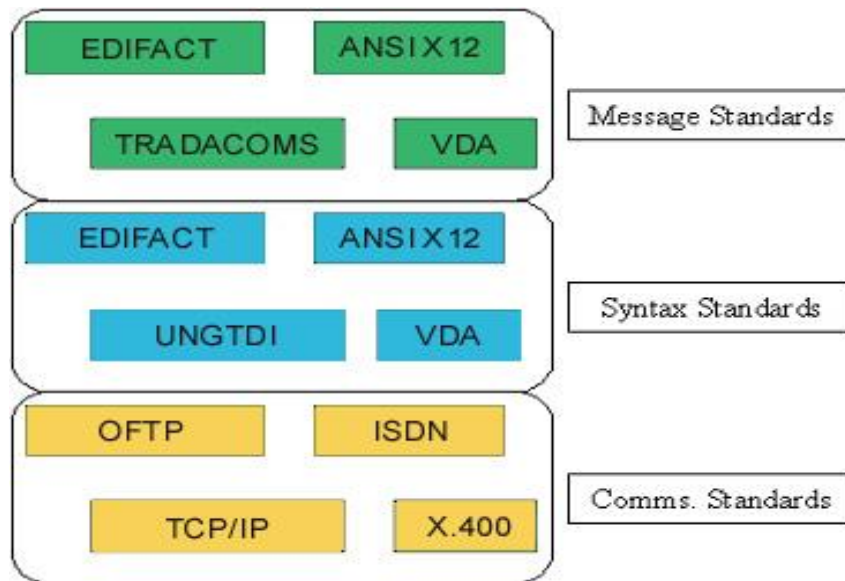
telecommunication networks. Each transaction format includes many data segments needed for the business function as well as instructive information to ensure that the telecommunication system routes the data correctly. Examples of ANSI ASC X.12 transactions include vendor registration, request for quotation, response to request for quotation, purchase order or delivery order, purchase order acknowledgement and functional acknowledgement. These X.12 transactions are transmitted to the trading partner (TP) through either the X400 e-mail protocol, or the multipurpose internet mail extensions (MIME) protocols.

EDIFACT

The International Standards Organization (ISO), an organization within the United Nations, has developed the EDI standard that is used in Europe. The Electronic Document Interchange for Administration, Commerce, and Transportation (EDIFACT) is the UN standard that the whole world has agreed to eventually adopt. The actual implementation of EDIFACT within the U.S. has been moving at a snail's pace. The standard appears to currently be taking the same route that metric standards have taken. Everyone agrees that EDIFACT is the international standard, but tried and true X12 standards are not abandoned in favor of EDIFACT.

The EDI Model

There are three logical levels or "layers" of standards required to achieve EDI information transfer, each layer having its own controlling standards organisations (although some organisations may define more than one layer). This structured approach to EDI allows for the maximum flexibility and also enables future developments in technology and standards to be easily incorporated.

Figure 4.11: EDI Model

From the lowest layer upward, these three layers are:

• The Communications Standards - Defining just how the data is to be transferred from the sender to the receiver.

• The Syntax Standards - Defining what overall standards format the EDI file will be in.

• The Message Standards - Defining exactly what the message is and what information is to be placed where within this message.

These standards are going to be further described in the following sections but it is important to remember that whatever standards are used within each layer, the layering process is required to allow flexibility. For example not all users will wish to use a specific communication protocol; some may even wish to copy the data onto a floppy disk and send it in the post! So the communications level is now a floppy disk but the higher levels still remain.

This principle of multiple methods of achieving the same goal is found over and over again within the EDI regime. It is not an attempt at duplication but is designed to give users the best possible solution and flexibility in all cases.

The Communications Standards are described in a section of their own.

VDA Standard

It should be noted that VDA messages are treated as non-EDI files by most members of the ODEX family. This is because VDA messages are not true EDI messages. VDA stands for Verband der Automobile industries (Motor Industry Association). The VDA is a German automotive standards body which issues the VDA standard documents. VDA messages are not strictly EDI messages as they are simply flat files. Instead of using special characters to divide each segment from the next and each data element from the next, a VDA message consists of fixed length records within which each data element (field) is allowed to take up a specific number of characters. If any item of data is omitted, its absence must be shown by a space the same length as the omitted item of data.

Furthermore, VDA messages do not contain service segments, so there is no concept of interchange or group. However, the first record in a VDA message does contain addressing information of a kind and can therefore be used by an intelligent program such as ODEX Enterprise or DARWIN for routing purposes.

There are enough similarities between VDA messages and true EDI messages to allow VDA messages to be treated by some programs as EDI. VDA messages have a hierarchical structure, meaning that records within a message must adhere to certain rules about the position in which they may appear. VDA records, like EDI segments, also have attributes such as a name, a maximum number of times they may occur and whether their occurrence is mandatory or conditional.

Owing to the differences that exist between the VDA standard and real EDI standards, VDA messages are usually treated as non-EDI files. However, ODEX Enterprise and DARWIN 3 have been programmed to recognise VDA messages and to treat them as if they were real EDI messages.

Syntax Standards

The middle level in our three layer EDI model is the Syntax Standard to be used. Taking the analogy of a telephone call, it is no use if the call is connected but the remote party does not speak the same language as the caller; a few minutes will be lost whilst each side tries to understand the other but no meaningful information may be exchanged.

To avoid this problem, three main syntax standards are used for EDI. These are the American ANSI X12 standard, the European EDIFACT standard and an older European standard still very popular in some sectors such as the retail industry, UNGTDI (United Nations Guidelines for Trade Data Interchange). There is also the VDA syntax standard, used in Germany. Although not strictly EDI, VDA messages have been included under the EDI umbrella.

With the exception of VDA, no matter what standard is used, the same EDI terms and concepts apply. Let us now look at these terms and what they mean in more detail.

An EDI "Message" may be split up into a number of logical units. The message is itself a single document such as an invoice or an order, and is made up of a number of "Segments". Each segment contains complete information about a part of the document. For example two segments that will be required in an invoice message are the buyer's and seller's details. Segments can themselves be split down into "Data Elements". Data elements hold the actual information. Simple data elements hold only one item of information, such as a name or a value. Composite data elements hold one or more "Sub-Elements" of closely associated information such as the lines of an address.

EDI messages between two trading partners may be grouped together into an "interchange". The interchange may contain messages of varying types, the only common factor being the sending and receiving parties. All EDI files must contain at least one interchange; this ensures that the interchange can be routed to the correct destination.

Messages of the same type can be held together in a "group". The functional group is not a very widely used vehicle, most partners considering that as the interchange is the main routing method and may contain many messages, then the group is somewhat superfluous. Different standards call the group different names. The group itself is an EDIFACT term, UNGTDI standards know it as a "batch" and ANSI X12 standards as a "document". ANSI X12 also calls the message a "transaction".

Message Standards

In our telephone analogy, our telephone callers may exchange information because both parties are speaking the same language and understand the protocols that they must use, but

unfortunately the remote party still does not understand the information that the caller is giving because they are from different industries and each industry has its own jargon and sequence or layout of information. To get over this problem the final layer of the EDI model was developed, in which both trade-specific and general document standards are defined by the controlling organisations.

It should be mentioned at the outset that the message standards are subject to different interpretations and even misuse by some trading partners, so it is vital to get agreements between partners not only about the message standards used but also about the exact meaning and contents of information, before EDI interchanges are exchanged. Many large organisations publish their own implementation manuals for the standards that they wish to use. Even though these standards are based upon an industry standard message, there may well be minor differences in layout and format.

The EDIFACT message standard is the most widely used in Europe. EDIFACT is a general-use standard not linked to any particular industry and is controlled by the EDIFACT board closely associated with both the EAN numbering associations and the United Nations. For the automotive industry there is ODETTE (Organisation for Data Exchange by Tele-Transmission in Europe) and VDA (Verband der Automobilindustrie). ODETTE have historically had their own standards but have, since 2000, adopted the EDIFACT standards. The VDA standard is not a true EDI standard but does have many similarities. Many other industry specific organisations exist, such as CEFIC for the chemical industry and TRADACOM for the retail industry.

So what is a message standard? From the introductory section you will have learned about the need to code a paper document's information into electronic form. In the previous sections we have looked at ways of moving data electronically and ways of getting a computer to understand the format (syntax) of a file by splitting it up into messages, segments and data elements. Now all that is left is to define exactly what item of information is going to be contained in which segment, element, etc. That is the purpose of the message standards.

Each message standard is firstly defined by a structure diagram detailing the segments and where they occur. Each segment on the structure diagram is defined as having a number of attributes. These are a name, a maximum number of occurrences and a mandatory or conditional status. The segment is drawn on the diagram as shown below.

Here we see a NAD segment (NAD segments are used by EDIFACT to define Names and Addresses) where the segment name is held in the top section of the diagram. The segment is Mandatory (M) meaning that it must occur at least once in the message. The alternative to mandatory is Conditional (C) meaning that it need not occur if there is no information to be held in it. The segment is repeating (R) which means that it may occur more than once. An invoice, for example, may have more than one item line on it. Alternatives to this are the number 1 for a segment that may only occur once, or a number defining the maximum number of times that the segment may occur.

Message Structure

Many of these segment diagrams are combined together to form a message structure diagram. The message structure is hierarchic, meaning that segments may appear at a number of different levels and some segments will act as "parents" and "children" to others to define more complex pieces of information. To take a simple example, an item of goods appearing on a document, an invoice or order perhaps, would have a basic description held in a parent segment and then be further defined by child segments under the parent which describe its dimensions, its cost, its markings and many other attributes. These child segments may themselves be parents to more detailed segments, for example the segment holding the price may have date information segments under it as the price changes with time.

VALUE-ADDED NETWORKS

A VAN is a communications network that typically exchanges EDI messages among trading partners. It also provides other services, including holding messages in 'electronic mailboxes', interfacing with other VANs, and supporting many telecommunications modes and transfer protocols. A VAN's 'electronic mailbox' is a software feature into which a user deposits EDI transactions and then retrieves those, message when convenient. It works much like residential personal mailboxes, and it allows everybody involved to be flexible and cost-effective.

Businesses can exchange data either by connecting to each other directly or by hooking into a VAN. Traditionally, by acting as middleman between companies, VANs have allowed companies to automatically and securely exchange purchase orders, invoices and payments. When a company sends an Edi transaction, it arrives at a message storehouse on the VAN to

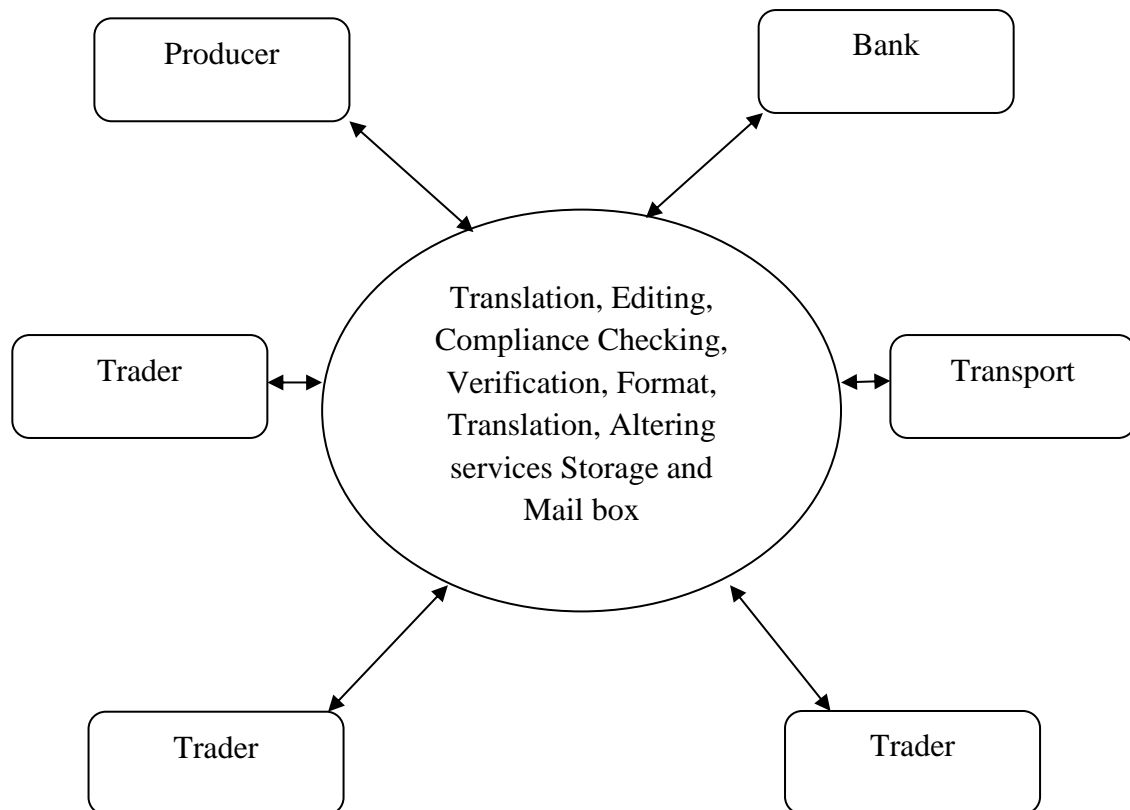await pickup by the destination company. In this way VANs can safeguard the transaction network.

Over the years, a common and convenient method for conducting EDI has emerged form of Value Added Network or VAN. Issues related to connectivity and common services such as continuous presence for retrieving and sending documents often implemented through mailboxes, protocol conversion, implementation assistance, security and auditing are handled by the value added network provider. Thus, all trading partners are expected to use a modem to dial into the VAN and enjoy the services of EDI.

In other words, value added networks are the third-party communication networks established for exchanging EDI traffic amongst partners. Various businesses (trading partners) subscribe to VAN services. For every subscriber, the VAN maintains an account, which serves as an electronic post box for the subscriber, for sending and receiving EDI messages. The subscriber's account receives and accumulates all incoming mail from other partners, which can be viewed by the account owner as and when they connect to the VAN account. There are a number of third-party value added network provides in the marketplace. Many VANs today also offer document exchange ability of EDI documents with other VANs.

Typically, a company subscribes to a VAN for smooth provision of network services and to facilitate EDI. These services include: EDI translation, encryption, secure e-mail, management reporting, and other extra services for their customers.

The typical services provided by VANs are as follows:

1. Document conversion form one standard to another; typically required when two trading partners use different standards for EDI exchanges, i.e. ANSI ASC X12 to EDIFACT or TDCC to ANSI ASC X12.

Figure 4.12: Value Added Network (VAN)

2. Converting one ANSI ASC X12 document to another ANSI ASC X12 documents when the documents may need to be converted to another type within the same system. For instance, a motor carrier details and invoice (210) document may need to be converted to a generic freight invoice (859).

3. The sender may follow certain conventions that are different from the receiver. VANs can also provide translation from a sender's conventions of a standard document to the receiver's conventions; i.e.

   - Translate field separators
   - Discard unwanted characters
   - Format translation from EDI standard to or from flat file to flat file, XML, and other formats
   - Data translation among the PDF, XLS, MDB or other web-based documents

4. The appropriate customer data can be saved in the VAN account and later appended on messages where required for instance, the sender's bill of lading (BOL) number can be

stored in the account and upon receipt of the BOL acknowledgement (997), an acknowledgment message including the BOL number can be the created and transmitted to the sender.

5. The VAN provider's computers also store data such as customer profiles, repetitive waybill codes, etc. which can be used for filling up the EDI transaction document with the help of the customer profile code and the data from the profile stored on the VAN can be used for completing the EDI transaction.

6. Subscribers can interactively enquire about the status of any EDI transaction made by them.

7. Subscribers can receive 'verify acknowledgements' in the mailbox even they are not online.

8. The VAN can alert the subscriber (receiver) that there is data in their mailbox to be picked up:

    *   By sending a fax notification

    *   By calling a pager or other altering devices that signal users about the waiting mail in the mailbox

9. The VAN can capture the specified data from transactions which, in turn, can be used for generating customer-specified reports

10. The subscriber may specify the editing requirements, which can be edited by the VAN for completeness and correctness, as per requirements. For instance, it can verify that the line item charges on an invoice add up to the total value shown on the EDI invoice.

11. In situations where such missing or mismatching data is found during the edit process, the VANs usually send messages to the originator informing it about the missing or mismatched data and the request re-transmission of the same. For instance, the ASC X12, upon receipt of the shipment status message (214) with missing data, sends a status inquiry (213) transaction to the carrier requesting correction and re-transmission.

12. Validate and verify the information stored in customer's database for missing data and messages to appropriate firms requesting correction of the missing data

The services offered by value added networks ease the adoption of EDI by smaller organisations with lower levels of technical expertise large organizations with several trade partners may also find VANs quite attractive as VANs, in essence, provide depend upon the services offered, experience, reliability and availability of other related trading partners. In case of smaller organisations and ancillary units, the decision to join a VAN is often governed by their dominant partners. There are many third party VAN providers the marketplace. Some of them are listed here:

- GEIS – operated by general Electric of USA, GEIS has presence in over 50 countries GE as the major trader (buyer as well as supplier) of goods from top corporations of the world has brought major trade partners on a VAN.

- Cable & Wireless – highly reliable, with a subscriber base of over 2000 top companies of the world, cable and wireless holds nearly 8 percent market share of the global VAN market.

- GNS – it is one of the largest value added network, and has presence in around 36 countries

- Transpac – A France based EDI VAN provider, Transpac owns the largest domestic Van market share and has a strong presence in Europe. It uses the Infonet for offering VAN services outside the domestic domain.

- Infonet – it is a VAN service jointly owned and operated by WorldCom, Singapore Telecom and Transpac. The owning organisations themselves offer VAN services in the local domains and cover rest of the world through the Infonet.

- Satyam Infoway – Satyam is first private national internet service provider (ISP) to offer EDI VAN services in India, in association with the Sterling software of USA. In addition to the standard VAN services, it offers web EDI Van services as well

- NICNET – the National Informatics Center, an arm of Indian Ministry of Information Technology has established connectivity through 600 points in India. The NIC's network (NICNet) interconnects all the state capitals and district headquarters through its network. The NICNet in late 1999 also started offering value added network (VAN) services to facilitate and encourage EDI adoption in India. Some of the largest

implementations of EDI in India, such as Indian Customs, Port Trust, and Apparel Export Promotion Council use the NICNet VAN.

INFRASTRUCTURE FOR EDI

Several elements of infrastructure must exist in order to introduce an EDI system, including:

1) Format standards to facilitate automated processing by all users,

2) Translation software to translate from a user's proprietary format for internal data storage into the generic external format and back again,

3) Value-added networks to solve the technical problems of sending information between computers,

4) Inexpensive microcomputers to bring all potential users—even small ones—into the market, and

5) Procedures for complying with legal rules. It has only been in the past several years that all of these ingredients have fallen into place.

Format Standards

To permit the efficient use of computers, information must be highly organized into a consistent data format. A format defines how information in a message is organized: what data goes where, what data is mandatory, what is optional, how many characters are permitted for each data field, how data fields are ordered, and what codes or abbreviations are permitted.

Early EDI efforts in the 1960s used proprietary formats developed by one firm for exclusive use by its trading partners. This worked well until a firm wanted to exchange EDI documents with other firms who wanted to use their own formats. Since the different formats were not compatible, data exchange was difficult if not impossible. To facilitate the widespread use of EDI, standard formats were developed so that an electronic message sent by one party could be understood by any receiver that subscribes to that format standard. In the United States the Transportation Data Coordinating Committee began in 1968 to design format standards for transportation documents. The first document was approved in 1975. This group pioneered the ideas that are used by all standards organizations today.

North American standards are currently developed and maintained by a volunteer organization called ANSI (American National Standards Institute). The format for a document

defined by ANSI is broad enough to satisfy the needs of many different industries. Electronic documents are typically of variable length and most of the information is optional. When a firm sends a standard EDI purchase order to another firm, it is possible for the receiving firm to pass the purchase order data through an EDI translation program directly to a business application without manual intervention. In the late 1990s, international format standards were established and introduced as well to facilitate international business activity.

Translation Software

Translation software makes EDI work by translating data from the sending firm's internal format into a generic EDI format. Translation software also receives a sender's EDI message and translates it from the generic standard into the receiver's internal format. There are currently translation software packages for almost all types of computers and operating systems.

Value-Added Networks (VANS)

When firms first began using EDI, most communications of EDI documents were directly between trading partners. Unfortunately, direct computer-to-computer communications requires that both firms

1) Use similar communication protocols,

2) have the same transmission speed,

3) have phone lines available at the same time, and

4) have compatible computer hardware.

If these conditions are not met, then communication becomes difficult if not impossible. A value-added network (VAN) can solve these problems by providing an electronic mailbox service. By using a VAN, an EDI sender need only learn to send and receive messages to or from one party: the VAN. Since a VAN provides a very flexible computer interface, it can talk to virtually any type of computer. This means that to conduct EDI with hundreds of trading partners, an organization only has to talk to one party. In addition, VANs provide important security elements for dissemination of information between parties.

Inexpensive Computers

The fourth building block of EDI is inexpensive computers that permit even small firms to implement EDI. Since microcomputers are now so prevalent, it is possible for firms of all sizes to deal with each other using EDI.

Procedures for Complying with Legal Rules

Legal rules apply to the documents that accompany a wide variety of business transactions. For example, some contracts must include a signature or must be an original in order to be legal. If documents are to be transmitted via EDI, companies must establish procedures to verify that messages are authentic and that they comply with the agreed-upon protocol. In addition, EDI requires companies to institute error-checking procedures as well as security measures to prevent unauthorized use of their computer systems. Still, it is important to note that some sorts of business documents such as warranties or limitations of liability are difficult to transmit legally using EDI.

Traditional EDI

EDI is a communication standard that enables electronic transfer of routine documents, such as purchasing orders, between business partners. It formats these documents according to agreed-upon standards. An EDI implementation is a process in which two or more organizations determine how to work together more effectively through the use of EDI.

EDI often serves as a catalyst and a stimulus to improve the business processes that flow between organizations. It reduces cost, delays, and errors inherent in a manual delivery system of documents. The following are some issues in the conventional electronic data interchange:

Urgency Issues

The time factor was also a problem. The company sending the document had printed it in a few seconds. It was placed in an envelope and then posted. The document would probably take several days to reach the final destination (always with the possibility of accidental loss) where the envelope would be removed and the document presented for keying in to another computer.

For a long time, managers had been thinking how good it would be to have "Just in Time" production techniques, where a supply lorry would be able to arrive at the production line gates just in time to be unloaded and its contents taken directly to where they were needed on the production line. They dreamed of an end to costly warehousing and stock control. But these methods were impossible while the trading partners were still using the post. Lorries would be arriving at the wrong times, or not at all, causing the production lines to stop and chaos to reign, all because of the delay in the information flow.

Communications

Part of the answer to these problems was computer communications and the need to make one trading partner's computer "talk" to another. Communications have been in existence since the early days of computers. A file can be transmitted from one computer to another, either over a normal telephone line or over a "Leased Line" that is continuously in use and dedicated to computer communications. Many commercial products exist that can move files in this way.

Communications did not solve the whole problem though. Once a file is received it needs to be understood by the receiving computer. Items of information must be in the exact place that the computer is expecting them. If just a single character is out of place, the whole file will become uninterpretable by the computer.

In the early days of communications, trading partners had to spend a great deal of time agreeing exactly where each item of information would be stored in the files that were transmitted. These agreements were only active for one trading partner. Start trading with another partner and the requirements would change slightly, a larger product code would perhaps be needed, or a different method of pricing, but the whole negotiation and agreement process had to take place all over again. It kept the programmers busy but did little for the company profits.

The Move to Standardised EDI : The solution was Electronic Data Interchange, a standard method of transferring commercial information between computers.

The Message

EDI (Electronic Data Interchange) files contain information, in one of many possible formats, pertaining to commercial documents. For example, a paper invoice will always contain certain information whatever the company or country of origin. It will contain the originating and receiving company's information such as addresses, telephone numbers, contacts, etc. It will then have a section where the items to be invoiced are laid out in a formatted manner, with prices and quantities, and finally it will have a totals section. All this information may be contained within an EDI file of a pre-defined format, so that whoever receives the file will be able to understand it and automatically pass this information into their own in-house systems, irrespective of the type of computer or the systems that they are running.

The Standard Bodies

A number of different standard bodies were created to define both methods of communications and the layout of standard trading documents, so that simple and cost effective electronic trading could take place. The main document standards with which we will be concerned are EDIFACT, Tradacoms and ANSI X12, but before going into detail about the standards themselves, here is a short background to the development of the UK documents standards bodies.

The earliest development of standards, usually for particular sectors of industry, was carried out in the late 1970's under the auspices of the EAN. EAN is the International Article Numbering Organisation dealing with EDI standards. It acts as an umbrella group for the various national Numbering Organisations.

In 1998, as a result of the merger of the Article Number Association (ANA) and the Electronic Commerce Association, the e.centre[UK] was launched as the EAN Numbering Organisation for the UK. More recently, in February 2005, the e.centre[UK] has become GS1 UK. This is in line with the global re-launch of EAN International as GS1. The first UK message standards were published by the ANA in 1982, having been tested and developed since 1979. Over 90 percent of all UK trade EDI takes place using standards from the ANA, whose members include representatives from manufacturing, distribution, wholesaling, service and retail organisations. The ANA standards use the two key syntaxes:

• UN/GTDI (General Trade Data Interchange), which forms the basis for TRADACOMS messages;

• UN/EDIFACT (EDI for Administration Commerce and Transport), which is the basis for EANCOM and UK EDIFACT messages.

Limitations of Traditional EDI

Traditional EDI has evolved over time from a point-to-point digital communication media to a comprehensive tool that allows large companies to reengineer their supply chain systems. For example, a traditional EDI allows for a continuous replenishment by suppliers or for instant payment upon delivery.

However, despite the tremendous impact of traditional EDI among industry leaders, the set of adopters represented only a small fraction of potential EDI users. Most of the companies have had only a small number of their business partners on EDI, mainly due to its complexity and high cost. Therefore, in reality, many businesses have not benefited from EDI.

The major factors that have limited the use of traditional EDI are:
- Significant initial investment is needed, and ongoing operating costs are high.
- Business processes must be restructured to fit EDI requirements.
- A long start-up time is needed.
- Use of expensive, private VANs is necessary.
- There are multiple EDI standards, so one company may have to use several standards.
- An EDI cannot support dynamic trading in marketplaces.
- The system is complex.
- A converter is required to translate business transactions to EDI code.
- The system is inflexible; it is difficult to make quick changes, such as adding business partners.

These factors suggest that traditional EDI relying on formal transaction sets, translation software, and VAN is not a suitable long-term solution for many corporations. Therefore, a better infrastructure is needed. Internet-based EDI coupled with XML and extranets is such an infrastructure.

Internet Based EDI: Internet appears to be the most feasible alternative for putting online B2B trading within reach of virtually any organization, large or small. For most companies the world of EDI is one that they have been exposed to for only the past five to ten years. EDI itself however is significantly older, going back to the days before the Internet was prevalent as a communication medium between businesses. During this time EDI transactions were typically exchanged using third-party service providers known as Value Added Networks or VANs. In the mid 1990s however companies began to pioneer the process of using the Internet to send and receive EDI data. This Internet based EDI has begun to grow at significant rates over the past few years, spurred in large part by the adoption of key Internet based EDI technologies by companies like Wal-Mart. The following are some factors make the internet useful for EDI:

Flat-pricing:

It is not dependent on the amount of information transferred. The internet flat-rate model is better for the customer as opposed to the standard VAN approach of charges per character.

Cheap access:

The low cost of connection is often a flat monthly fee for leased line or dial-up access. Business users have access to commercial and noncommercial interest services in some countries providing ubiquitous network coverage.

Common mail standards

This standard and proven networking and interoperable systems, another attraction is that internet mail standards are nonproprietary and handle congestion and message routing exceptionally well. It has been noted that sometimes on a VAN network an e-mail message can take hours or days to reach its destination, while on the internet it usually takes seconds to minutes.

Security: The public key encryption techniques are being incorporated in various electronic mail systems. This will enable systems to ensure the privacy of EDI messages and give users a way to verify the sender and recipient.

How Internet-Based EDI works: The basic operational aspect of Internet based EDI is simply to use already existing communication protocols available on the Internet to exchange EDI data. For this reason internet based EDI uses the SMTP (e-mail), HTTPS and Secure FTP communication protocols to exchange data. Because these communication channels are being used to send and receive Internet based EDI however they are often referred to through a set of acronyms that were established in the mid 1990s. Accordingly, when using SMTP for Internet based EDI the common terminology is AS1, while HTTPS is AS2 and Internet based EDI through secure FTP is known as AS3.

Benefits of internet Based EDI Internet based EDI can have a number of benefits over using VANs. The reason is simple - VAN based EDI and other "aggregators" of EDI data charge based on the amount of data that is used and transmitted over their lines. By employing Internet based EDI you establish a direct link to your trading partners bypassing third parties and sending and receiving data directly. It benefits, coupled with the low cost of using the Internet, that convinced Wal-Mart to switch their entire supplier network to Internet based EDI. While they are the only one to require use of Internet based EDI other retailers have also made this option available. For businesses that rely on EDI for their operations using Internet based EDI can save a great deal of money and provide significant return on investment.

The Future of Internet-Based EDI

The future of this technology is very bright indeed. While in the early days software that allowed for AS1, AS2 or AS3 communications was extremely expensive there are solutions in the market place that make using Internet based EDI significantly more cost effective making it a viable technology not only for large organizations with hundreds of trading partners, but also for smaller businesses who trade with only one or two trading partners. Because of these developments many small businesses are beginning to convert to this technology and are seeking software solutions that either includes this technology or that have it available as an add-on at reasonable prices.

FTP based Messaging

To exchange EDI messaging through File Transfer Protocol (FTP), some setup information must be included in the trading partner agreement. Typically, an account would be created for each trading partner for a FTP log-in, including a password. Typically, each X.12

or EDIFACT message would be stored in a file, and the trading partner agreement would define the conventions for naming files and directories for the messages.

The trading partner agreement would include:

- FTP log-in name and password; machines from which the login will be accepted
- Directory and file name conventions
- File encryption protocols and keys
- Wrappers around EDI data, e.g. MIME/EDI headers, PEM/PGP wrappers
- Agreement on message format, e.g. X.12 or EDIFACT transaction sets

Several compression routines and utilities are available for virtually any computer system that uses the internet. Many of these utilities will convert across the platforms (like UNIX to Mac, UNIX to PC, and vies versa) and are available at no cost from one of several FTP archive servers.

Legal, Security and Privacy issues of EDI:

In case of EDI, dealing with trade between countries and corporations, issues of legal admissibility and computer security are paramount. Companies that deal with EDI often retain the services of a lawyer during the design of an EDI application so that the appropriate evidentiary or admissibility safeguards are implemented. Indeed, these concerns are real and must be addressed.

Analysing the security requirements of particular applications can be aided by considering the security characteristics the application should possess as well as the sensitivity level for each. As enhanced security techniques become more cost effective and increasingly ubiquitous, the task will become easier. However, careful assessment of the trade-offs must be part of this process and should satisfy legal requirements.

Legal Status of EDI messages:

There has been considerable debate concerning the legal status of EDI messages and electronic messages in general. Although a lot of work is being done on legal framework, nothing concrete has come out these efforts. No rules exist that indicate how electronic messages may be considered binding in business or other related transactions.

The establishment of such a framework is essential if EDI is to become widespread. To understand the terrain better, let's take a quick look at contact law. It distinguishes three modes of communication types:

- Instantaneous communication
- Delayed communication via the US Postal Service (USPS)
- Delayed Communication via the non-USPS couriers

Instantaneous

If the parties are face to face or use an instantaneous communication medium such as the telephone, an offer or acceptance is deemed communicated and operable when spoken.

Delayed (USPS)

The 'mailbox rule' provides that an acceptance communicated via USPS mail is effectively communicated when dispatched, or physically deposited in a USPS mailbox.

Delayed (non-USPS)

Offers or acceptances transmitted (other than through USPS mail) through telegram, mailgram, and probably electronic messaging systems, are deemed communicated and operate upon receipt. Couriers fall within this category. The legal disparity between USPS and non-USPS services requires re-examination, as the difference is longer there.

Messaging systems combine features of both instantaneous and delayed communications. A message's delay is a function of the specific application, message routing, networks traversed, system configuration, and other technical factors typically unknown to the user.

Review Questions

1. What is Business to Business e-commerce model and explain its needs?
2. What do you mean by Electronic data interchange? Explain EDI architecture.
3. Describe about EDI standards.
4. What is the value added network and explain its salient features.
5. Discuss briefly about the benefits of EDI?
6. Explain FTP based messaging.

UNIT –V

SECURITY ISSUES IN E-COMMERCE

In this chapter we will learn

- ↓ Security Issues in E-Commerce

- ↓ Security components of E-commerce

- ↓ E-commerce Security Tools

- ↓ Security threats in e-commerce

- ↓ Types of threats

- ↓ Sources of Threats

- ↓ Risk-Management Approach E-Commerce

- ↓ Corporate Digital Library

- ↓ I.T. Act 2000

Introduction

The internet offers tremendous cost savings and productivity gains, as well as significant opportunities for generating revenue to the business organisations. However, along with the convenience and easy access to information come new risks. Among them is the risk that valuable data or information may be lost, stolen, corrupted or misused. Information recorded electronically, and available on networked computers, is more vulnerable compared to the same information being printed on paper and locked in a file cabinet. In the increasingly competitive environment, an unscrupulous competitor may try deriving advantages by intruding and getting access to his competitor's financial, design and other transactional information. The websites of Bhabha Atomic Research Center (BARC), National Informatics Center (NIC) of India, Microsoft, NASA, FBI, CNN, eBay and Amazon all have been hacked and defaced by intruders at one point of time or the other.

E-commerce Security is a part of the Information Security framework and is specifically applied to the components that affect e-commerce that include Computer Security, Data security and other wider realms of the Information Security framework. E-commerce
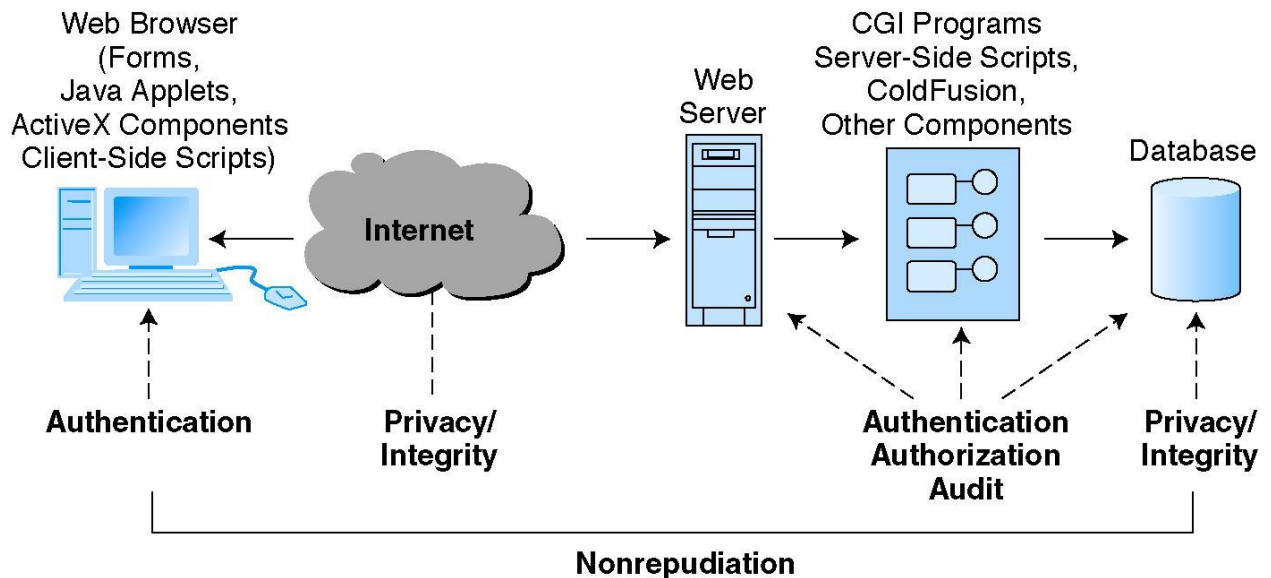
security has its own particular nuances and is one of the highest visible security components that affect the end user through their daily payment interaction with business. Today, privacy and security are a major concern for electronic technologies. M-commerce shares security concerns with other technologies in the field. Privacy concerns have been found, revealing a lack of trust in a variety of contexts, including commerce, electronic health records, e-recruitment technology and social networking, and this has directly influenced users. Security is one of the principal and continuing concerns that restrict customers and organizations engaging with ecommerce. Web e-commerce applications that handle payments (online banking, electronic transactions or using debit cards, credit cards, PayPal or other tokens) have more compliance issues, are at increased risk from being targeted than other websites and there are greater consequences if there is data loss or alteration. Online shopping through shopping websites is having certain steps to buy a product with safe and secure.

The e-commerce industry is slowly addressing security issues on their internal networks. There are guidelines for securing systems and networks available for the ecommerce systems personnel to read and implement. Educating the consumer on security issues is still in the infancy stage but will prove to be the most critical element of the e-commerce security architecture. Trojan horse programs launched against client systems pose the greatest threat to e-commerce because they can bypass or subvert most of the authentication and authorization mechanisms used in an ecommerce transaction. These programs can be installed on a remote computer by the simplest of means: email attachments. Privacy has become a major concern for consumers with the rise of identity theft and impersonation, and any concern for consumers must be treated as a major concern for e-Commerce providers.

Security Services

In the transactional environment, it is important to ensure the security of transactions as they travel over the network. Transactions may be subjected to passive or active intrusion. Passive intrusion threatens the loss of privacy and confidentiality of data, but an active intrusion may result in the intruder assuming someone else identity and crating transactions on their behalf, through fabrication. The active intruder may also modify the content of the transaction. For developing trust in the electronic commerce environment, for transactions to take place, the following issues are important. E-commerce security is the protection of e-commerce assets

from unauthorized access, use, alteration, or destruction. Six dimensions of e-commerce security are

Figure 5.1: General Security Issues at EC Sites

Authentication

Authentication is the process of verifying the identity of a person from whom the communication message emanated. In the case of a single message, authentication assures the recipient that the communication partner is not an imposter, and that the text of the message itself has not been altered. In case of ongoing interaction, such as the connection of a remote terminal to a host, there are two aspects of this service:

- At the time of initiation of a connection, the verification of the two participating entities, i.e. establishing that each of them is the same entity what they claim to be

- The connection is not interfered with, in such a way that a third party can masquerade as one of the two legitimate parties, for purpose of unauthorised transmission or reception.

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Integrity

It means that it should be possible for the receiver of a message to verify that the message has not been tampered with, while in transit. An intruder should not be able to substitute a false message for a legitimate one. In other words, no one should be able to add, delete, or modify any part of the message during transmission. The receiver should be in a position to verify, in case any tampering has taken place in the message stream. The integrity of the message prevents any intentional or unintentional modification of the message through the use of error detection codes, checksums and sequence numbering, time-stamping and encryption, and hashing techniques. Error detection codes and checksums computed on files, or entire messages, help in detecting, and sometimes even correcting, errors that may have crept in during transmission.

Sequence numbering and time-stamping protects against recording, replaying and loss of part of the message. Encryption techniques can be used for detecting the tampering messages. Algorithms such as Message Digest 5 (MD5) and Secure Hash Algorithm (SHA) compute a hash code of a fixed size, for any given message. The code computed by these algorithms is guaranteed to be unique. In order to ensure integrity the sender may send the message and computed hash code as well. The receiving side, on receiving the message, the two hash codes the one computed at receiver's end and the one provided by sender, will not match.

Non-repudiation

It prevents either the sender or the receiver form denying a transmitted message or files or data, when in fact they did. When a message is sent, the receiver can prove that the message was in fact sent by alleged sender. Similarly, when a message is received, the sender can prove that the message was in fact received by the alleged receiver. In a business transaction, the legal framework ensures that no party is in position to unilaterally repudiate the transaction. But, for legal purposes an agreement should be signed by the parties. However, in the electronic commerce environment, as transactions take place over the network, only digital content, rather than physically signed documents, may exist.

In such a situation, a customer places an order for 1000 shares of ABC Corporation, at Rs.100 per share. The stock broker executes the order, but later on the same day price drops

down to Rs.10 share. If the transaction was placed electronically, the customer may deny placing the order. A similar repudiation can take place from a greedy broker, who may discover the price for the shares have gone up to Rs.500 per share. In commerce environment has to guard against repudiation by introducing fool-proof, digitally signed contacts and agreements that can be validated by the legal infrastructure, to offer a repudiation-free business environment.

Confidentiality

It is the protection of transmitted data, from passive attacks. When a message is transmitted over the communication channel, it can be intercepted at any point in between, through wiretapping or with the help of computer programs. Confidentiality ensures that the contents of a message are not leaked or revealed to a hacker as it travels to its destination. In the electronic commerce environment, the confidentiality of payment information and ordering details are of utmost concern. Similarly, in case of business partners and associates sharing sensitive information over the internet, a competitor may like to have access to the information. Since, the internet environment is quite susceptible to passive intrusion, as the packets pass through variety of host computers, confidentiality is usually ensured by encrypting information.

 Authorization

Systems connected on the internet share information over the network, among a variety of users. The authentication process ensures the correct identification of the user and letting him/her in, but all the information on a system may not be shared with all users. Authorization pertains to the permission granted to a person or a process to do certain things. Privileges are associated with sensitive information stored on hosts. Authentication ascertains that the user is who he claims to be, while authorisation ascertains the rights of the claimant to access the information, before presenting the data to him.

The confidentiality of messages in electronic commerce can be handled by encryption the message prior to transmitting it over the network, and finally decrypting it at the destination. Cryptography, the science of encryption, can be used for addressing a variety of issues related to secure communication over the network.

E-commerce Security Components

E-commerce security strategies deal with two issues: protecting the integrity of the business network and its internal systems; and with accomplishing transaction security between the customer and the business. The main tool businesses use to protect their internal network is the firewall. A firewall is a hardware and software system that allows only those external users with specific characteristics to access a protected network. The original design was supposed to allow only specific services (e.g., email, web access) between the Internet and the internal network. The firewall has now become the main point of defense in the business security architecture. However, firewalls should a small part of the business security infrastructure.

Transaction security is critical to bolstering consumer confidence in a particular e-commerce site. Transaction security depends on the organization's ability to ensure privacy, authenticity, integrity, availability and the blocking of unwanted intrusions. Transaction privacy can be threatened by unauthorized network monitoring by software devices called sniffer programs. These programs are most likely found at the endpoints of the network connection. There are a number of defences against this threat such as encryption and switched network topologies. Transaction confidentiality requires the removal of any trace of the actual transaction data from intermediate sites. Records of its passage are a different thing and are required to verify the transaction actually took place. Intermediate nodes that handle the transaction data must not retain it except during the actual relaying of the data. Encryption is the most common method of ensuring confidentiality. Transaction integrity requires methods that prevent the transactions from being modified in any way while it is in transit to or from the customer. Error checking codes are an example of such a method.

Encryption techniques such as secret-key, public-key and digital signatures are the most common method of ensuring transaction privacy, confidentiality and integrity. The common weakness of these techniques is that they depend on the security of the endpoint systems to protect the keys from modification or misuse. The following paragraphs will discuss the vulnerabilities of this client-server model.

Early hacker attacks were directed at the server systems because that's where the access or data lived. As server system administrators became more experienced, it became harder for hackers to successfully penetrate the servers. The hackers then shifted their focus to the

network feeding into the server. They were able to continue subverting the servers by intercepting the clear text traffic flowing in and out the server. Encrypting network traffic, converting the network to a switched topology and filtering unknown access were some of the countermeasures to this "sniffer" attack. In response to this, the hackers simply shifted to the client side and this is where most network security architectures collapse. Why? Looking at the OS architectures prevalent in the client side, we observe: an OS used in a server is also used on the client system or the PC/Macintosh OS is used on the client. If the client OS is the same as the server, then the same server defense mechanisms can be used on the client system. However, if the client OS architecture is based on Windows 9x or MacOs then there is no effective defense available. These OS platforms have no built-in security designed into them and allow anyone with access to the system to be able to gain control of it. These OS architectures will continue to be susceptible to virus and Trojan horse program attacks.

The two main threats to the e-commerce client-server model are viruses and Trojan horse programs. Viruses are simply disruptive in nature but the Trojan horse programs are the more serious threat because they not only facilitate breaking into another system, they also permit data integrity attacks.

Viruses

Viruses are the most publicized threat to client systems. They are effective because of the built-in insecurity of client systems (PC/Mac). Subverting a PC/Mac system requires access to the system and no special privilege is needed to write code or data into sensitive system areas. This operating system design issue is evident in older versions of Windows 9x or MacOs 8.x. Operating systems such as Windows NT, Windows 2000, while still vulnerable to this type of attack, do have the capability of restricting who can activate the virus.

Trojan Horses

The **BackOrifice**, **Netbus**, **BO2K** hacker tools allow a remote user to control, examine, monitor any information on the target PC. What makes them especially beguiling is that they are also capable of using the target PC to send information to the net *as if the legitimate user had done so.* There are commercial tools like CUCme, VNCviewer that perform the same function. There are numerous hacker exploit web sites such as www.portwolf.com/trojans.htm, www.cultdeadcow.com, www.rootshell.com, http://thc.pimmel.com and www.insecure.org

where anyone can download a copy of the abovementioned Trojan horse programs. The good side of the Force allows system administrators to use these tools to remote manage large numbers of workstations. This is the typical system admin support tool since there are many more machines than system admin. However, the dark side of the Force allows a malicious user to install these tools for nefarious purposes such as forgery, data modification and eavesdropping.

Privacy Issues

The abuse of consumer privacy is becoming a concern at the consumer, business and government level. There will be resistance to participating in certain types of ecommerce transactions if the assurance of privacy is low or non-existent.

Abusing Customer Privacy:

The government (Big Brother) isn't the biggest threat to privacy anymore. Businesses are! US Bankcorp was sued for deceptive practices in 1999. The bank supplied a telemarketer, Member Works, with sensitive customer data such as name, phone, bank account and credit card numbers, SSN, account balances and credit limits. Member Works used these customer lists to sell dental plans, videogames, and services. US Bankcorp settled out of court. Well Fargo, Bank of America and other financial institutions announced they were *discontinuing the practice* after the US Bankcorp settlement was announced. Many banks still deal with Member Works today. Jane Bryant Quinn's essay on Privacy Issues lists a couple of items of concern:

1. No Federal law shields "transaction and experience" information.

2. Social Security Number information is periodically disclosed either intentionally or not.

3. Self-regulation by business doesn't work.

Obviously, not all businesses are dens of information disclosure. However, most businesses do not treat the information security cycle as a high priority until an event happens. They consider a firewall to be the best line of defense and pay not enough attention to securing the internal net.

The Distributed Denial of Service Attacks (DDOS)

Businesses that rely on web-based transactions are continues to be vulnerable to Denial of Service (DoS) attacks. DoS attack scripts are the most common, effective and easiest to implement attacks available on the web. No actual damage is done to the victim site. The access paths to it are simply overwhelmed with incoming packets. It would be every businessman's dream to be in this situation if the incoming packets were legitimate customer orders. However, it can be their worst nightmare if they are the targets of a DoS attack. Early DoS attacks were triggered by one internal machine against another. The Distributed Denial of Service (DDOS) attacks are the latest evolution of DoS attacks and their success depends on the inability of intermediate sites to detect, contain and eradicate the penetration of their network. The more intermediate sites are compromised, the more sites are available to launch a DDOS attack against a victim site.

E-COMMERCE SECURITY TOOLS

Major security tools are described as follow

- Authentication
- Access control
- Encryption software
- Firewalls – Software and Hardware
- Digital Signatures
- Electronic Mail (E-Mail)
- Secure Sockets Layer (SSL)
- Secure Electronic Transaction (SET)
- S-HTTP and
- SHEN

Authentication:

There are several techniques that can identify and verify someone seeking to access an e-commerce system. These includes

- A user name and password combination, where the password can vary in length and include numbers and characters
- "Two factor" authentication requiring something the user has and something the used knows

- A digital certificate that enables authentication through the use of an individuals' unique signing key

- A person's unique physical attribute, referred to as a biometric. This can range from a fingerprint or iris scan, through to retina or facial-feature recognition.

Access control

This restricts different classes of users to subsets of information and ensures that they can only access data and services for which they have been authorized. These include using:

- Network restrictions to prevent access to other computer systems and networks

- Application controls to ensure individuals are limited in the data or service they can access

- Changes to access privileges must be controlled to prevent users retaining them if they transfer between departments or leave the business.

Encryption:

It is a very effective and practical way to safeguard the data being transmitted over the network. Sender of the information encrypts the data using a secret code and specified receiver only can decrypt the data using the same or different secret code.

Encryption should be applied to protect the confidentiality of sensitive or critical information.

Based on a risk assessment, the required level of protection should be identified taking into account the type and quality of the encryption algorithm used and the length of cryptographic keys to be used.

Specialist advice should be sought to identify the appropriate level of protection, to select suitable products that will provide the required protection and the implementation of a secure system of key management. In addition, legal advice may need to be sought regarding the laws and regulations that might apply to the organization's intended use of encryption.

Procedures for the use of cryptographic controls for the protection of information must be developed and followed. Such procedures are necessary to maximize benefits and minimize the risks of using cryptographic techniques and to avoid inappropriate or incorrect use.

Firewall

A firewall insulates a private network from a public network using carefully established controls on the types of request they will route through to the private network for processing

and fulfillment. For example, an HTTP request for a public Web page will be honored, whereas an FTP request to a host behind the firewall may be dishonored. Firewalls typically run monitoring software to detect and thwart external attacks on the site, and are needed to protect internal corporate networks. Firewalls appear primarily in two flavors; application level gateways and proxy servers. Other uses of firewalls include technologies such as Virtual Private Networks that use the Internet to tunnel private traffic without the fear of exposure

A slightly more specific definition of a firewall comes from William Cheswick and Steven Bellovin, two engineers with AT&T who wrote the classic *Firewalls and Internet Security* (Addison Wesley, 1994). They based the book on their experience developing a firewall to protect AT&T connections to the Internet. Cheswick and Bellovin define a firewall as a collection of components or a system placed between two networks and possessing the following properties:

- All traffic from inside to outside, and vice-versa, must pass through it;
- Only authorized traffic, as defined by the local security policy, is allowed to pass through it; and
- The system itself is highly resistant to penetration.

Put simply, a firewall is a mechanism used to protect a trusted network from an untrusted network, usually while still allowing traffic between the two. Typically, the two networks in question are an organization's internal (trusted) network and the (untrusted) Internet. However, nothing in the definition of a firewall ties the concept to the Internet. We traditionally define the Internet as the worldwide network of networks that uses TCP/IP for communications. We define an internet as any connected set of networks. Although many firewalls are currently deployed between the Internet and internal networks, there are good reasons for using firewalls in any internet, or intranet, such as a company's WAN.

Firewall is a hardware or software security device that filters information passing between internal and external networks. It controls access to the internet by internal users, preventing outside parties from gaining access to systems and information on the internal network. A firewall can be applied at the network level, to provide protection for multiple workstations or internal networks, or at the personal level where it is installed on an individual PC.

A firewall typically takes one of two forms:

Software firewall

It is specialized software running on an individual computer

Network firewall

It is a dedicated device designed to protect one or more computers.

Both types of firewall allow the user to define access policies for inbound connections to the computers they are protecting. May also provide the ability to control what services (ports) the protected computers are able to access on the internet (outbound access). Most firewalls intended for home use come with pre-configured security policies from which the user chooses, and some allow the user to customise these policies for their specific needs.

Types of firewalls

There are three basic types of firewalls depending on

1. Whether the communication is being done between a single node and the network or between two or more networks
2. Whether the communication is intercepted at the network layer, or at the application layer
3. Whether the communication state is being tracked at the firewall or not

With the scope of filtered communication there exist:

Personal firewalls

It is a software application, which normally filters traffic entering, or leaving a single computer.

Network firewalls

It is normally running on a dedicated network device or computer positioned on the boundary of two or more networks. Such a firewall filters all traffic entering or leaving the connected networks

Intrusion Detection

The software related to intrusion monitor system and network activity to spot any attempt being made to gain access. If a detection system suspects an attack, it can generate an alarm, such as an e-mail alert, based upon the type of activity it has identified.

Despite the sophistication of these controls, they are only as good as the people who use them. A continual awareness program is such a vital component of any security policy.

Digital Signature:

Digital signature ensures the authenticity of the information. A digital signature is a e-signature authentic authenticated through encryption and password. The digital signature is to electronic world what the handwritten signature is to the commerce. It must incorporate the following properties:

- It must be able to verify the author, the date and the time of the signature

- It must be able to authenticate the contents at the time of signature

- It must be verifiable by third parties, in case of any dispute.

The above properties place the following requirements on the digital signature:

- The signature must be a bit pattern that is dependent on the message being signed

- To prevent forgery and denial, the signature must use some information unique to the sender

- The digital signature must be easy to generate

- The storage of a copy of the digital signature must be simple.

- Forging the signature must be computationally infeasible, i.e., either by constructing a fraudulent signature for a given message, or constructing a new message with an existing signature

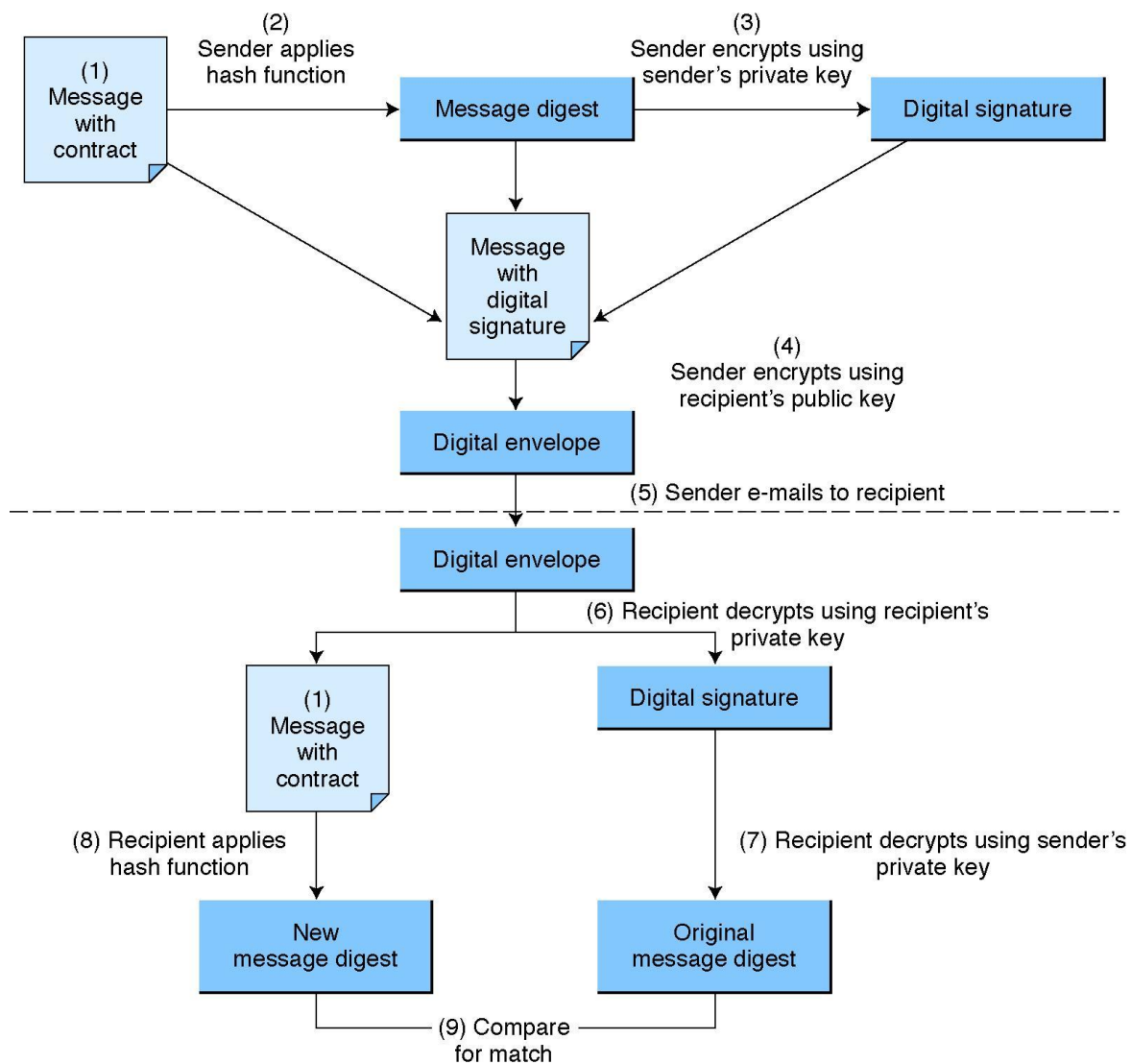- The signature must be easy to recognise and verify.

Secret key signature

This approach involves a central authority that is trusted by everybody. Each user shares his/her secret key with the CA.

Public key signature

The problem with secret key signatures is that the Central Authority has access to all messages and agreements, in addition to the previously discussed problem with shared secret

key based mechanism. Public key infrastructure (PKI) has emerged as the strongest authentication mechanism in global electronic commerce.

Figure 5.2: Process of Digital Signature

Features of digital signature

Digital signatures have the following features

Evidence:

When the signee makes a mark in a distinctive manner, the signature becomes attributable to signee.

Legality:

The signature makes the document legal.

Approval:

By signing, the signee gives the approval that he/she accepts the terms

Authenticity:

The increasing use of electronic documents poses special challenges in verifying authenticity because digital technology makes such documents easy to alter or copy leading to multiple non-identical versions that can be used in unauthorised or illegitimate ways.

A digital signature mainly provides authentication to a message. The paper stores the information as atoms of link and computer stores the information in bits as digital signature. Hence the authentication of electronic means should be secured. Therefore digital signature must have the following attributes:

Signee authentication:

A person involved in the transaction uses digital signatures made through the use of a private key

Document authentication:

A signature should indicate who signed a document, a message or a record and should be difficult for another person to produce without authorisation

Security Certificates:

Security certificate is unique digital id used to verify identity of an individual website or user.

Encrypted Documents and Electronic Mail (E-Mail)

E-mail users who desire confidentiality and sender authentication are using encryption. Encryption is simply intended to keep personal thoughts personal. Some users are already using Pretty Good Privacy (PGP); others are starting to use Privacy Enhanced Mail (PEM).

E-mail is typically encrypted for the reason that all network correspondence is open for eavesdropping. Internet e-mail is obviously far less secure than the postal system, where envelopes protect correspondence from casual snooping. A glance at the header area of any e-mail message, by contrast, will show that it has passed through a number of nodes on its way to you. Every one of these nodes presents the opportunity for snooping.

Everyday communication over phone and fax lines entails security risks. Despite leaps in technology and wide usage, fax transmissions are not yet widely encrypted. The main reason is the inconvenience of equipping both the sending and receiving machines with compatible encryption before facsimile transmission; the fax protocol has no convenient place for inserting

non-fax functions such as encryption, and until recently there has been little awareness of security threats among fax users. However, increasing awareness of the security problems will increase the availability of products that encrypt fax communications.

E-mail software is increasingly incorporating specific options that simplify encryption and decryption. Examination of encrypted information is non-trivial, each file must be decrypted even before it can be examined. If the file itself proves to contain embedded, compressed, encrypted files, those too must be expanded and decrypted. This process may need repeating several times before the innermost files contents are discernible.

Security Protocols for electronic commerce

In the process of purchasing a product online, the potential purchaser browsers an online catalogue over the internet, selects items for purchase, fills in the payment (credit card) information, and sends the information to the merchant over the internet. At the merchant's site, electronic payment systems validate and confirm the transaction and deliver the digital goods over the internet or schedule the shipment and delivery process. All these information is transmitted through the internet, which is public domain. This connection needs to be made secure because of the internet's public nature and the risk of fraudulent interception of private information. The leading protocols for securing the online transaction processes are
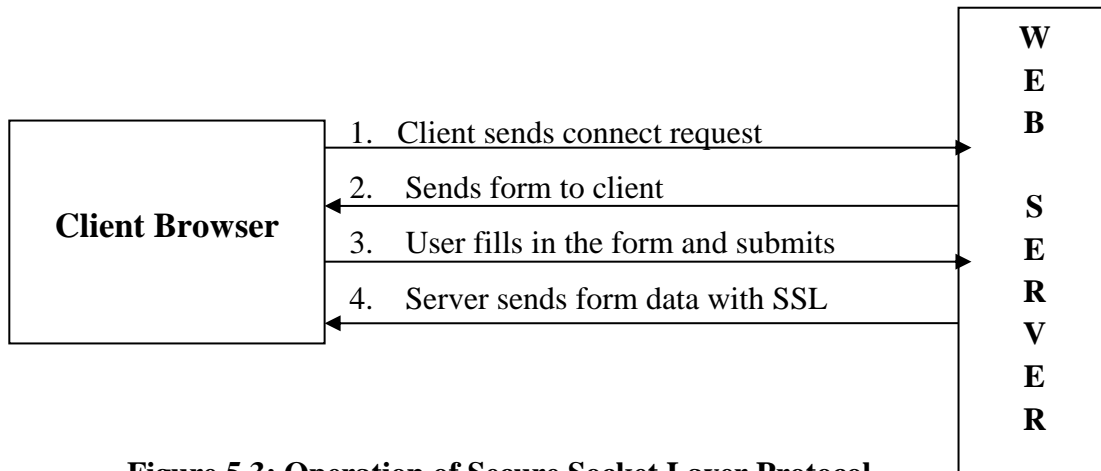
- Secure Sockets Layer (SSL)
- Secure Electronic Transaction (SET)
- S-HTTP and
- SHEN

Secure Socket Layer (SSL)

It is the most commonly used protocol designed and implemented by Netscape Communications. Netscape claims it is designed to work, as the name implies, at the socket layer, to protect any higher level protocol built on sockets, such as Telnet, FTP or HTTP. It is ignorant of the details of higher level protocols and what is being transported.

SSL provides for the encryption of a session, authentication of a server, and optionally a client, and message authentication. This means that once a secure session is established, all communication over the internet is encrypted. The SSL Handshake Protocol and the application

protocol, both operate on top of the SSL Record protocol, a simple means of encapsulating authentication information. SSL Record Layer works on TCP or other reliable transport mechanism.

Figure 5.3: Operation of Secure Socket Layer Protocol

SSL relies on the existence of a key certification mechanism, for the authentication of a server. Security established by means of the handshake protocol, in which a set of session keys is set up between the client and server. Four session keys are setup – two encryption keys and two authentication keys in order to provide directional security. Messages are protected using symmetric encryption and by generating a Message Authentication Code (MAC) on the data. This means that on the link from the client to server, and vice versa, messages are protected for confidentiality and data integrity. However, there is no non-reputation on the messages, since the data integrity is provided using symmetric cryptography, rather than through the use of digital signatures. It is possible to obtain data origin authentication from the client site using SSL, if the option of client authentication is employed. But in order to be able to do this, a separate method of obtaining keys needs to have been employed. The public key used to authenticate the server to client is not practice generally recommends for the use of keys in cryptography.

Therefore, the type of application that is appropriate for SSL security is where there are a large set of end users, and it would be too expensive or time consuming to set up highly secure client software with public key pairs.

Secure Electronic Transaction (SET)

The SET protocol is a set of written standards that describes how credit card associations, banks, merchants and consumers should implement credit card transactions across the internet's World Wide Web. It was established by MasterCard and Visa for the secure use of credit, debit and corporate purchasing cards over the internet. The co-developers and supporters are Microsoft, CyberCash, GTE, IBM and Netscape. Other supporters include RSA Data security, Terisa systems and VerSign. SET represents an evolution, merging and replacement of S-HTTP and SSL.

SET is intended to reduce fraud by unscrupulous merchants and consumers, thus reducing the financial risk of internet based commerce, to both merchant banks and honest merchants. The SET architecture involves a number of players. These include entities known as the cardholder, merchant acquirer, issuer and payment gateway, as well as number of certification authorities. The payment gateway is a device operated by an Acquirer, or a designated third party that processes merchant payment messages (including payment instructions from cardholders). The intention is to take the payment processing away from the merchant, so as to reduce the risk of merchant fraud. SET has following components −

Card Holder's Digital Wallet Software:

Digital Wallet allows card holder to make secure purchases online via point and click interface.

Merchant Software:

This software helps merchants to communicate with potential customers and financial institutions in secure manner.

Payment Gateway Server Software:

Payment gateway provides automatic and standard payment process. It supports the process for merchant's certificate request.

Certificate Authority Software:

This software is used by financial institutions to issue digital certificates to card holders and merchants and to enable them to register their account agreements for secure electronic commerce.

Secure Hypertext Transfer Protocol (SHTTP)

Secure HTTP is a scheme proposed by CommerceNet, a coalition of businesses interested in developing the internet for commercial uses. Current HTTP implementations only provide modest support for the security mechanisms necessary for commerce. SHTTP provide a variety of mechanisms to provide for confidentiality, authentication and integrity to HTTP clients and servers. Separation of policy from mechanism was an explicit goal in the design of this protocol. The system is not tied to any particular cryptographic system, key infrastructure, or cryptographic format.

Secure HTTP is a secure message-oriented communications protocol, designed for use in conjunction with HTTP. It is a superset of HTTP, which allows messages to be encapsulated in various ways. Encapsulations can include encryption, signing, or message authentication code (MAC) based authentication. The encapsulation can be recursive, and a message can have several security transformations applied to it. SHTTP also includes header definitions to provide key transfer, certificate transfer, and similar administrative functions. SHTTP appears to be extremely flexible in what it will allow the programmer to do. SHTTP also offers the potential user involvement in, and oversight of, authentication and encryption activities.

SHEN

AHEN is a scheme proposed by Philip Hallam-Baker of CERN. Like SHTTP it is a high level replacement for the existing HTTP protocol. SHEN provides for three separate security-related mechanisms:

1. Weak authentication with low maintenance overheads, and without patent or export restrictions:

A user identity must be established as genuine. Unauthorised access must be improbable, but security from all possible forms of attack events need not be provided.

2. Strong authentication through public key exchange:

A user identity must be established as genuine. Unauthorised access must be impossible except by random chance or by access to unknown technology.

3. Strong encryption of message content:

The data must not be transmitted in a form comprehensible to a third party; with an identified party acting as guarantor in this respect.

Although SHEN has existed as a proposal for nearly two years, no browser or server vendor has implemented it.

Virtual Private Network (VPN)

A network that uses the public Internet to carry information but remains private by using encryption to scramble the communications, authentication to ensure that information has not been tampered with, and access control to verify the identity of anyone using the network
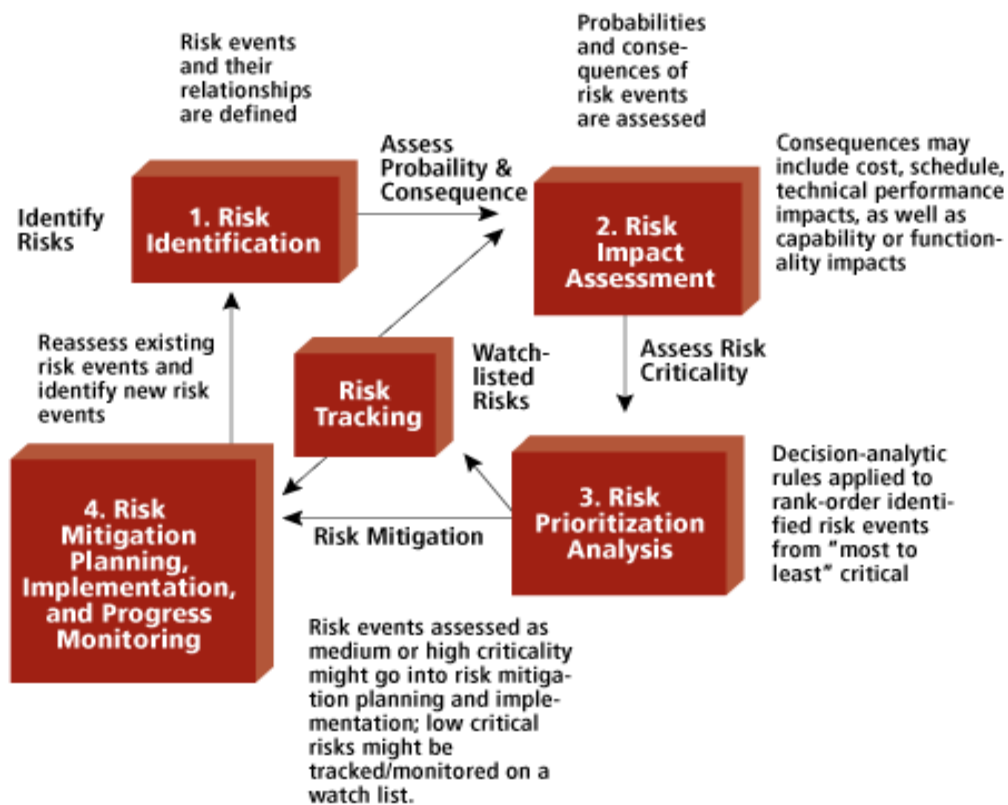
Risk management approach

"Risk management is the process for identifying, analyzing, and communicating risk and accepting, avoiding, transferring, or controlling it to an acceptable level considering associated costs and benefits of any actions taken". The risk management approach determines the processes, techniques, tools, and team roles and responsibilities for a specific project. As a management process, risk management is used to identify and avoid the potential cost, schedule, and performance/technical risks to a system, take a proactive and structured approach to manage negative outcomes, respond to them if they occur, and identify potential opportunities that may be hidden in the situation. The risk management approach and plan operationalizing these management goals.

System-level risk management is predominantly the responsibility of the team working to provide capabilities for a particular development effort. Within a system-level risk area, the primary responsibility falls to the system program manager and Software Engineer for working risk management, and the developers and integrators for helping identify and create approaches to reduce risk. In addition, a key responsibility is with the user community's decision maker on when to accept residual risk after it and its consequences have been identified. The articles in the Risk Management topic area provide guidance for identifying risk (Risk Identification), mitigating risks at the system level with options like control, transfer, and watch (Risk Mitigation Planning, Implementation, and Progress Monitoring), and a program risk assessment scale and matrix (Risk Impact Assessment and Prioritization). These guidelines, together with MITRE SEs using tools such as those identified in the Risk Management Tools article, will help the program team deal with risk management and provide realism to the development and implementation of capabilities for the users.

The Risk Management Plan

The Risk Management Plan describes a process, such as the fundamental steps shown in the Figure given below, that are intended to enable the engineering of a system that is accomplished within cost, delivered on time, and meets user needs.

Figure 5.4: Fundamental Steps of Risk Management

In supporting both Department of Defense (DoD) and civilian agency projects and programs, MITRE SEs have found the following minimum conditions needed to initiate and continuously execute risk management successfully. With these, the program increases its chance of identifying risks early so the goals and objectives are achieved. Major things in the risk management

1. Risk management must be a priority for leadership and throughout the program's management levels. Maintain leadership priority and open communication. Teams will not identify risks if they do not perceive an open environment to share risk information (messenger not shot) or management priority on wanting to know risk information

(requested at program reviews and meetings), or if they do not feel the information will be used to support management decisions (lip service, information not informative, team members will not waste their time if the information is not used).

2. Risk management must never be delegated to staff that lack authority.

3. A formal and repeatable risk management process must be present—one that is balanced in complexity and data needs, such that meaningful and actionable insights are produced with minimum burden.

4. The management culture must encourage and reward identifying risk by staff at all levels of program contribution.

5. Program leadership must have the ability to regularly and quickly engage subject matter experts.

6. Risk management must be formally integrated into program management

7. Participants must be trained in the program's specific risk management practices and procedures.

8. A risk management plan must be written with its practices and procedures consistent with process training.

9. Risk management execution must be shared among all stakeholders.

10. Risks must be identified, assessed, and reviewed continuously—not just prior to major reviews.

11. Risk considerations must be a central focus of program reviews.

12. Risk management working groups and review boards must be rescheduled when conflicts arise with other program needs.

13. Risk mitigation plans must be developed, success criteria defined, and their implementation monitored relative to achieving success criteria outcomes.

14. Risks must be assigned only to staff with authority to implement mitigation actions and obligate resources.

15. Risk management must never be outsourced.

16. Risks that extend beyond traditional impact dimensions of cost, schedule, and technical performance must be considered (e.g., programmatic, enterprise, cross-program/cross-portfolio, and social, political, economic impacts).

17. Technology maturity and its future readiness must be understood.

18. The adaptability of a program's technology to change in operational environments must be understood.

19. Risks must be written clearly using the Condition-If-Then protocol.

20. The nature and needs of the program must drive the design of the risk management process within which a risk management tool/database conforms.

21. Risk management tool/database must be maintained with current risk status information; preferably, employ a tool/database that rapidly produces "dashboard-like" status reports for management.

Risk management principles

Standard risk management principles are not designed to promote uniformity or conformity; rather, they offer broad guidance that should be uniquely tailored for the specific needs of each organization. The risk management programs should be based on two *key tenets*:

- Risk management should enhance an organization's overall decision making process and maximize its ability to achieve its objectives.
- Risk management is used to shape and control risk, but cannot eliminate all risk.

The *key principles* for effective risk management include:

- Unity of Effort
- Transparency
- Adaptability
- Practicality
- Customization

Unity of Effort:

Risk management efforts should be coordinated and integrated among all partners, with shared or overlapping risk management responsibilities, to include Federal, state, local, tribal, and territorial governments, as well as the private sector, non-governmental organizations, and international partners. Most homeland security measures involve representatives of different organizations, and it is important that there is unity of effort amongst those charged with managing risks to ensure consistent approaches are taken and that there is a shared perspective of security challenges.

Transparency

Transparency is vitally important in homeland security risk management due to the extent to which the decisions involved affect a broad range of stakeholders. Transparency is important for the analysis that contributes to the decision making. It includes the assumptions that supported that analysis, the uncertainty involved with it, and the communications that follow the decision. Risk management should not be a "black box" exercise where analysis is hidden. Those impacted by a risk management approach should be able to validate the integrity of the approach.

This principle does not countermand the times when there is need for security of sensitive or classified information; however, it does suggest that the processes and methodologies used for homeland security risk management may be shared even if the information is not. In turn, transparency will foster honest and realistic dialogue about opportunities and limitations.

Adaptability: The principle of adaptability includes designing risk management actions, strategies, and processes to remain dynamic and responsive to change. A changing world, filled with adaptive adversaries, increased interdependencies, and new technologies, necessitates security measures that are equally adaptable.

Practicality:

Risk management is an effective and important management practice that should lead to better-supported decisions and more effective programs and operations.

Customization:

The principle of customization emphasizes that risk management programs should be tailored to match the needs and culture of the organization, while being balanced with the specific decision environment they support. The organizations and personnel should tailor the methods for the dissemination of risk information and decision making and communications processes to fit the needs of their mission. The customization principle includes ensuring that the organization's risk management approach is appropriately governed and uses the best available information. This assures that the risk management effort is systematic, timely, and structured based on the values of the organization. However, the principle of customization does not supersede the need to adhere to organizational standards, requirements, and operating procedures for risk management when there is a requirement for working together to analyze risks and promote joint decision making.

Preventing problems from Viruses, Trojans and Worms

Anti-virus software should be used to protect against viruses. It can detect viruses, preventing access to infected files and quarantine any infected files.

Anti-virus software

There are different types of anti-virus software:

- **Virus scanners:**

It must be updated regularly, usually by connecting to the supplier's website, in order to recognise new viruses

- **Heuristics software:**

It detects viruses by applying general rules about what viruses look like. While it does not require frequent updates, this software can be prone to giving false alarms.

The threat of virus infection can be minimized by:

- Using a virus checker on your internet connection to trap viruses both entering and leaving the business IT systems

- Running virus checkers on servers to trap any viruses that have managed to evade the above check

- Running individual virus checkers on users' PCs to ensure that they have not downloaded a virus directly or inadvertently introduced one via a CD or floppy disk

Other methods of preventing viruses

Other ways of preventing of viruses include:

- Installing software patches provided by the supplier of your operating system to close security loopholes that could be exploited by viruses

- Using a firewall to prevent unauthorized access to your network

- Avoiding download of unauthorized programs and documents from the internet and ensuring the staff adhere to this policy

The system may still become infected even if you follow the above guidelines. Make regular back-ups of your data and software so that you can replace infected files with clean copies.

Virus altering services

Consider subscribing to a service or supplier who will provide virus alerts for you. Some are available on paid for basis, while others are provided by suppliers of anti-virus software to their customers.

Spyware

There is software available that scans your computer and detects known spyware programs. Spyware can then be removed or quarantined. As with anti-virus software, it is important to keep this software up-to-date.

Digital identity and digital signature

Digital entity is the electronic representation of a real-world entity. The term is usually taken to mean the online equivalent of an individual human being, which participates in electronic transactions on behalf of the person in question. However a broader definition also assigns digital identities to organisations, companies and even individual electronic devices. Various complex questions of privacy, ownership and security surround the issue of digital identity.

Digital identity refers to the aspect of digital technology that is concerned with the mediation of people's experience of their own identity and the identity of other people and things.

Digital identity is a safe personal web platform that gives the individual the power to control how they interact with the internet and share their personal information. Each individual is assigned a personal web address that functions as a master key to all his or her online communication. Through a number of practical tools such as online business cards, CV, favorites, personal messages, access control etc the individual creates and have full control of their online information. With digital identity each individual becomes an integrated part of the internet, hence other websites, search engines and applications automatically can interact with the online identity.

The Threats to E-Commerce

The standard client server model has three components: the server system, the network and the client system. In the past, server systems were typically mainframes running operating systems such as MVS, VM, VMS or UNIX. Window NT and Windows 2000 (W2K) are now making inroads into this arena. The network component includes the internal business network, the path between the business and the customer through various ISPs and the customer's internal network. Client systems are usually PC or Macintosh systems running their respective Window 9x, NT, W2K or MacOs operating systems although Unix systems do serve as client systems.

Types of Computer Security Threats

There are many types of computer security threats in this world. Some are pretty harmful while some are totally harmless although annoying. There are also some which does not do any damage to your computer, but has the capability to empty the numbers in your bank account.

1. Trojan:

Trojan is one of the most complicated threats among all. Most of the popular banking threats come from the Trojan family such as Zeus and SpyEye. It has the ability to hide itself from antivirus detection and steal important banking data to compromise your bank account.

If the Trojan is really powerful, it can take over your entire security system as well. As a result, a Trojan can cause many types of damage starting from your own computer to your online account.

2. Virus:

It is a malicious program where it replicates itself and aim to only destroy a computer. The ultimate goal of a virus is to ensure that the victim's computer will never be able to operate properly or even at all. It is not so popular today because Malware today is designed to earn money over destruction. Viruses are the most publicized threat to client systems. They are effective because of the built-in insecurity of client systems (PC/Mac). Subverting a PC/Mac system requires access to the system and no special privilege is needed to write code or data into sensitive system areas. This operating system design issue is evident in older versions of Windows 9x or MacOs 8.x. Operating systems such as Windows NT, Windows 2000, while still vulnerable to this type of attack, do have the capability of restricting who can activate the virus. Viruses need "system privilege" in order to be effective. In general, the multiple privilege access schemes present in Unix, VMS and other multi-user operating systems prevents a "virus" from damaging the entire system. It will only damage a specific user's files.

3. Worms:

One of the most harmless threats where it is program designed only to spread. It does not alter your system to cause you to have a nightmare with your computer, but it can spread from one computer to another computer within a network or even the internet. The computer security risk here is, it will use up your computer hard disk space due to the replication and took up most of your bandwidth due to the spread.

4. Spyware:

It is a Malware which is designed to spy on the victim's computer. If you are infected with it, probably your daily activity or certain activity will be spied by the spyware and it will find itself a way to contact the host of this malware. Mostly, the use of this spyware is to know what your daily activity is so that the attacker can make use of your information. Such as if you browse on sex toys for a week every day, the attacker will try to come out with a sex toy scam to cheat on your money.

5. Scareware:

Scareware is something that plant into your system and immediately inform you that you have hundreds of infections which you don't have. The idea here is to trick you into purchasing a bogus anti-malware where it claims to remove those threats. It is all about cheating your money but the approach is a little different here because it scares you so that you will buy.

6. Adware:

It is a form of threat where your computer will start popping out a lot of advertisement. It can be from non-adult materials to adult materials because any ads will make the host some money. It is not really harmful threat but can be pretty annoying.

7. Backdoor:

Backdoor is not really a Malware, but it is a form of method where once a system is vulnerable to this method, attacker will be able to bypass all the regular authentication service. It is usually installed before any virus or Trojan infection because having a backdoor installed will ease the transfer effort of those threats.

8. Wabbits:

It is another a self-replicating threat but it does not work like a Virus or Worms. It does not harm your system like a Virus and it does not replicate via your LAN network like a Worms. An example of Wabbit's attack is the fork bomb, a form of DDoS attack.

9. Exploit:

Exploit is a form of software which is programmed specifically to attack certain vulnerability. For instance, if your web browser is vulnerable to some out-dated vulnerable flash plug in, an exploit will work only on your web browser and plug in. The way to avoid hitting into exploit is to always patch your stuff because software patches are there to fix vulnerabilities.

10. Botnet

Botnet is something which is installed by a BotMaster to take control of all the computer bots via the Botnet infection. It mostly infects through drive-by downloads or even Trojan infection. The result of this threat is the victim's computer, which is the bot will be used for a large scale attack like DDoS.

11. Dropper:

Looking at the name, a Dropper is designed to drop into a computer and install something useful to the attacker such as Malware or Backdoor. There are two types of Dropper where one is to immediately drop and install to avoid Antivirus detection. Another type of Dropper is it will only drop a small file where this small file will auto trigger a download process to download the Malware.

12. Fake AV:

Fake Antivirus threat is a very popular threat among Mac user about 10 months ago. Due to the reason that Mac user seldom faces a virus infection, scaring them with message which tells them that their computer is infected with virus is pretty useful where it results them into purchasing a bogus antivirus which does nothing.

13. Phishing:

A fake website which is designed to look almost like the actual website is a form of phishing attack. The idea of this attack is to trick the user into entering their username and password into the fake login form which serves the purpose of stealing the identity of the victim. Every form sent out from the phishing site will not go to the actual server, but the attacker controlled server.

14. Cookies:

Cookies are not really a Malware. It is just something used by most websites to store something into your computer. It is here because it has the ability to store things into your computer and track your activities within the site. If you really don't like the existence of cookies, you can choose to reject using cookies for some of the sites which you do not know.

15. Bluesnarfing:

Bluesnarfing is all about having an unauthorized access to a specific mobile phones, laptop, or PDA via Bluetooth connection. By having such unauthorized access, personal stuff such as photos, calendar, contacts and SMS will all be revealed and probably even stolen.

16. Bluejacking.

Bluejacking is also uses the Bluetooth technology but it is not as serious as Bluesnarfing. What it does is it will connect to your Bluetooth device and send some message to another Bluetooth device. It is not something damaging to your privacy or device system compared to the Bluesnarfing threat.

17. DDoS.

One of the most famous thing done by Anonymous, which is to send millions of traffic to a single server to cause the system to down with certain security feature disable so that they can do their data stealing. This kind of trick which is to send a lot of traffic to a machine is known as Distributed Denial of Service, also known as DDoS.

18. Boot Sector Virus:

It is a virus that places its own codes into computer DOS boot sector or also known as the Master Boot Record. It will only start if there it is injected during the boot up period where the damage is high but difficult to infect. All the victim need to do if they realize there is a boot sector virus is to remove all the bootable drive so that this particular virus will not be able to boot.

19. Browser Hijackers:

A browser hijacker uses the Trojan Malware to take control of the victim's web browsing session. It is extremely dangerous especially when the victim is trying to send some money via online banking because that is the best time for the hijacker to alter the destination of the bank account and even amount.

20. Virus Document:

Virus today can be spread through document file as well especially PDF documents. Last time, people will only advice you not to simply execute an EXE file but in today's world with today's technology, document file should also be avoided. It is best if you use an online virus scanner to scan first before opening any single file which you feel it is suspicious.

21. Pharming:

Pharming works more or less like phishing but it is a little tricky here. There are two types of pharming where one of it is DNS poisoning where your DNS is being compromised and all your traffic will be redirected to the attacker's DNS. The other type of pharming is to edit your HOST file where even if you typed www.google.com on your web browser, it will still redirect you to another site. One thing similar is that both are equally dangerous.

22. Crime ware:

Crime ware is a form of Malware where it takes control of your computer to commit a computer crime. Instead of the hacker himself committing the crime, it plants a Trojan or whatever the Malware is called to order you to commit a crime instead. This will make the hacker himself clean from whatever crime that he had done.

23. SQL Injection:

SQL injection does not infect the end users directly. It is more towards infecting a website which is vulnerable to this attack. What it does is it will gain unauthorized access to the database and the attacker can retrieve all the valuable information stored in the database.

SOURCE OF THREATS

1. The Internet

The worldwide web is the main source of malware. Malware can penetrate your computer as a result of the following actions:

Visiting a website contains a malicious code. Drive-by attacks can be taken as an example. A drive-by attack is carried out in two steps. First, a malefactor makes users visit a

website by using spam sent via e-mail or published on bulletin boards. The website contains a code that redirects the request to a third-party server that hosts an exploit. During drive-by attacks malefactors use a wide range of exploits that target vulnerabilities of browsers and their plug-ins, ActiveX controls, and third-party software. The server that hosts exploits can use the data from HTTP request headers to get the information about the version of the user's browser and operating system. When the information about the victim's operating system is received, the corresponding exploit is activated. If the attack is successful, a Trojan is secretly installed on the computer, so the malefactors take control of the infected machine. They can get access to confidential data stored on the computer and use the machine to carry out DoS attacks. Earlier malefactors created malicious websites, but now hackers tend to infect harmless websites by inserting script exploits or redirection codes, which make browser attacks more dangerous.

- Downloading malicious software disguised as keygens, cracks, patches, etc.

- Downloading files via peer-to-peer networks (for example, torrents).

2. Email

Email messages received by users and stored in email databases can contain viruses. Malware can be found not only in attachments, but also in a body of a letter. You can infect your computer by opening such a letter or by saving the attached file. Email is a source of two more types of threats: spam and phishing. While spam results only in a waste of your time, the target of phishing letters is your private data, such as credit card numbers.

 3. Software vulnerabilities

Software vulnerabilities are most common targets of hacker attacks. Vulnerabilities, bugs and glitches of software grant hackers remote access to your computer, and, correspondingly, to your data, local network resources, and other sources of information.

4. Removable data storage media

Removable drives, flash memory devices, and network folders are commonly used for data transfer. When you run a file from a removable media you can infect your computer and spread the virus to the drives of your machine.

5. Users' actions

Sometimes users infect the computer by installing applications that are disguised as harmless. This method of fraud used by malefactors is known as social engineering. Using various tricks, malefactors make users install their malicious software.

Digital E-commerce Cycle

Security is very important in online shopping sites. Now days, a huge amount is being purchased on the internet, because it's easier and more convenient. Almost anything can be bought such as music, toys clothing, cars, food and even porn. Even though some of these purchases are illegal we will be focusing on all the item's you can buy legally on the internet. Some of the popular websites are eBay, iTunes, Amazon, HMV, Mercantila, dell, Best Buy and much more.
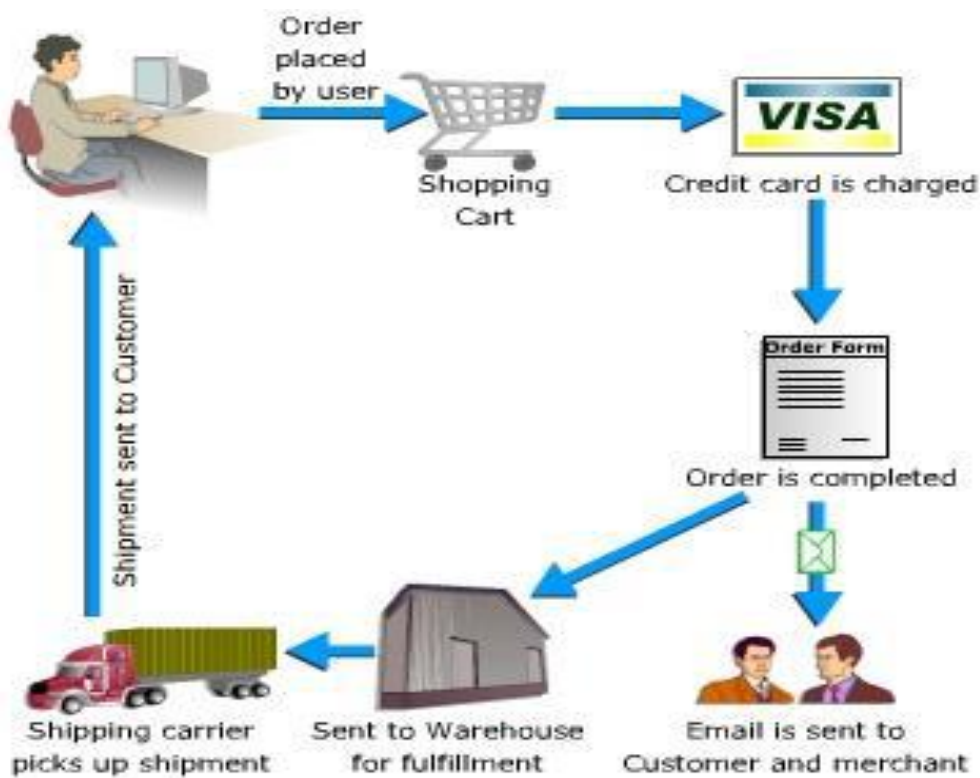

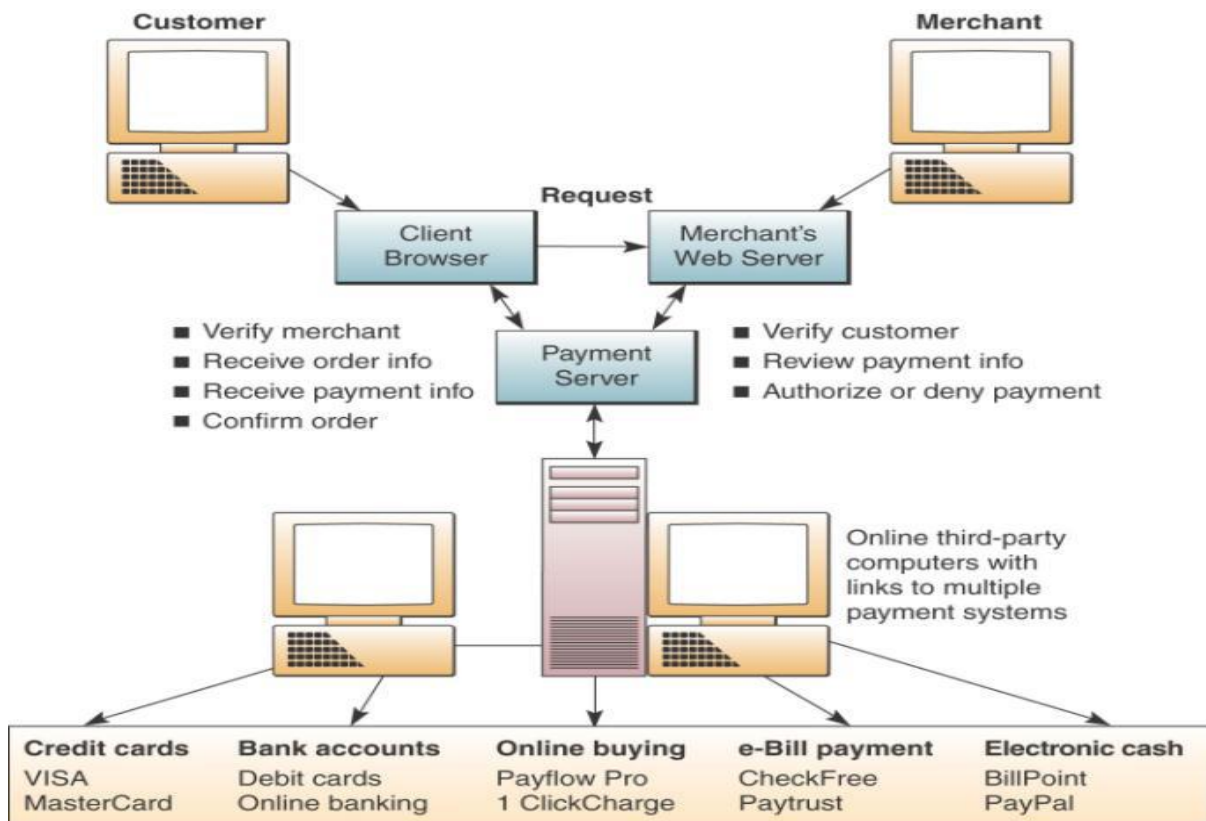**Figure 5.5: Digital E-commerce cycle**

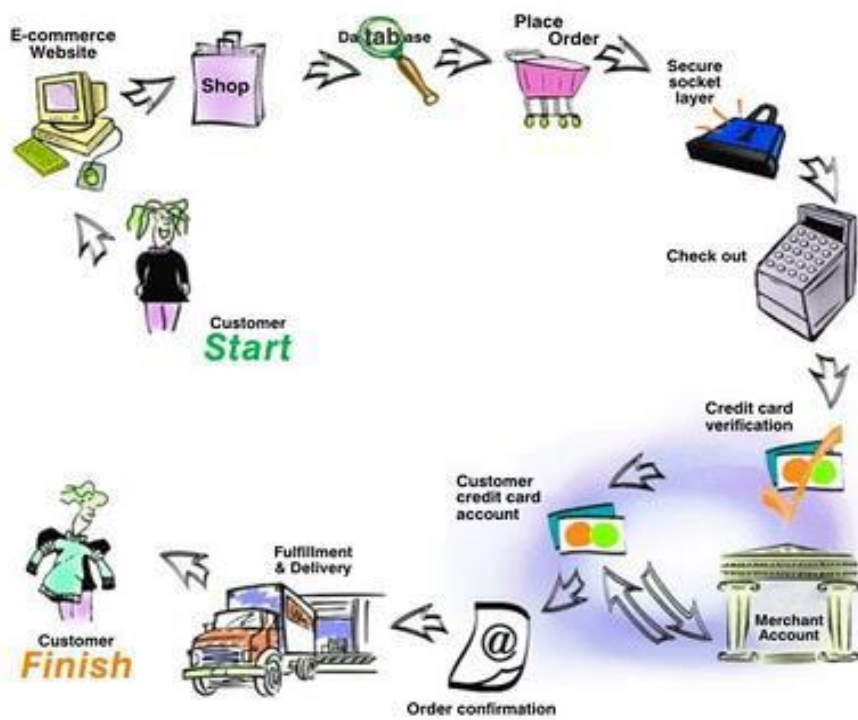**Figure 5.6: Digital E-commerce cycle**

Figure 5.7: Online Shopping - Steps to place an order

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Security policy, procedure and practices

A security policy is a formal statement of the rules by which people with access to an organisation's technology and information assets must abide, to ensure the security these assets. It provides a framework for making specific decisions such as which defence mechanisms to use and how to configure services. It is the basis for developing secure programming guidelines and procedures, for users and system administrators to follow. A security policy generally covers the following aspects:

- High level description of the technical environment of the site, the legal environment (governing laws), the authority of the policy, and the basic philosophy to be used when interpreting the policy

- Risk analysis to identify the site's assets, the threats existing against those assets, and the costs of asset loss

- Guidelines for system administrators on how to manage the systems

- Definition of acceptable use for users

- Guidelines for reacting to a site compromise (e.g., whether to trace the intruder or shutdown and rebuild the system)

A successful security policy involves many contributing factors like management commitment, technological support for enforcing the policy, effective dissemination of the policy and the security awareness of all users. Management assigns responsibility for security ensures that security personnel and adequately trained. Technological support for the security policy includes options like:

- Challenge or response systems for authentication

- Encryption systems for confidential storage and transmission data

- Network tools such as firewalls and proxy servers

- Auditing systems for accountability and event reconstruction

Need for Security Policies

A security policy should fulfill many purposes. It should:

Protect people and information

- Set the rules for expected behavior by users, system administrators, management, and security personnel.

- Authorize security personnel to monitor, probe, and investigate.

• Define and authorize the consequences of violation.

• Define the organization consensus baseline stance on security.

• Help minimize risk.

• Help track compliance with regulations and legislation.

Information security policies and procedures provide a framework for best practice that can be followed by all employees. They help to ensure risk is minimized and that any security incidents are effectively responded to. Information security policies will also help turn staff into participants in the organization's efforts to secure its information assets, and the process of developing these policies will help to define a Government Agency's information assets. Information security policy defines the organization's attitude to information, and announces internally and externally that information is an asset, the property of the organization, and is to be protected from unauthorized access, modification, disclosure, and destruction.

Security related procedures

Procedures are specific steps to be followed, based on the security policy. Procedures address topics such as connecting to the site's system from home or while travelling, retrieving programs from the network, using encryption, authentication for issuing accounts, configuration and monitoring.

Security practices

System administration practices play a key role in network security. Some commonly recommended practices are:

- Implement a one-time password system, ensure that all accounts have a password and these passwords are difficult to guess.

- Use strong cryptographic techniques to ensure the integrity of system software on a regular basis

- Use safe programming techniques when writing software

- Make appropriate changes to the network configuration when vulnerabilities become known

- Keep the systems current with upgrades and patches

- Check for security alerts and technical advice regularly

- Audit systems and networks, and regularly check logs for detecting an intrusion

Security remains the biggest obstacle for many individuals and organisations reposing full faith in the Information Superhighway. It is a major issue facing organisations today. We live in the era characterised by complex computer environments, by multiple computer platforms, and by vast conglomerates of integrates computer networks. Decisions about key security issues are far from trivial. Implementing security across the entire enterprise can be a perplexing and overwhelming task. To take control of security and protect information assets, an organisation must first address questions such as: How much security is necessary and what kind of security most effectively satisfies its requirements? Where to begin? How can it obtain an economical level of security for its information systems, at a reasonable cost? Fortifying the entire system is an onerous task and a half-hearted approach may defeat the very purpose of the exercise. It is important to remember that security is only as strong as the weakest link in the chain.

It can be expected that over the next few years, solutions will be found to many of the internet security problems. This does not mean that there will not be security issues to deal with of course there will be. In the future though, more proven tools and techniques will be available to combat internet crime. But at the same time the gravity and scale of electronic crimes may also increase. The future of the internet is an exciting prospect and does hold many surprises. We have just embarked on the road to a global information infrastructure. There will be able to safely complete journey.

A comprehensive solution requires that security issues be addressed at each level od the system. Any solution that an address the security needs, to create the trustworthy business environment, has to ensure the site security, service security and on-the-wire transaction security.

Digital Library

Rapid advances in information technologies have revolutionized the role of libraries. As a result, libraries face new challenges, competitors, demands, and expectations. Libraries are redesigning services and information products to add value to their services and to satisfy the changing information needs of the user community. Traditional libraries are still handling largely printed materials that are expensive and bulky. Information seekers are no longer satisfied with only printed materials. They want to supplement the printed information with more dynamic electronic resources. Demands for digital information are increasing.

The "digital library" is a term that implies the use of digital technologies by libraries and information resource centers to acquire, store, conserve and provide access to information. But with the increased interest in other areas such as electronic commerce and knowledge management, the concept of digital library has gone beyond the digitization of library collection. It has been expanded to encompass the whole impact of digital and networking technologies on libraries and the wider information field. Researchers from many fields including computer science, engineering, library and information science are investigating not only the digitization of catalogues and collections or the effective use of networked resources but also the meaning of these developments for both information providers and users alike. Beside the technical issues that engineers are dealing with, there are a number of issues such as acquisition, content management, charging and intellectual property that require the help of the business and the legal experts to deal with.

Digital libraries will start gaining ground in India in the present century. We are heading toward an environment in which digital information may substitute for much print-based information. A library's existence does not depend on the physical form of documents. Its mission is to link the past and the present, and help shape the future by preserving the records of human culture, as well as integrating emerging information technologies. This mission is unlikely to change in the near future. Digital libraries come in many forms. They attempt to provide instant access to digitized information and consist of a variety of information, including multimedia.

According to the Digital Library Federation (DLF), digital libraries are "organizations that provide the resources, including the specialized staff, to select, structure, offer intellectual access to, interpret, distribute, preserve the integrity of, and ensure the persistence over time of collections of digital works so that they are readily and economically available for use by a defined community or set of communities." (Digital Library Federation, 2001). From the above, it is clear that the stakeholders of digital libraries are many and wide-ranging. They include publishers, individual authors and creators, librarians, commercial information providers, federal, state and local governments, schools, colleges, universities and research centers, corporate technology providers, major information user organizations in both the public and private sectors. With this, it is unsurprising to find a myriad of different definitions and interpretations of a digital library. It could be a service, architecture, information resources, databases, text, numbers, graphics, sound, video and a set of tools and capabilities to locate

retrieve and utilize the information resources available. It is a coordinated collection of services, which is based on collections of materials, some of which may not be directly under the control of the organization providing a service in which they play a role. However, this should not be confused with virtual libraries or resource gateways that merely provide a link to the external resources without any extra effort to manage those resources. As those resources are normally not under the control of the organization, maintaining content and keeping the links up to date is extremely difficult.

But while the definition of the digital library is still evolving, it might be easier to look at the characteristic and functionality provided by the digital library. The DELOS Digital Library Reference Model defines a digital library as:

An organization, which might be virtual, that comprehensively collects, manages and preserves for the long term rich digital content, and offers to its user communities specialized functionality on that content, of measurable quality and according to codified policies. ("Digital Library")

A digital library is not a single entity. It requires technology link the resources of many collections. The links between digital libraries and their resources are transparent to users. Digital library collections are not limited to document surrogates (bibliographic records. They are the actual digital objects such as images, texts, etc.

Lynch (1994) says that, "digital Libraries ... [provide] users with coherent success to a very large, organized repository of information and knowledge." According to Berkeley Digital Library Project, University of California, the digital library will be a collection of distributed information sources. Garrett (1993) outlined some of these characteristics that are worth noting:

Ubiquity:
At least some set of services must be accessible at any time from any physical location.
Transparency:
The internal functioning of infrastructure components and interactions must be invisible to users. Users must be able to access services using their user interface of choice.
Robustness and scalability:
The infrastructure must be powerful enough to withstand a wide range of potential risks and continue to function without disruption to users and service providers.

Security and confidentiality:

The infrastructure must include mechanisms which ensure that parties to any transaction can reliably identified to each other, that confidentiality of the parties and the transaction can be assured where appropriate, and that the system cannot be easily compromised.

Billing, payment, and contracting:

The infrastructure must support both financial transactions in payment for goods and services, and the delivery and utilization of electronically generated and managed tokens (e.g., digital cash).

Searching and Discovery:

The infrastructure must provide for a wide range of resource identification strategies, from highly specific searches to generic browsing.

Clearly, the above characteristics involve access to information, content management, search and retrieval of information, payments, security and confidentiality, technology and infrastructure. While some of these issues sound manageable, other issues such payments and intellectual property still pose significant challenges and are still candidates for further research and development. The following sections address some of these issues confronting digital library development, and in particular, those affecting the electronic commerce aspect of the digital library.

The contrast between traditional and digital libraries is presented below

Traditional Libraries	Digital or Electronic Library
Print collection	All resources in digital form.
Stable, with slow evolution	Dynamic and ephemeral
Individual objects not directly linked with each other.	Multi-media and fractal objects
Flat structure with minimal contextual metadata	Scaffolding of data structures and richer contextual metadata.
Scholarly content with validation process	More than scholarly content with various validation processes
Limited access points and centralized management	Unlimited access points, distributed collections and access control
The physical and logical organization correlated.	The physical and logical organization may be virtually
One way interactions	Dynamic real time dialogue
Free and universal access.	Free as well as fee based.

Function of Digital Library

- Access to large amounts of information to users wherever they are and whenever they need it.
- Access to primary information sources.
- Support multimedia content along with text
- Network accessibility on Intranet and Internet
- User-friendly interface
- Hypertext links for navigation
- Client-server architecture
- Advanced search and retrieval.
- Integration with other digital libraries.

Purpose of Digital Library

- Expedite the systematic development of procedures to collect, store, and organize, information in digital form.
- Promote efficient delivery of information economically to all users.
- Encourage co-operative efforts in research resource, computing, and communication networks.
- Strengthen communication and collaboration between and among educational institutions.
- Take leadership role in the generation and dissemination of knowledge

Components

The components of a digital library are:

- Infrastructure
- Digital Collection
- Systems function
- Telecommunication facility
- Human resources

Planning for Digital Library

A digital library committee should be formed to plan for its creation and maintenance. The members must be from various library departments, and, if necessary, consultants can be hired. There are at least two ways of developing a digital library: converting a traditional library into a digital library, and direct development of a digital library. Planning includes:

- IT Infrastructure

- Digitization
- Access
- Staffing
- Furniture, equipment, and space
- Services
- Funding

Creation of Digital Resources

- Database of digital material that is open to all users over the campus-wide LAN.
- High bandwidth Internet connectivity
- Focus selectively on acquiring digital resources
- Electronic journals, and gradual elimination of print subscriptions
- Licensed databases
- Creation of local digital content available within the university

Benefits of Digital Library

Increase in efficiency of the organisation

E-libraries exist within the context of their organisations providing services that essentially increase the tendency towards delivering high quality customer service based on personal interaction with clients which causes customers to remain loyal as long as they continue to be served well. For instance, an insurer can take full advantage of e-libraries to increase operational efficiency, improve service, build on existing customer loyalty and ultimately complete successfully with the giants in a challenging marketplace.

Accurate information

Digital libraries provide accurate information to the organisation which helps to select, structure, offer intellectual access, interpret, distribute, preserve the integrity and ensures the persistence over time of collections of digital works so that they are readily and economically available for use.

Digital management

A large multinational law firm manages all of its correspondence and contracts in digital libraries. Because of the firm believes it has an obligation to offer similar legal advice to all correspondence, contacts and so forth as produced in each of its offices.

Storage

E-library allows legally recognised documents used in e-commerce transactions to be created, transmitted and stored. Without electronic document management, fast and efficient

e-commerce transactions would be buried under mounds of paper or be tied up in litigation over the authenticity of the electronic originals. A digital library has the potential to allow access to electronic documents, while respecting the intellectual property rights.

Data must be stored in e-libraries considering the following:

- Provide adequate context information for documents
- Provide means to prove the authenticity of documents used as evidence
- Be flexible according to organisational or technological change
- Provide links between paper and electronic documents

Preparation of data for analysis

Digital libraries must be efficient in handling large numbers of users and high volumes of transactions. These must work on linking, browsing, searching, clustering, handling multimedia information and managing large distributed collections to support discovery and reuse so as to provide information retrieval and multimedia.

Limitations

- Lack of screening or validation
- Lack of preservation of a fixed copy (for the record and for duplicating scientific research)
- Lack of preservation of "best in class"
- Difficulty in knowing and locating everything that is available, and differentiating valuable from useless information.
- Job loss for traditional publishers and librarians
- Costs are spread and many become hidden.

Digital Library Initiatives in India

India is in the experimental stages of digital libraries. Barring the Health Education Library for People (HELP), Mumbai, the Tata Institute of Fundamental Research (TIFR), Mumbai, IIT Kharagpur, and National Centre for Science Information (NCSI), Bangalore, a majority of libraries provide bibliographic access only. IASLIC-LIST and the LIS-FORUM, along with the electronic newsletter, INFOWATCH provide professional information. *Information today and Tomorrow* , *INFLIBNET Newsletter* , and the *DESIDOC Bulletin of Information Technology* (D-BIT) are a few other sources of current information on the use of ICTs and networks in India. Research and development activities regarding digital libraries are being undertaken in some institutions, for example, at the Education and Research network (ERNET) of Department of Electronics, GoI (http://www.doe.ernet.in) and the electronic

library being developed at the Indian National Scientific Documentation Centre (NISCAIR), New Delhi (http://www.NISCAIR.org). A brief account of some of the resources and services is presented below.

- Searchable databases on the web from Central Library of Indian Institute of Technology, Kharagur (IIT-Kgp) (http://144.16.192.18or http://libweb.iitkgp.ernet.in)

- Digitization at IIT-Kgp Library initiated at the beginning of 1990s. IIT-Kgp is one of the six premier institutions of quality education in engineering and technology, the Indian Institute of Technology (IITs).

- Electronic current awareness bulleting 'Infowatch' beginning in July 1996 by the University Grants Commission (UGC). (http://144.16.72.150/ncsi/iw.html)

- LIS-FORUM, a discussion forum sponsored by NCSI, Bangalore. (http://144.16.72.150/ncsi/services/lis-archive.html)

- Development of OPACs in many libraries such as Centre on Rural Documentation CORD of National Institute of Rural Development (NIRD), Hyderabad (http://www.nird.org/clic/index.html and http://www.nird.org/clic/L.html)

- Index of *Hitesranjan Sanyal Memorial Collection (HSMC)* at the Centre for Studies in Social Sciences (CSSS), Calcutta. (http://www.iisg.nl/asia/cssc.htm and http://www.socialsciencecal.org)

- Health Education Library for People (HELP), in Mumbai. HELP is a privately managed site providing health related information and managing an online catalogue of over 15,000 documents (http://www.healthlibrary.com)

The situation in India regarding digital libraries is very peculiar. Many government agencies, as well as institutions, mostly in the public sector, are engaged in some sort of work regarding the digitization of libraries. Examples clearly indicate that the potential of ICTs for developing digital libraries has not been fully realized by the GoI. While one government agency is providing support for one particular aspect, the other is focusing elsewhere, without any coordinated effort by a nodal agency.

IT ACT 2000

Introduction

Central to the growth of e-commerce and e-governance is the issue of trust in the electronic environment. The future of e-commerce and e-governance depends upon the trust that transacting parties place in the security of transmission and the content of communication.

Electronic transactions over the internet include formulation of contracts, delivery of content, exchange of business documents related to transactions, etc.

In order to address various issues in electronic commerce environment, the government of India enacted the Information Technology Act 2000 (IT Act) on June 9, 2000 and notified its implementation on October 17, 2000 with the publication of Information Technology (certifying authorities) Rules, 2000. The IT act is modelled on the UNCITRAL Model E-commerce Act that was developed by the United Nations with the aim of encouraging nations to adopt a similar law for providing recognition to e-transactions. The UN Model law has defined the basic concepts of electronic message, electronic signature, originator and recipient of electronic messages. The integrity, confidentiality and non-reputation of the messages in addition to electronic authentication of the transacting parties involved, is to be ensured in transactions. The electronic records are sought to be made at par with the hand written signature.

The IT act provides legal recognition to electronic records, and to digital signatures. Digital signature is one special form of more general concept of electronic signatures or e-signatures, based on asymmetric key pairs generated by the specific mathematical algorithms. It is the most widely used e-signature as of now. The IT Act recognises only the digital signature in the electronic world for it to be legally valid. It is thus technology specific. Thus the IT act is a single act encompassing several aspects relevant to the growth of e-commerce and e-governance.

The IT Act, 2000

The IT act defines the following key concepts related to electronic records, digital signatures and clarifying authorities:

- Asymmetric cryptosystem
- Certifying authority
- Certification practice statement
- Computer
- Computer networks
- Computer systems
- Data
- Digital signature certificate

- Electronic form

- Electronic record

- Key pair

- Originator

- Private Key

- Public key

- Secure system

Legal recognition to electronic records

Section 3 of the IT act provides for authentication of an electronic record by a person by affixing his digital signature, "which shall be affected by the use of an asymmetric crypto system and hash function".

Section 4 of the Act provides legal recognition to records, while section 5 provides legal recognition to digital signatures. Section 6 allows filling of electronic records in the form of electronic forms, with digital signatures of persons, to be filed with government organisations in lieu of paper-based forms, when prescribed by any of them.

Section 7 of the Act provides legal recognition to electronic records that are stores in the original formats in which they were generated. Retention of electronic records has thus been legalised. The government has been further authorised to have Official Electronic Gazette which will have the same legal recognition as the paper gazette for all rules, regulations, orders, bye-laws, notifications, or any other matter published in it.

Formation of online contracts

Section 11 to 13 of the IT act relate to the formation of an online contract between two parties that is solely mediated electronically. The originator of an electronic record sends it as a message which is deemed to have been received by the addressee, if he sends an acknowledgement, or conducts him in a manner so as to let the originator know that the message has been received by him. The two parties can agree on the formation of the contract depending on whether the acknowledgment of receipt of the electronic record by the addressee has been stipulated as a condition by the originator. If it has been mandated, then the contract will be deemed to be formed only after receipt of the acknowledgment from the addressee. In the alternative case, if the originator does not receive any acknowledgment, or any indication

that the addressee has received the electronic record sent by him, the originator, he can re-transmit the message stating the time frame by which the acknowledgment should come, failing which the originator can treat the electronic record as though it had never been sent.

The time of dispatch of the electronic record is deemed to be the time at which the electronic record enters a computer resource outside the control of the originator. Likewise, the time of receipt of an electronic record is taken to be the time it enters the computer resource designated by the addressee. These sections further clarify that the place of business of both the parties will be taken to the places where the electronic record will be deemed to have originated, and received, respectively. This will be the case irrespective of where the computer resources of both parties may be located.

Digital signature and certifying authorities

Section 14 through 42 in chapter V to VII of the IT Act deal with digital signatures, regulation of Certifying Authorities (CAs), Digital Signature Certificates (DSCs) and the duties of subscribers. The method of creating a secure electronic record and digital signature is described here.

The process of licensing a CA, and monitoring of its subsequent compliance with the terms and conditions of the license, including adherence to technology standards and the procedures of issuing DSCs to the users as laid in the rules and regulations under the IT act, are described in these chapters. A Controller of Certifying Authorities (CCA) is to be appointed for the purpose of exercising supervision and control over the CAs. The CCA itself is expected to observe the same technical standards in discharge of its functions that are technical in nature. It has to operate its own infrastructure to certify the public keys of CAs, in much the same way that a CA has to for certifying the public keys of its subscribers. In addition, he has to maintain a national repository of all the DSCs issued by the CAs in the country.

A CA has to declare its practices in public in the form of what is known as its Certification Practice Statement (CPS). As part of the CPS, it describes the classes of DSCs to be issued by the CA, and the physical verification procedure that it follows to issue the certificates. The attributes of the person are given in the certificate. It is his authentication token in the electronic world. Depending upon the level of physical verification, as described in the CPS, a particular class of DSC may be used for high value transactions. The CA is also

expected to state in the class of certificate issued by it, the type of transaction or the end-use, it may be put to. A relying party, on seeing a certificate, can thus decide on the level of authentication that is necessary for his transaction.

The digital signature regime works on the private-public key pair that is generated by an asymmetric cryptosystem algorithm, such as the RSA algorithm. While the private key is used to sign an electronic record by encrypting it suitably, it is the corresponding public key that alone verifies that the record was indeed signed by its owner's private key. Hence, the owner of a DSC has to ensure that he keeps his private key safe custody. In fact, the very first step of generation of the key pair should be initiated by the user so that he retains control of his private key. The act enjoins upon the user responsibilities related to protection of his private key.

Cyber crimes under the IT Act

Cyber crimes under the IT Act have been covered in section 15.3. As observed, it is not a special act dealing with internet crimes or cybercrimes per se. hence it does not appear to highlight the enormity of cyber crimes. Many of the now well known cyber crimes do not even find a mention in the IT act.

The Act does not cover common cyber crimes such as cyber stalking, cyber harassment, stealing of internet hours, cyber defamation, etc. Cyber stalking and e-mail harassment are emerging as major crimes which are increasing by the day, but are not covered by the present IT Act. Hacking and pornography are covered in the Act in a fairly reasonable way so as to bring the perpetrators of these crimes to justice. The Act also provides for data protection in a limited way through sections on cyber contraventions covering unauthorised access to computer system or computer network and cyber offences dealing with computer, computer system or computer network related serious offences.

Economic offences resulting in financial losses are the key drivers for motivating the protection of sites, data and e-transactions. Online trading firms and stock brokers in Mumbai suffered due to virus attacks. The loss in terms of money has not been adequately quantified.

Therefore, Cyber crimes are very real. They can result in huge financial losses to the society. They can also harass citizens in other ways. A more comprehensive Cyber Crime Bill

or Internet Crime Bill may be required, in due course, to deal with these crimes. For now, the IT act has created the necessary legal and administrative framework to promote the growth of e-commerce and e-governance through the establishment of public key infrastructure, and by including the necessary clauses for providing punishment for computer misuse and frauds rolled into this omnibus act. If thus seeks to build confidence among the public that frauds in cyber space will not go unpunished.

Section 65 through 78 of the IT act deal with offences, and prescribe punishment in the form of fine and imprisonment. Specifically, as noted above, hacking, pornography, and law and order have been addressed in a focused way. All other cyber crimes are left uncovered. On the other hand, government systems have been given the status of protected systems under section 70, provided they have been notified to that effect in the Official Gazette. In such a case, an intruder into such a system can be punished with imprisonment of up to 10 years.

Advantages of Cyber Laws

- The IT Act 2000 attempts to change outdated laws and provides ways to deal with cyber crimes. We need such laws so that people can perform purchase transactions over the Net through credit cards without fear of misuse. The Act offers the much-needed legal framework so that information is not denied legal effect, validity or enforceability, solely on the ground that it is in the form of electronic records.

- In view of the growth in transactions and communications carried out through electronic records, the Act seeks to empower government departments to accept filing, creating and retention of official documents in the digital format. The Act has also proposed a legal framework for the authentication and origin of electronic records / communications through digital signature.

- From the perspective of e-commerce in India, the IT Act 2000 and its provisions contain many positive aspects. Firstly, the implications of these provisions for the e-businesses would be that email would now be a valid and legal form of communication in our country that can be duly produced and approved in a court of law.

- Companies shall now be able to carry out electronic commerce using the legal infrastructure provided by the Act.

- Digital signatures have been given legal validity and sanction in the Act.

- The Act throws open the doors for the entry of corporate companies in the business of being Certifying Authorities for issuing Digital Signatures Certificates.

- The Act now allows Government to issue notification on the web thus heralding e-governance.

- The Act enables the companies to file any form, application or any other document with any office, authority, body or agency owned or controlled by the appropriate Government in electronic form by means of such electronic form as may be prescribed by the appropriate Government.

- The IT Act also addresses the important issues of security, which are so critical to the success of electronic transactions. The Act has given a legal definition to the concept of secure digital signatures that would be required to have been passed through a system of a security procedure, as stipulated by the Government at a later date.

- Under the IT Act, 2000, it shall now be possible for corporate to have a statutory remedy in case if anyone breaks into their computer systems or network and causes damages or copies data. The remedy provided by the Act is in the form of monetary damages, not exceeding Rs. 1 crore.

Review Questions

1. Describe various security issues in e-commerce.
2. Explain various security components of e-commerce.
3. What is e-commerce security? and discuss its tools.
4. Discuss briefly about security threats in e-commerce.
5. Explain e-commerce infrastructure resource planning.
6. What are all the types of threats?
7. Describe briefly about digital library and its benefits.
8. Explain briefly about I.T. Act 2000