

Course Title : Fundamentals of E-Commerce

Course no : CSE - 356

Credit hours : 3

Full Marks : 60+20+20

Pass Marks : 24+8+8

Course Synopsis : Discussion on types of commerce, doing business in electronics, infrastructure of electronic commerce.

Goal : This course introduces basic concept of commerce and discusses the basic needs of electronic commerce.

Course Contents :

Unit 1:

-14Hrs.

1.1 Introduction to Electronic Commerce : Introduction of commerce, Electronic commerce framework, electronic commerce and media convergence, the anatomy of e-commerce application.

1.2 The Network for Electronic Commerce : Need of Network, market forces influencing the T-way, components of T-way, network access equipment, and global information distribution network.

1.3 The Internet as a Network Infrastructure : Introduction, the Internet terminology, NSFNET : Architecture and Components, Internet governance : The Internet Society.

Unit 2:

- 23 Hrs.

- 2.1 Network Security and Firewalls: Client - server network security, security threats in client - server, firewalls and network security, data and message security, encrypted documents and electronic mail.
- 2.2 Electronic Commerce & World Wide Web: Introduction, architectural framework for electronic commerce, WWW as an architecture, security in the web.
- 2.3 Consumer Oriented Electronic Commerce: Introduction, consumer oriented application, mercantile process models, mercantile models from the consumer's perspective, mercantile models from the merchant's perspective.
- 2.4 Electronic Payment Systems: Introduction, types of electronic payment system, digital token based electronic payment systems, smart cards and electronic payment systems, credit card systems, threat on electronic payment system.

Unit 3:

- 8 Hrs.

- 3.1 Inter-organizational Commerce & Electronic Data Interchange: Introduction, EDI application in business, EDI: legal, security, and privacy issues, EDI and electronic commerce.
- 3.2 The Corporate Digital Library: Introduction, dimensions of electronic commerce systems, types of digital documents, Issues behind document infrastructure, corporate data warehouses.

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UNIT 1:

1.1) Introduction to Electronic Commerce

Introduction of E-commerce :-

E-commerce refers to the business methodology that is done via computer network. It is relatively new, emerging and constantly changing area of business management and information technology. E-commerce is digitally enabled commercial transaction between organizations and individuals. It includes all the commercial transaction i.e. exchange of value (money) in return for product and services. Without an exchange of value no commerce occurs.

Some of the definitions of e-commerce depends upon heard and found in publication and media are mentioned below:

"E-commerce is a subset of business where business transaction takes place through telecommunication network specially the internet."

"E-commerce describes buying and selling of products, services and information through computer networks including the internet."

"E-commerce is about doing business electronically."

"E-commerce is defined as the conduct of financial transaction by electronic means."

E-business :-

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E-business known as electronic business is the online presence of business. It can also be defined as the business which can done with the help of internet or electronic data interchange. E-commerce is one of the important component of e-business.

E-business include e-commerce but also covers internal processes such as production, inventory management, production development, risk management, financial management, knowledge management and human resource management. E-business strategy is more complex, more focused on internal processes and aimed at first saving and improvement in efficiency.

E-commerce Vs E-business

E-business and e-commerce are terms that are sometimes used interchanging and sometimes they are used differently. But the terms are different and that difference matters to today's business.

E-commerce.

E-commerce involves commercial transaction done over internet.

E-commerce is the subset of e-business.

E-business

E-business is conduct of business process on the internet.

E-business is the super set of e-commerce.

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E-commerce

E-commerce is use of electronic transaction that covers buying and selling products and services.

E-commerce requires website that can represent the business.

E-commerce use the internet to connect with rest of the world.

Buying a pendrive from amazon.com is considered as e-commerce.

E-business

E-business include monetary transaction in addition with other transaction.

E-business requires a website, CRM (Customer Relationship Mgmt.) and ERP (Enterprise Resource Planning) for running the business over the internet.

E-business use internet, intranet and extranet to connect with the parties.

Using internet by company like by DELL or amazon for maintaining business process such as online customer support, e-mail marketing, supplies in management are considered as e-business.

Related terms

- M-commerce
- E-Marketing
- E-Market
- U-Commerce

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M-commerce :-

It is termed as mobile commerce where buying and selling of goods and services is done through wireless handheld devices such as cellular telephone and Personal Digital Assistant (PDA).

E-Marketing (Electronic Marketing)

E-Marketing is the process of marketing a product or services using internet. It also includes marketing done through e-mail and wireless media. It uses range of technologies to help connect business to their customers. Some primary benefits of e-marketing are listed below :

- i) Much better return on investment than from that of traditional marketing.
- ii) Reduce marketing campaign by using internet.
- iii) Fast result of the campaign.
- iv) Easy monitoring through the web tracking capabilities.

E-Market

E-Market is information system which is used by multiple separate organizational entities with one or among multiple tiers in economic value change.

U-Commerce (Ubiquitous commerce)

U-Commerce is the combination of electronic, wireless, television, voice and silent commerce. U-commerce can be defined as the use of ubiquitous network

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to support personalized and uninterrupted communication and transaction between firms and its various stakeholders to provide a level of value above and beyond traditional commerce.

Traditional Commerce Vs. E-commerce

Traditional commerce

E-commerce

- | Traditional commerce | E-commerce |
|---|---|
| i) Heavy dependency on information exchange from person to person. | i) Information sharing is done easily through electronic communication channel making a little dependency on person to person information exchange. |
| ii) Communication /transaction are done in synchronous way, manual intervention is required for each communication and transaction. | ii) Communication /transaction can be done in asynchronous way, the whole process is completely automated. |
| iii) It is difficult to establish and maintain standard practices in traditional commerce. | iii) A uniform strategy can be easily established and maintain in e-commerce. |
| iv) Communication of business depends upon personal skills. | iv) In e-commerce, no human intervention occurs. |

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Traditional commerce

- v) Unavailability of uniform platform as it depends heavily on personal communication.

- vi) No uniform platform for information sharing as it depends heavily on personal communication.

E-commerce

- v) E-commerce website provides the user a platform where all the information is available at one place.

- vi) E-commerce provides a universal platform to support commercial business activities across the globe.

Advantages of E-commerce

Advantages to organization

- International market
- Operational cost savings
- Mass customization
- Low telecommunication cost
- Digitization of product and processing
- No more 24 hours time constraints.

Advantages to customer

- 24/7 access
- More choices
- Price comparison
- Improved delivery process
- An environment of competition

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Advantages to society

- a) Enable more flexible working practice
- b) Connect people
- c) facilities delivery of public services.

Advantages of E-commerce to organization

a) International market

Using E-commerce organization can expand their market to national and international with minimum capital investment. An organization can easily locate more customers, best suppliers and suitable business partners across the globe.

b) Operational cost saving

The cost of creating, processing, distributing, storing and retrieving paper based information has decreased

c) Mass customization

E-commerce has revolutionized the way customer buy goods and services. For example:- in the past when the company 'ford' started making cars, customer could have any colour so long as it was black. Now customer can configure a car according to their specification within a minute online through the www.ford.com.

d) Low telecommunication cost

The internet is much cheaper than Value added network (VAN) which was based on leasing telephone lines for the sole use of the organization and its authorized partners. It is also cheaper to send a fax or email through the internet than direct dialing.

e) Digitalization of product and processing

Particularly in the case of software and music video products which can be downloaded and email directly to customers through the internet in digital and electronic format. Specially

f) No more 24 hrs time constraints

Business can be conducted by or collect customer or supplier at any time.

Advantages of E-commerce to customer

a) 24/7 access

E-commerce enables customers to shop or conduct other transaction 24 hours a day, all year round from almost any location.

b) More choices

Customer not only have a whole range of products

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that they can choose from and customized but also an international selection of suppliers.

c) Price comparison

Customers can shop around the world and conduct comparisons directly by visiting different sites for financial products and services.

d) Improved delivery process

This can range from the immediate delivery of electronic goods such as software or audio/video files and to the online tracking of the progress of package being delivered by mail or couriers.

e) An environment of competition

Substantial discount can be found or value added as different retailer for customer.

Advantages of E-commerce to society

a) Enable more flexible working practice

Enhance the quality of life for a whole host of people in society enabling them to work from home. It also potentially reduces environmental pollution as people have to travel for their work regularly.

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b) Connect people

Enable people in developing countries and rural area to enjoy and access product, services, information and other people which otherwise would not be so easily available to them.

c) Facilitates delivery of public services

Enables people to receive different public services available over the internet such as health services, filling taxes, etc.

Limitations of E-commerce

Limitations to organization

- a) Lack of sufficient system security, reliability standard and communication protocol.
- b) Rapidly evolving and changing technology
- c) Under pressure to innovate and develop business models.
- d) Facing increased competition
- e) Problem with compatibility with older and newer technology.

Limitations to consumer

- a) Computing equipment
- b) Technical knowledge
- c) Cost of access to internet
- d) Cost of computing equipment

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- e) Lack of security and privacy of personal data
- f) Physical contact and relationship are replaced by electronic processes.

Limitations to society

- a) Breakdown in human interaction
- b) Social division
- c) Reliance on telecommunication infrastructure, power and IT skills
- d) Wasted resources
- e) Difficulty in policing the internet.

Limitations of E-commerce to organization

- a) Lack of sufficient system security, reliability standard and communication protocol

There are numerous reports of website and database being hacked into security holes in software. So organization has to face many challenges to secure their websites and maintain standard. For example: Microsoft has over the years issued many security notices and patches for their software. Several banking and other business website have experienced breaches (threat) in security where technical errors or a fault in their system lead to confidential client information becoming disseminate.

- b) Rapidly evolving and changing technology
ICT is the most rapidly changing technology. So, there is always a feeling of trying to catch up and not be left behind to an organization.
- c) Under pressure to innovate and develop business models
It is always under pressure to innovate and develop business models to exploit the new opportunities which sometimes leads to strategies harmful to organization.
- d) Facing increased competition
Facing competition from both national and international competitors often leads to price wars and subsequent unconsiderable losses for the organization.
- e) Problem with compatibility with older and newer technology
There is a problem where older business system cannot communicate with web based and internet infrastructure leading to some organizations running almost two independent system where data cannot be shared. This often leads to having additional investment in new system or an infrastructure which bridges the different systems. In both cases financially as well as it will be destructive to the efficient running of an organization.

Limitations of E-commerce to consumer

a) Computing equipment

It is needed for individual to participate in the new digital format which means an initial capital cost to consumer.

b) Technical knowledge

The basic technical knowledge is required for both computing equipment and navigation of the internet.

c) Cost of access to internet

Whether dial up or broadband, the cost of internet charge is required.

d) Cost of computing equipment

Not just the initial cost of buying equipment but also make sure that the technology is updated regularly to be compatible with changing requirements of internet, websites and application.

e) Lack of security and privacy of personal data

There is no real control of data that is collected over the web or internet. Data protection laws are not universal and website hosted in different countries may or may not have laws which protect privacy of personal data.

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- f) Physical contact and relationship are replaced by electronic processes

Customers are unable to touch and feel goods being online user and cannot keep the relation of human beings.

Limitations of E-commerce to society

- a) Breakdown in human interaction

As people move users to interacting electronically there could be an divide of personal and social skills which might eventually determine to the world we live where people are comfortable interacting with a screen than face-to-face.

- b) Social division

There is a potential danger that there will be any increase in the social divide between technical haves and not have so people who do not have technical skills become unable to secure better paid job and could form an under class with potentially dangerous implication for social stability.

- c) Reliance on telecommunication infrastructure, power and IT skills

Dependency on telecommunication infrastructure, power and IT skills which in developing countries nullifies the benefits when all these factors are unavailable or under

development.

d) Wasted resources

As new technology dates quickly changes, we need to dispose all the older devices or softwares.

e) Difficulty in policing the internet

It means that numerous crimes can be carried out and often go undetected. For example: there can be unpleasant rise in the availability and access of obscene (dirty) materials and is with which paedophiles and other can trap children by masquerading in chat rooms.

Technical and Non-technical disadvantages

Technical disadvantages:

- a) There can be lack of system security, reliability or standards because of poor implementation of e-commerce.
- b) The software development industry is still evolving and keep changing rapidly.
- c) In many countries, network bandwidth might cause an issue.
- d) Special type of web server or other software might be required by the vendors setting the e-commerce environment apart from the network servers.
- e) Sometimes it becomes difficult to integrate an e-commerce software or websites with existing application or database.
- f) There could be software/hardware compatibility issue as

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some e-commerce software may be incompatible with operating system or any other component.

Non-technical disadvantages:

- a) The initial cost of creating an e-commerce application may be very high.
- b) User may not trust the website being an unknown faceless seller. Such untrust makes it difficult to convince traditional user to switch from physical stores to online and virtual stores.
- c) It is difficult to ensure data privacy on online transaction.
- d) Lack of touch and feel of products during online shopping.
- e) Internet access is still not cheaper and is inconvenient to user for many potential customer such as those living in remote village.

Some unique features of E-commerce :

1. Ubiquity
2. Global reach
3. Universal standards
4. Richness
5. Interactivity
6. Information density
7. Personalization / Customization.

1. Ubiquity :-

In traditional commerce a market place is restricted i.e. we can be in limited area to buy or sell whereas e-commerce is ubiquitous meaning that it is available just about everywhere at all time. It makes possible to shop from our desktop at home, at work or even from our car using mobile commerce. The market place extended beyond traditional boundaries and remove from a temporal and geographical location. From a consumer view, ubiquity reduce the transition cost i.e. the cost of participating in market, travelling money to the market and save our time.

2. Global reach :-

Unlike traditional commerce, e-commerce technology permits commercial transaction to cross cultural and national boundaries with more conveniently and effectively. As a result, the potential market size of e-commerce merchant's is roughly equal to the size of world's online population.

3. Universal standard :-

One striking unusual feature of e-commerce technology is that the technical standard of the internet and the technical standard for conducting e-commerce are universal. They are shared by all nations around the world. In contrast, most traditional commerce technologies differ from one nation to another nation. The universal technical standard of e-commerce greatly reduce the market entry cost i.e. the cost merchant must pay just to bring their goods to market.

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4. Richness :-

Information richness refers to the complicity and the content from the message. With the use of e-commerce technology, merchant can permit to present their message in effective way.

5. Interactivity :-

E-commerce technology are interactive meaning that they allow two-way communication between merchant and consumer. For instance, television cannot ask viewer any questions, enter into a conversation with a viewer or request customer to enter information into a form. In contrast all of these activities are possible in e-commerce website. Interactivity allow an online merchant to engage a consumer in a way similar to face-to-face experience but on a much more massive global scale.

6. Information density :-

The internet and web vastly increase information density i.e. the total amount and quality of information available to the all market participants, consumers and merchants. E-commerce technology reduce the information collection, storage, processing and communication process. At the same time, this technology increase greatly the accuracy and timeliness of information i.e. making information more useful and important than ever. As a result information becomes more plentiful, cheaper and of higher quality.

7. Personalization | Customization :-

E-commerce technologies permits personalization i.e. merchant can target their marketing message to the specific individual by adjusting the message. The technology also permits customization i.e. changing the delivered product or services based on user performance or prior behaviour.

Business model for e-commerce :

A business model is the method of doing business by which a company can sustain itself i.e. generate revenue. The business model spells out how a company makes money by specifying where it is position in the value chain. Some models are quite simple where a company produce goods and services and sell it to customer. If all goes well, the revenue from sales exceeds the cost of operation, the company realize profit. Other models can be complex such as radio and television broadcasting. The broadcaster is a part of complex network of distributor, contact creator, advisor and listener or viewer who makes money and how much it is not always clear at the outset.

A company's business model is the way in which it conduct business in order to generate revenue. In the new economy companies are creating new business model and reinventing old models. Reading the literature, we find business model categorized in different ways. But presently there is no single comprehensive and cogent taxonomy of web business model. Although there are many different ways

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be

To categorize e-business model, they can broadly classified as follows:

1. E-business model based on the relation of transaction parties
2. E-business model based on the relation of transaction types

1. E-business model based on the relation of transaction parties

The electronic markets are emerging in various fields. Different industries have markets with different characteristics. Generally, e-commerce business models can be categorized into following categories:

- a) Business to Business (B2B)
- b) Business to Customer (B2C)
- c) Customer to Customer (C2C)
- d) Customer to Business (C2B)
- e) Business to Government (B2G)
- f) Government to Business (G2B)
- g) Government to Customer (G2C)

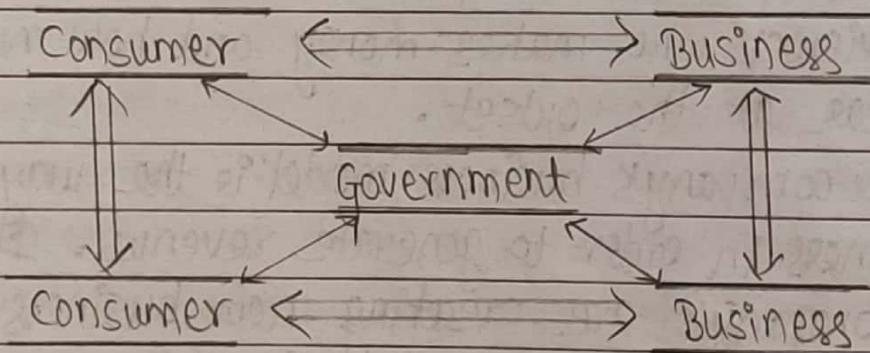


Fig :- E-business transaction model

a) Business to Business (B2B):

The website following the B2B ^{business} model sells its product to an intermediate buyer who then sells the product to the final customer. For example: a wholesaler places an order from a company's website and after receiving the consignment sells the end product to the final customer who comes to buy the product at one of its retail outlets.

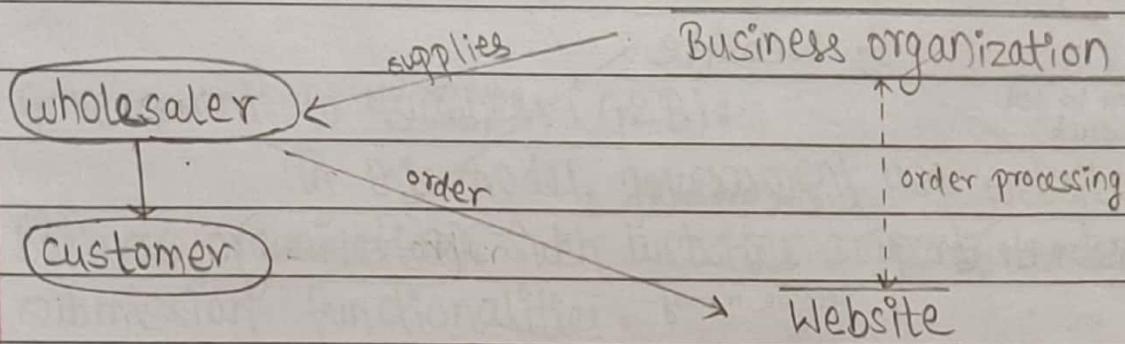


Fig :- B2B model

b) Business to Customer (B2C):

A website following a B2C business model sells its product directly to a customer. A customer can view a product on a website, choose a product and order the same product. The website will then send notification to the business organization through e-mail and then organization will dispatch the product to the customer.

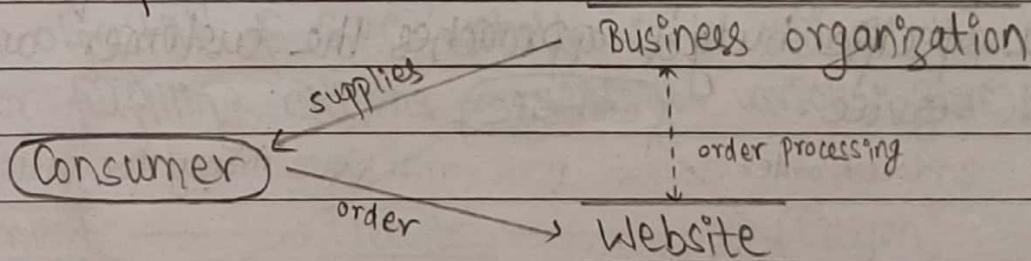


Fig :- B2C model

c) Customer to Customer (C2C):

A website following C2C business model helps consumer to sell their asset like residential property, cars, motorcycles, mobiles, etc or rent a room by publishing their information on the website. Websites may or may not charge the consumer for its services. A consumer lists items for sale and other customers place bids on the item.

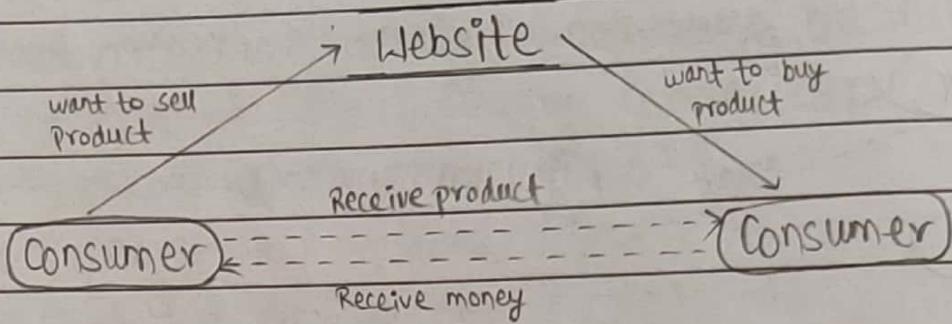
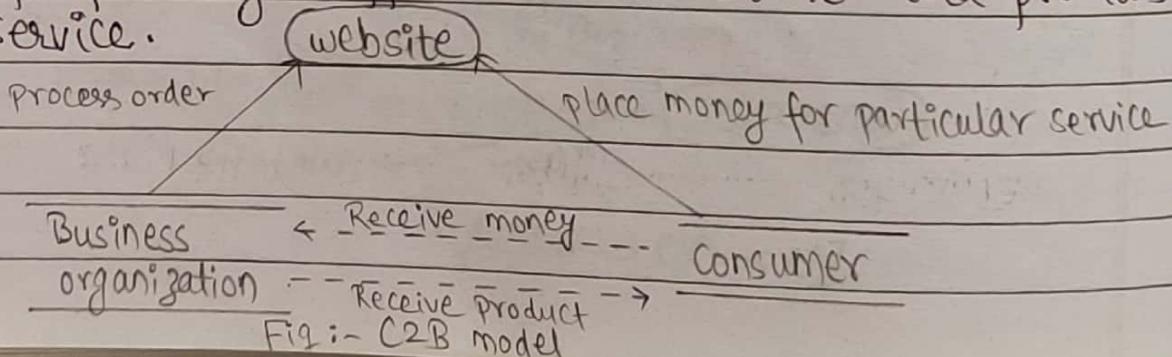


Fig:- C2C model

d) Customer to Business (C2B):

In this model, a consumer approaches a website showing multiple business organization for a particular service. The consumer place an estimate of amount he/she want to spend for a particular service. For example; the comparison of interest rate of personal loan or car loan provided by various banks through website. A business organization who fulfills the consumer's requirement within the specific budget approaches the customer and provides its service.



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e) Business to Government (B2G):

In this model, websites are used by government to trade and exchange information with various business organization.

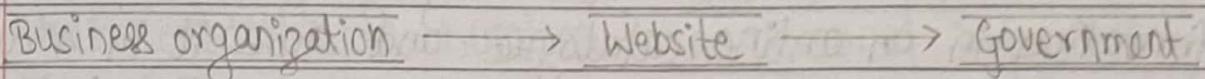


Fig:- B2G model

f) Government to Business (G2B):

In this model, government use website to approach business organization. Such websites support tenders and application submission functionalities.

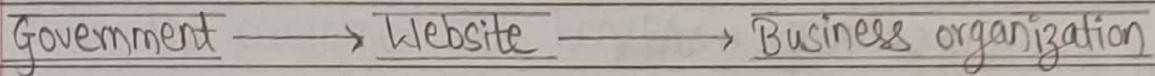


Fig:- G2B model

g) Government to Customer (G2C):

In this model, government use website to support citizen in general works. Such website provide auctions of vehicles, machinery or any other materials. It also provides services like registration for birth, marriage or death certificate. The main objective of G2C website is to reduce the average time for fulfilling citizens request for various government services.

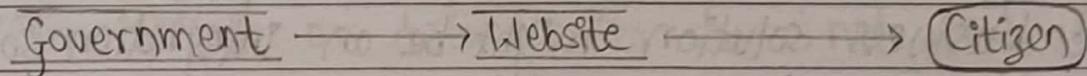


Fig:- G2C model

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Business to Consumer (B2C):

The B2C model refers transaction between business organizations and customers. It apply to any business organization that sells its products and services to consumer over the internet. These sites display product and information in an online catalogue and store it in a database. The B2C model also include services such as online banking, travel services, health information and many more. Following figure shows model of B2C.

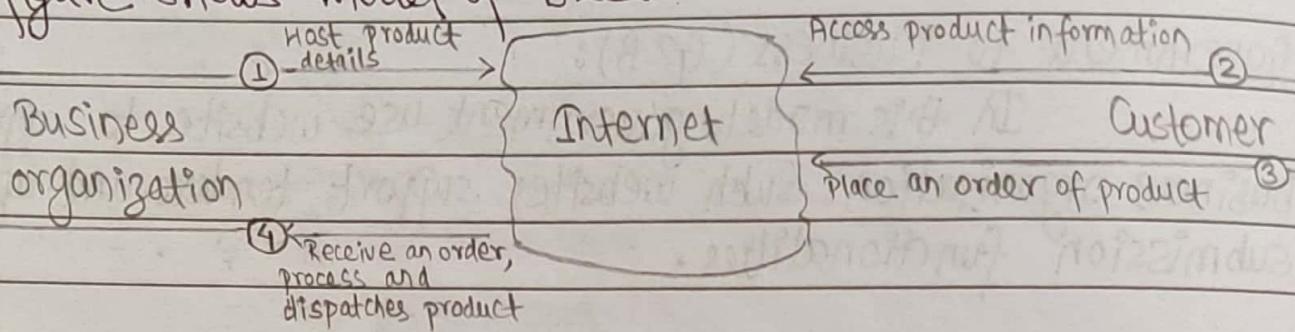


Fig:- B2C model

Customer increasingly going online to shop for and purchase product, arrange financing, arrange shipment or take delivery of digital products such as software and gets services after the sale. B2C e-business model include retail sales often called e-tail or re-tail and other online purchases such as online tickets, entertainment tickets, hotel rooms, etc.

For example: www.amazon.com site also involves B2C model in which customers search for a product on site and place order if required. This implies that a complete business solution might be an integration solution of more than one business model. In www.amazon.com,

include the B2B model in which the publisher transact with amazon and the B2C model in which an individual customer transact with the business organization.

The B2C model of e-commerce is more prone to the security threats because individual customers provide their credit card number and personal information in the site of the business organization. In addition, the customer might doubt that his information is secured and used effectively by the business organization.

Advantages of e-business for B2C business model:

Advantages of B2C can be considered either from the view point of customer or from that of the business organization.

From the customer side benefits include:

- i) Access to goods and services from the home or other remote locations.
- ii) The possibility of lower goods and services ^{cost}.
- iii) Access to greater variety of goods and services.
- iv) Allow to shop at any time of day or night.

From the business side benefits include:

- i) Lower transaction cost associated with sales.
- ii) Access to global market.
- iii) Can display information of product and services without spending a lot of money on colourful advertisement.
- iv) Can operate on decrease or even no overhead.

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Disadvantages of e-business for B2C business model:

Disadvantages for consumer:

- i) security issue:- Probably one main reason why people don't purchase online is security. Credit card information is very sensitive and must be handled by someone that customer can trust. Phishing, fraud, scams, etc are common on the web.
- ii) Customer's service :- Customer are not always satisfied with their purchase while buying online.
- iii) High sales cycle :- Normally a lot of phone calls and mailing are needed for online transaction

Disadvantages for business organization:

- i) The technology problem can cause site not operate properly resulting losing customers and sales.
- ii) Require higher cost of doing business.
- iii) Need skilled staffs that give customer service and sales support service.

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Process in B2C (How B2C works?)

B2C e-commerce is more than just an online store. It really is about managing the entire processes just using technology as a tool for order processing and customer support. Figure below depicts the processing of B2C :

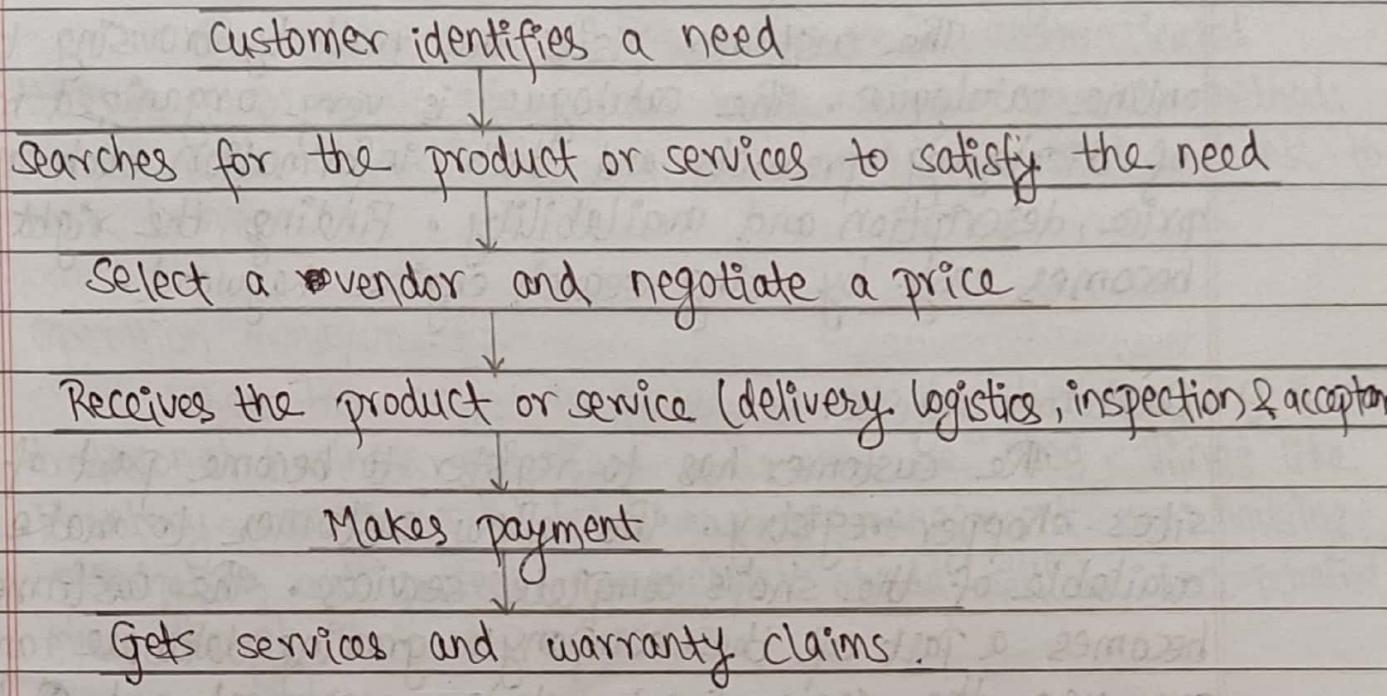


Fig:- Processes in B2C.

The B2C process can be explained in detail as:

- 1) Visiting the virtual mall
- 2) Customer register
- 3) Customer buy products
- 4) Merchant processes the order
- 5) Credit card is process

- 6) Operation management
- 7) Shipment and delivery
- 8) Customer services
- 9) After-sales service

1) Visiting the virtual mall :-

The customer visits the mall by browsing the online catalogue. The catalogue is very organized manner of displaying products and their information such as price, description and availability. Finding the right product becomes easy by using search engine keyword.

2) Customer register :-

The customer has to register to become part of the site's shopper registry. This allow customer to make available of the shop's complete services. The customer becomes a part of the company's growing database and can use the same for knowledge management and data mining.

3) Customer buy products :-

Through a shopping cart system, order details, shipping charges, taxes, additional charges and price totals are represented in an organized manner. The customer can even change the quantity of certain product.

4) Merchant processes the order:-

The merchant then processes the order that is received from the previous stage and fill up the necessary forms.

5) Credit card is process:-

The credit card of the customer is authenticated through a payment gateway or bank. Other payment methods can be used as well such as debit card, visa card or bank-to-bank transfer.

6) Operation management:-

When the order is passed to the logistic people, the traditional business operations will still be used. Things like inventory management, total quality management, warehousing, optimization and project management should still be incorporated even though it is an e-business.

7) Shipment and delivery:-

The product is then shipped to the customer. The customer can track the order or delivery as virtual malls have a delivery tracking module on the website which allows the customer to check the status of a particular order.

8) Customer services:-

The product is received by the customer and is verified. The system should then tell the firm that the order has been fulfilled.

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9) After-sales services:-

After the sale has been made, the firm has to make sure that it maintains a good relationship with customers. This is done through customer relationship management (CRM).

Business to Business (B2B):

Business to Business model involves electronic transactions for ordering, purchasing as well as other administrative tasks between business houses. It includes trading goods such as business subscriptions, professional services, manufacturing and wholesale dealing. Sometimes in the B2B model, business may exist between virtual companies which may not have any physical existence. In such cases, business is conducted only through the internet.

Let us take an example of www.amazon.com. As we know, [amazon.com](http://www.amazon.com) is an online book store that sells books from various publishers. In this case, the publisher have the option of either developing their own sites or displaying their books on other sites. The publisher mainly choose to display their books on www.amazon.com as it gives them a large audience/customer. Now to do this publisher needs to transact with [amazon](http://www.amazon.com) involving business houses on the both ends, which is known as B2B model.

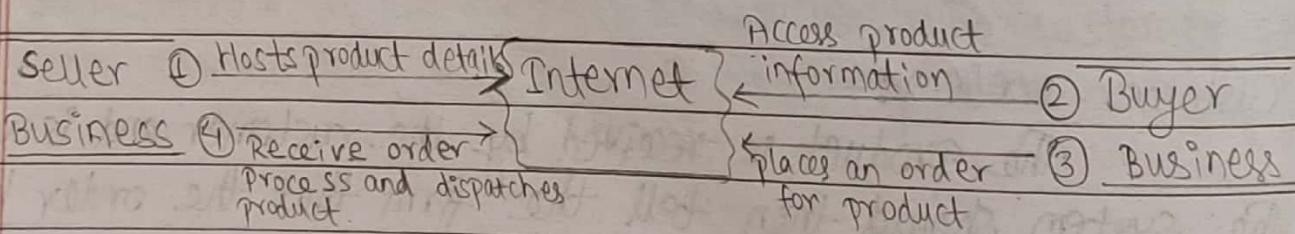


Fig:- B2B business model.

B2B model is that model of e-commerce whereby a company conducts its trading and other commercial activities through the internet and customer is another business house. This essentially means commercial activities between companies through the internet as a medium is B2B.

Advantages of B2B model:

1. Direct interaction with customer
2. Focused sells promotion
3. Building customers loyalty
4. Scalability
5. Saving in distribution cost

1. Direct interaction with customer:

This is a greatest advantage of e-business where there is no need of any mediator and e-business organization can interact and communicate with its customers via internet.

2. Focused sells production:

Company can collect information about likes, dislikes and preferences of clients and thus helps the company to bring out focused sells promotion drives which are aimed to the right customers.

3. Building customers loyalty:

It has been observed that online customer can be more loyal than the offline customer if they are made to feel special and their distinct identity is recognized and

their privacies are respected. It has also been found that once a customer develop binding relationship with a site and its product they do not like to shift loyalties to another site or product.

4. Scalability:

This mean that the web is open and offers round the clock access. This access is from any location. Thus, a company is able to handle many more customers on a much wider geographical spread.

5. Saving in distribution cost:

A company can make huge saving in distribution, logistical and after sells support cost by using e-business model.

Disadvantages of B2B:

- The number of B2B websites as early as 2000, there was an exclusive growth. Inorder to obtain cheaper and faster delivery hundreds of websites are opened to support chemical, pharmaceuticals, retail and other industries. So, e-commerce is no suitable for every business.
- B2B model can be a problem which lead to a possible lack of credit. For example: large electronic market owners may intentionally kill smaller competitors transaction.
- Due to the large number of transactions involved, B2B business operations can be too risky when organization cannot guarantee adequate quality of service in terms of

performance, availability and security.

Process for B2B transactions:

Transaction process for company breaks down into 8 clear steps:

- i) Identify need:- Identify need for a product purchase. For example: lawn wants to offer mowing services to its clients. To do this, it needs to purchase mower. Thus, the need to make a purchase of a product mower is identified.
- ii) Select specific product:- Select a specific product to meet the need. for example: the lawn company must select which type of mower from the many push and riding varieties on the market that needs the company's requirements.
- iii) Appoint purchase team:- Put a team together to manage the purchase process including, finalizing the list of required technical specifications for the product, the bid solution and award process.
- iv) Specified technical specification:- Make a list of required technical specification for the product to ensure it meets the company's needs.
- v) Budget for purchase:- Establish a budget for purchase depending on range of prices identified by the research done by purchase team.

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- v) Potential supplier :- Research the various product types that fit the need along with nearer suppliers to identify the most durable product and the best price.
- vii) Solicit bids :- Solicit bid from the manufacturer and supplier of the identified product that meets all the required technical specification.
- viii) Award contract :- Select a supplier from the bid submitted and award the purchase contract.

Consumer to Consumer model (C2C) :-

The C2C model involves transaction between consumers. Here, a consumer sells directly to another consumer. Example: eBay is common example of online auction website that provide a consumer to advertise and sell their product online to another consumer. However, it is essential that both seller and buyer must register with a auction site.

While the seller needs to pay a fixed fee to the online auction house to sell their product, the buyer can bid without paying any fee. The site brings the buyer and seller together to conduct deals as shown in figure.

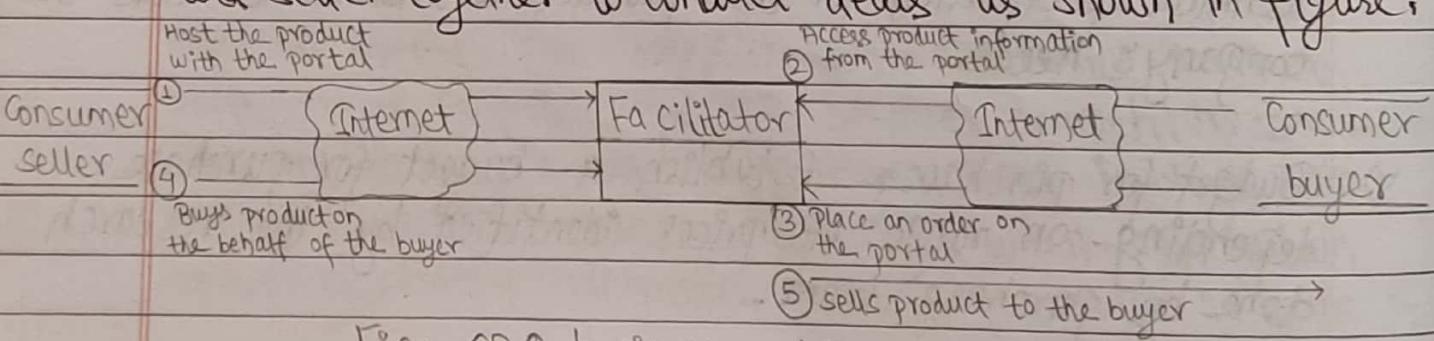


Fig:- C2C business model

Let us now look at the above figure with respect to eBay. When a customer plans to sell his product on the web of eBay, he first needs to interact with eBay site which acts as facilitator of the overall transaction then seller can host his product on www.eBay.com. Any buyer can now browse the site of eBay to search for the product he is interested in. If buyer find a product, he places an order for the same product on the website of eBay. eBay now purchase the product from the seller and then sells it to the buyer. In this way, the transaction between two customers occur and any organization acts as interface between them.

There are also a number of news that is C2C expert information exchanges are expected to generate 6 billion dollar in revenue by 2005. Some of these exchanges askme.com and abuzz.com are free and some allow their experts to negotiate fee with client. Inforocket.com is one of the first question and answer market place driven by a person to person auction format. The inforocket.com auction bidding system allow a person who submits a question to review the profile of the expert who offer the answer of the question. When the person asking the question accepts an expert offer, inforocket.com bids person's credit card, deliver the answer and take 20% commission.

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Advantages of C2C model:

- i) It is always available so that consumer can have access to whenever they feel like shopping.
- ii) There is a regular updating of a website. C2C benefits the higher profitability that results from selling directly to another.
- iii) There is low transaction cost. Seller can post their goods over the internet at the cheaper rate far better than higher price of renting a space in a store.
- iv) Customer can directly contact seller and do without any intermediary.

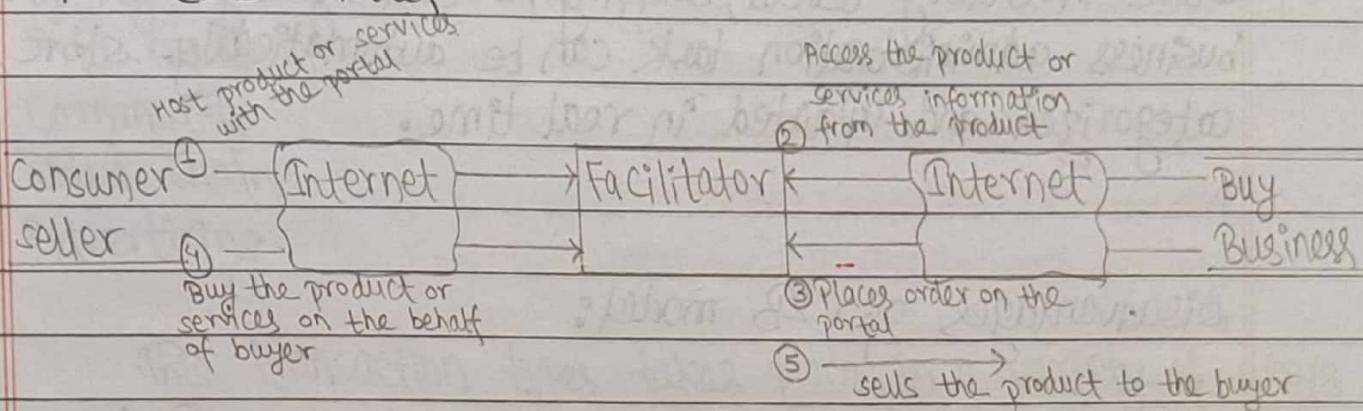
Disadvantages of C2C model:

- i) Payment made has no guarantee.
- ii) There could be theft as ^{hackers} scammers might try to create their fake website to attract customers.
- iii) There is a lack of controlling the quality of products.

Consumer to Business model (C2B) :-

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, consumer is the seller and the business organization is the buyer. In this kind of transaction the consumer decide the price of a particular product rather than the suppliers. This category includes individual who sells the product and services to the organization.

For example: www.master.com is a website on which a consumer can post their bio-data for the services they can offer. Any business organization that is interested in deploying the services of the consumer can contact them and then employ them if suitable. The following figure shows C2B model.



Advantages of C2B model:

1. Shrinks the competition gaps:- Reduce the marketing and advertising expenses, compete on equal footing with much bigger companies, easily compete on quality, price and availability of products.
2. Unlimited market place:- Internet gives opportunity to customer for doing business from any place, any time with wide range of market place.
3. Lower cost of doing business :- It has reduced inventory, employees, purchasing cost and data entry and even eliminated physical stores.

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4. Eliminate middle man :- It enables direct selling or purchasing mechanism between customers. So, it eliminates cost of middle man.
5. Easier business administration :- By using right software store inventory levels, shipping, receiving logs and other business administration task can be automatically stored, categorized and updated in real time.

Disadvantages of C2B model:

1. Catalog inflexibility :- The catalog need to regenerate everytime when there is some new information or items to add.
2. High sales cycle :- Usually a lot of phone calls and mailings are needed.
3. Need skilled staff :- Need skilled staff that gives customer services and sales support services

E-business models based on the relationship of transaction types:

Based on the transaction type, different type of models can be identified as below:

1. Brokerage
2. Aggregator
3. Info-mediary
4. Community
5. Value chain
6. Advertising

This transaction types takes place in a variety of ways. Moreover, any given firm may combine one or two of these as a part of their web business strategy.

1. **Brokerage model:** Brokers are market marker, they bring buyer and sellers together and facilitates transaction. Broker play a frequent role in B2B, B2C or C2C markets. Usually a broker charges a fee or commission for each transaction and formula for fee vary depending on contents. Brokerage model includes :-

- a) Market place exchange:

It offers full range of services covering the transaction process from market assessment, negotiation and fulfillment and for some example: orbitz.com, chemconnect.com.

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b) Buy/Sell fulfillment:

Takes customer order to buy or sell a product or service including terms like price and delivery. Some examples: cars direct^{.com}, respond.com.

c) Auction broker:

It conducts auction for seller. Brokers charges the seller a listing fee and commission scale with the value of the transaction. Auction vary widely in terms of offering and bidding rules. Example: eBay.

d) Transaction broker:

They provide a third party payment mechanism for buyer and seller to settle a transaction. For example: Paypal, escrow.com, e-sewa.

e) Search agent:

A software agent or robot used to search out the price and availability of goods or services, specified by the buyers or to locate hard to find information. Some examples: google, bing, yahoo.

f) Virtual market place:

It is a hosting service for online merchant that charges setup, monthly listing and transaction fees. It may also provide automated transaction and relationship marketing services. For example: amazon.com.

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2. Aggregator model :-

E-business model, where a firm collects information on goods and services for several competing sources at its website. The firm's strength lies in its ability to create an environment which draw visitors to its websites and in designing a system which allow easy matching a prices and specification. Aggregator model includes:-

a) Virtual merchant:

This is a business that operate only from the web and offers either traditional or web specific goods and services. The method of selling may be listing price or auction.

Example : amazon.com

b) Catalog merchant:

Catalog business is a migration of mailing order to web based order business. Example: Lands' End.

c) Bit vendor:

This is a merchant that deals strictly in digital product and services in its purest form. Example: Apple itune music store.

d) Subscription model:

The user have to pay for the access of the site. User are charged aperiodic : daily, monthly or annually . High value added content should be essential for subscription.

Example: netflix, America online .

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3. Info-mediary model :-

Data about customers and their consumption habits are valuable, specially when that information is carefully analyzed and used to target marketing campaigns. Independently collected data about producers and their products are useful to consumers when considering a purchase. Some firm functions as info-mediary is assisting buyers and sellers to understand a market environment. Info-mediary model includes :-

a) Advertising model:

They feed banner ads to a network of member sites, thereby enabling advertiser to deploy large marketing campaigns. Advertising network collects data about web user that can be used to analyze marketing effectiveness.

Example: double click.

b) Audience measurement services:

It includes online audience market research agencies. Example : Nielsen.

c) Incentive marketing:

Customer loyalty program that provide incentive to customers such as ^{date to exchange} redeemable points or coupons for marketing purchase from associated retailers. Data collected about users is sold for targeted advertising. For example: cool savings.

(4B)

d) Meta mediator :-

It facilitates transaction between buyers and sellers by providing comprehensive information and ancillary services without being involved in the actual exchange of good and services between the parties. Example: Edmunds.

4. Community model :-

The viability of the community model is based on user loyalty. Users have a high investment in both time and emotion. Revenue can be added on the sale of ancillary products and services or voluntary services or voluntary contributions; or revenue may be tied to contextual advertising and subscriptions for premium services. The internet is inherently suited to community business models and nowadays it is one of the more fertile area of development, as seen in rise of social networking. The community business model includes:

a) Open source:

Software developed collaboratively by a global community of programmers who share code openly. Examples: Linux, VLC player, Red Hat, etc.

b) Open content:

Openly accessible content developed collaboratively by a global community of contributors who work voluntarily. Example: Wikipedia

c) Public Broadcasting:

It is a user-supported model used by non-profit radio and television broadcasting extended to the web. A community of users support the site through voluntary donations. Example: The Classical Station (WCPE.org).

d) Social Networking Services:

Sites that provide individuals with the ability to connect to other individuals along a defined common interest. Social networking services can provide opportunities for contextual advertising and subscriptions for premium services. Example: Facebook, Orkut.

5. Value chain model:-

Value chain selling is supported through two business models: demand and supply chain. E-commerce supports the transactions through both the demand chain business model and supply chain business model. Products, goods, services, or information are delivered through the parties of the value chain from producers to end users. A value chain also has relational and administrative aspects, that is, we can manage the relationship of the parties. As a result, value chain business models must manage the two sides of their businesses; their customers and direct sales, and their channel partners or suppliers. Each requires their own management channels and practices. To sell directly to customers, value chain models usually include a storefront where customers can purchase their goods and services directly. To manage relationships with

partners or suppliers, the demand chain and a supply chain models within the value chain include a hub.

6. Advertising model:-

The web advertising model is an extension of the traditional media broadcast model. The broadcaster, in this model is website which provides content and services mixed with advertising messages in the form of banner ads. The banner ads may be the major source of revenue for the broadcaster. The advertising model works best when the volume of viewer traffic is large or highly specialized. Advertising model includes:

a) Portal:

Usually a search engine is taken as portal that may include various contents or services. A high volume of user traffic makes advertising profitable and permits further diversification of site services. Example: Yahoo, Google, bing.

b) Classifieds:-

The list items for sales or wanted for purchase. Listing fees are common, but they also may be a membership fee. Example: Monster.com, Craigslist.

c) User registration:

They are content based sites that are free to access but require users to register and provide demographic data. Registration allows inter-session tracking of user surfing habits and thereby generates data advertising campaigns. Example: NYTimes.

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d) Contextual Advertising/ Behavioural Marketing:

Contextual advertising can sell targeted advertising based on an individual user's surfing activity. For example: a browser extension that automates authentication and form fill-ins, also delivers advertising links or pop-ups as the user surfs the web.

Pure Vs. Partial e-commerce:

Pure e-commerce concern business whose transaction are totally carried out on the internet. For example: suppose some websites publishes music, you listen it and then using online payment system, you download and get it through the internet.

Partial e-commerce on the other hand concern business whose large part of the transaction takes place in the offline real world. For example: amazon sells books online but these must be stored in large warehouse and physically delivered through the post.

E-commerce framework

E-commerce application will be build on existing technology infrastructure such as a lot of computers, communication networks and communication softwares forming the nascent Information Super Highway. The framework for e-commerce consists of 3-parts as shown in figure below.

EDI - Electronic Data Interchange

classmate

Date _____

Page _____

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transaction between business org's customer

	Electronic commerce application	
Public policy and legal privacy issue	* Supply chain management * Video on Demand * Remote Banking * Procurement purchasing * On-line marketing & advertising * Home shopping	Technical standards for electronic documents multimedia and network protocol
	Common Business service Infrastructure (Security / Authentication, electronic payment, Directories catalogs Multimedia content Network publishing Infrastructure (Digital video, Electronic Books, www)).	
	Messaging & information distribution Infrastructure (EDI, Email, HTTP)	
	Information Super highway Infrastructure (Telecom, Cable TV, wireless, Interact	

Fig:- Generic Framework for Electronic Commerce

- The first part consists of a variety of electronic commerce application including both inter and intra organizational and electronic markets. Such as supply chain management, video on demand, procurement purchasing, online marketing and advertising, home shopping.

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- The second part of building blocks of infrastructure consists of:
 - * common business services for fulfilling the buying and selling process.
 - * messaging and information distribution as a mean of sending and receiving information.
 - * multimedia content and network publishing for creating a product and a mean to communicate about it
 - * Information superhighway for providing the highway system along which all e-commerce must travel.
- The third part consists of the public policy and technical standard necessary to support the application infrastructure.
 - * Public policy governs the issues like universal access, privacy and information piracy. It should take into consideration of
 - cost of accessing information.
 - regulation to protect consumers from fraud and protect their right of privacy.
 - policies of global information traffic to detect information pirating and obscene sites.
 - * Technical standard governs issues like technology for communication and for internet.

Essential E-commerce process architecture :

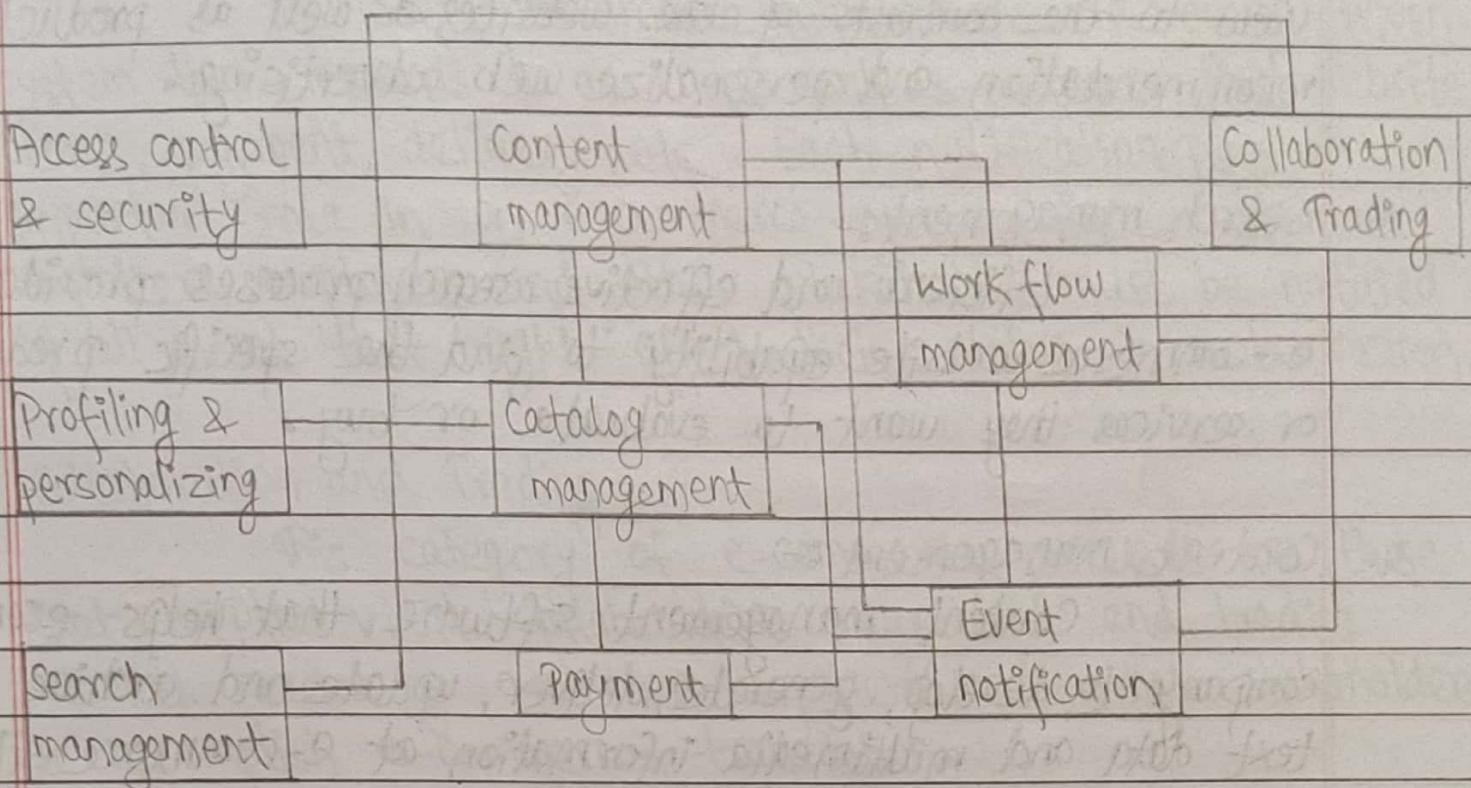


Fig:- Essential e-commerce process architecture

There are 9 essential e-commerce processes which are described as:

1. Access control and security :-

E-commerce must establish mutual trust and secure access between parties in an e-commerce transaction by authenticating users, authorizing access and enforcing security features.

2. Profiling and personalizing :-

Profiling processes gather data on an individual and their website behaviour and choices and build electronic profiles of their characteristics. These profiles are then used

to recognize individuals and provide them a personalized view to the contents of the websites as well as product recommendation and personalize web advertising.

3. Search management :-

Efficient and effective search processes provide an e-commerce website capability to find the specific product or services they want to evaluate or buy.

4. Content management :-

Content management software that helps e-commerce company to develop, generate, deliver, update and archive text data and multimedia information at e-commerce site.

5. Catalog management :-

A catalog management software helps to generate and manage catalog content. It may support customer self services and mass customization of the product.

6. Workflow management :-

E-business workflow system helps employees electronically collaborate to accomplish structure work task within knowledge based business process. It ensures that proper transactions and workflow activities are performed and the correct data and documents are delivered to the right employee, customers or suppliers.

7. Event notification :-

Most e-commerce applications are event-driven system that responds to an event such as customer first website access, payment, delivery, etc. Each notification plays an important role in an e-commerce system since customers, suppliers, employees and other stakeholder must be notified of all event that might affect their status in a transaction.

8. Collaboration and Trading :-

This category of e-commerce processes are those that supplies vital collaboration arrangement and trading services needed by customers, suppliers and other stakeholders to accomplish e-commerce transaction.

9. Electronic Payment Processes :-

Electronic Payment processes include secure electronic payment security in measures including encrypting data passing between customer and merchant, encrypting data passing between customer and company, authorizing a credit card transaction and tracking sensitive information offline.

E-commerce success factors :

There are various factor for the success of e-commerce which are listed as follows:

1. Selection and value: Attractive product selection, competitive prices, satisfaction guarantees and customer support after the sale.

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2. Performance and services: Fast, easy navigation, shopping, purchasing and prompt shipping and delivery.
3. Look and feel: Attractive web store front, website shipping area, multimedia product catalog phases and shopping features.
4. Advertising and incentives: Targeted webpage advertising and e-mail promotion, document and special offers including advertising at affiliate sites.
5. Personal attention: Personal webpages, personalized product recommendation, e-mail advertising and notices and interactive support for all customers.
6. Communicative relationship: Virtual communities of customers, suppliers, company representatives and others via news groups, chat rooms and link to related sites.
7. Security and reliability: security and website transaction, trust worthy information and reliable order fulfillment.
of customer information

Revenue Model:-

A revenue model is a framework for generating revenues. It identifies which revenue source to pursue, what value to offer, how to price the value and who pays for the value. It primarily identifies what product or services will be created in order to generate revenues and the way in which a product or services will be sold. Many online

companies generate revenues from multiple streams such as advertising, subscription, affiliate marketing.

There are five primary revenue models. Since there are possibilities of multiple variation, many companies do not use single revenue model.

1. Advertising revenue model:

Website that offers content services or products also provides a forum for advertisement and receive fee from advertiser. Examples: Google, NYTimes.

2. Subscription revenue model:

Website that offer user contents or services charge or subscription fee for access to some or all of its offering. For example: consumer report online, Yahoo, platinum, etc.

3. Transaction fee revenue model:

Company that receives a fee for enabling or executing a transaction. For example: e-trade, quicker.com, etc.

4. Sales revenue model:

Website that derives revenue by selling goods, information and services to customers. For example: amazon.com.

5. Affiliate revenue model:

Sites that directs to an affiliate, receives a referable fee or percentage of the revenue from any resulting sells. Example: Myprint.com.

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Electronic commerce and Media Convergence:

Media convergence is the melding of information communication technology, computer network and media content for the purpose of facilitating new form of information based commerce. It refers as integration of 3Cs i.e. communication, computing and contents.

Multimedia convergence applies to the conversion of text, voice, data, image, graphics and full motion videos into digital content.

Cross media convergence refers to the integration of various industries such as entertainment, publication and communication media based on multimedia content.

Convergence requires removing the barrier between telecommunication, broadcasting, computing, movie, electronic games and publishing industries to facilitate interoperability. For example: an individual watching a world cup football match between France and Brazil. Suppose an individual desire to know more about Brazil, instead of running to the local book store and purchasing a book he/she can think to an online database and search not missing any part of the match. The information in this online database is not limited to text but also provides photograph and digital videos.

Technological factors for media convergence:

1. Convergence of contents
2. Convergence of transmission
3. Convergence of information access devices

The above mentioned are technological factors for that derives the phenomenical convergence.

1. Convergence of contents:

It translates all types of information content such as books, documents, videos, movies, etc into digital information. Once converted into digital form that information can easily be processed, searched, stored, changed, compressed and so on, in way that are conveniently matched to today's information processing system.

2. Convergence of transmission:

It compresses and stores digitized information so it can travel through existing phones and cable wiring. New switching techniques and other technological breakthrough enables all types of information to travel to home. Here we see the convergence of communication equipments that provide the pipeline to transmit video, audio, images and texts without re-wiring.

3. Convergence of information access devices:

They have the sophistication to function as both computer and television. Other examples are telephone,

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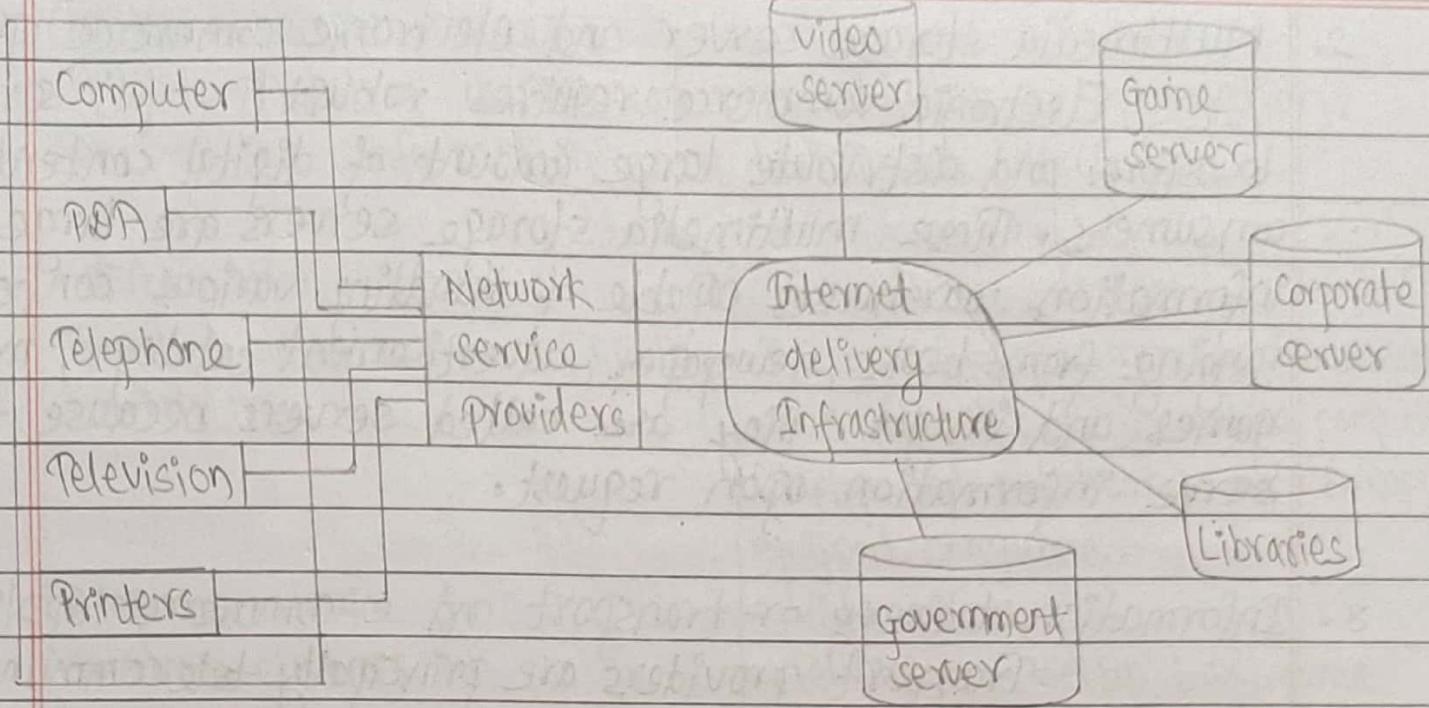
external FAX machine, modem, video monitor capable of receiving facts, email and video.

Convergence is also been derived by certain market conditions including the followings:

1. The wide spread availability of increasing low cost, high performance enabling component technologies, etc.
2. Entrepreneurs who are feeling on anticipated end user demand for new application, that rely on the aformation of enabling new technology.
3. Aggressive regulatory actions that are introducing competition in monopoly market and that serve to facilitate the rapid development of new application.

The anatomy of E-commerce :-

Although no one knows what application of electronic commerce will be successful in the long run, the potential pay back for those who hold the winning number is a powerful driving force behind the development of the infrastructure and the convergence of numerous industries. It is important, however, that applications can be found at all levels of the infrastructure itself. Not only multimedia content is part of the infrastructure that will enable customers to enjoy video on demand, but creation of the content is in itself an electronic application. Similarly, e-mail can be considered both message infrastructure and purchasable end product. Figure below shows the anatomy of e-commerce.



Information servers with variety of content.

Fig:- Element of electronic commerce applications

Followings are the parts of e-commerce application infrastructure,

1. Multimedia content for e-commerce application:

The multimedia content can be considered as both fuel and traffic for e-commerce application. The technical definition of multimedia is the use of digital data in more than one format such as combination of text, audio, video and graphics in a computer file or document. The multimedia mimics the natural way of people communication. Its purpose is to combine the interactivity of a user friendly interface with multiple form of content.

2. Multimedia storage server and electronic commerce application
 Electronic commerce requires robust (powerful) servers to store and distribute large amount of digital content to consumers. These multimedia storage servers are large information warehouses capable of handling various content ranging from books, newspaper, advertisement catalogues, movies, games and images. They are called servers because they serve information upon request.

3. Information delivery or transport and e-commerce application
 Transport providers are principally telecommunication cables and wireless industries, computer network including commercial networks and public networks. The transport system does not function as monolithic system. Instead it architecture a mix of many forms of high speed networks transport like wire, wireless, modem based, satellite etc.

Transport routes:

Information transport providers

- 1. Telecommunication companies
- 2. Cable television companies
- 3. Computer based online server
- 4. Wireless communication

Information delivery method

- Long distance telephone lines, local telephone lines.
- Cable tv coaxial, fibre optics and satellite
- Internet, commercial online service provider
- Cellular and radio network, paging system.

4. Consumer access devices :

A lot of devices can provide access to information. Some of the information access device are as follows.

Information consumers	Access devices
1. Computers with audio and video capabilities	- PC or desktop computing (workstation or multimedia PC), mobile computing (laptop and notebook) and CD-ROM equipped computers.
2. Telephonic device	- Video phone
3. Consumer electronics	- Television + setup box, game system
4. PDA	- Pen based computing, voice-driven computing, software agents

Electronic Commerce Consumers applications :

Consumer desires are very hard to predict in electronic market whose shape and population are still in the early stages. Business looking to get involved in the electronic market place want faster answer to some very basic questions like: What type of services do consumers really want or willing to pay for? Do they want applications that bring about social change, that entertain, that are educational or that educate as well as entertain? What amount is the consumer willing to pay for this service?, How should the product be priced so that firms are competitive as well as profitable?, etc.

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The e-commerce consumer application addressed the following issues.

1. Social interaction
2. What do consumer really want?
3. What are consumer willing to pay?
4. Delivery product to consumers
5. Consumer research.

1. Consumer application and social interaction:

Lessons from history indicates that the most successful technologies are those that make their mark socially. E-commerce winner will be those that can change the way consumer think and the way they do business.

2. What do consumer really want?

They want quality and cost of service should be conventional. If a new system requires more steps to do essentially the same thing, consumer may resist it.

3. What are consumer willing to pay?

According to the video on demand, consumers get cable bill at basic charge they will buy. If it is doubled, they will not buy. If the service providers economic will increase then network provider ^{operator} might look to advertise to fill the gap.

4. Delivery product to consumers:

To develop an e-commerce application, packing and

distribution must be considered.

5. Consumer research:

Evaluating consumer preference is the main uncertainty facing application designer. Many business are navigating the electronic market without proper consumer and market research. This can be destructive to them.

E-commerce organization Application:

Corporations do not buy information and communication technology simply because it is new or it is interesting to writer in press. Companies adopt technologies to save money and improve the bottom line. Developers of an organizational electronic commerce applications must address the following questions if they are to be successful.

- How can electronic markets improve the further organizational goals as better internal coordination, faster problem solving and improved decision making?
- How can it help better to serve consumer?
- How can we use it to better interact with our suppliers and distributors?

The electronic commerce organization application deals with following issues:

- i) Changing Business Environment
- ii) Electronic Commerce and Retail Industries
- iii) Marketing and Electronic Commerce
- iv) Inventory management and organizational applications

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- v) Supply chain management
- vi) Work Group Collaboration Applications

- iv) Inventory management and organizational applications:
When any company want to spread out its business initially face stiff (hard) competition. For successful business manager need to catch better way of doing international business. Adaptation would include moving towards complete paperless operation to reduce trading cost and facilitate the adaptation of new business.

One often targeted business process is inventory management. Solution for this processes go by different names. In the manufacturing industries, they are known as just-in-time inventory system, in the retail industry as quick response programs, and in transportation industry as consignment tracking system.

Just-in-Time Manufacturing :-

Just-in-Time 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 is based on two principles:

- * Elimination of waste &
- * Empowering workers

It is an evolution of Japanese approach to manufacturing and initially introduced for the Toyota production system. The first principle refers to the elimination of all waste such as time, materials, labours and equipments in the produc-

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cycle. The following management practices are associated with JIT system.

- a) Focused factory
 - b) Reduced setup time
 - c) Group technology
 - d) Total productive maintenance
 - e) Multifunction employee
 - f) Uniform workloads
 - g) JIT purchasing
 - h) Total quality control and quality circle
- JIT purchasing has received considerable attention in electronic commerce. It allows a manufacturer to incorporate its supplier's effort towards eliminating waste in the upstream portion of manufacturing cycle.

Quick Response Retailing :-

Quick response is a version of JIT purchasing tailored for retailing. It is used to reduce the risk of being out of stock. QR provides for flexible response to product ordering and lowers costly inventory levels. QR retailing focuses on market responsiveness while maintaining low level of stocks. It creates closed loops encompassing the retailers, vendor and consumer chain. Following figure illustrates the various steps of the quick response chain.

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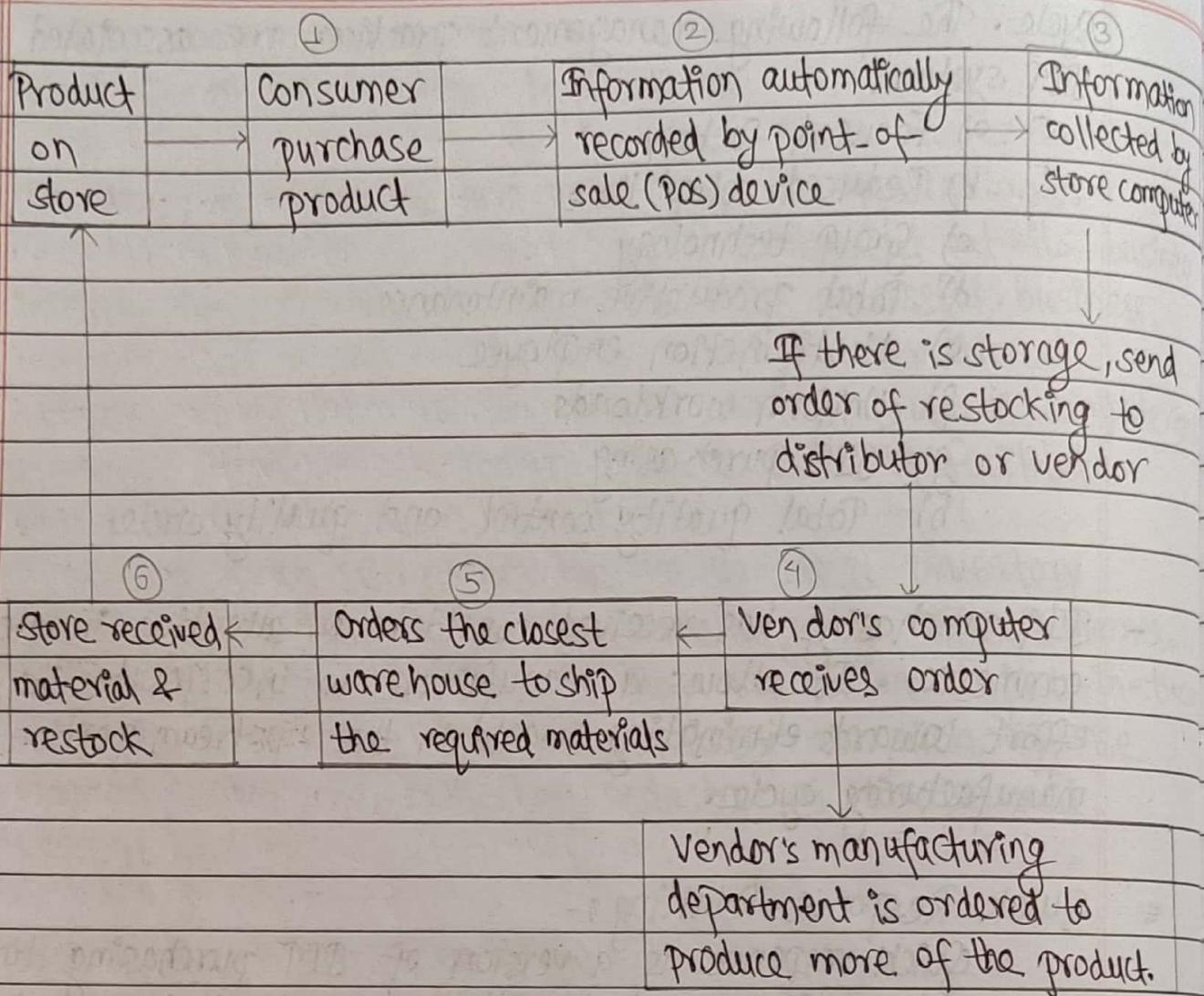


Fig:- The quick response chain

v) Supply chain management:

Supply chain is a series of processes started from one supplier upto the stage when the final product reaches to the hand of customers. These processes are defined as the part of relationship between business partners.

Supply chain management is also called extending which means integrating the internal and external partners on the supply and process chain to get raw materials to the manufacturer and finish product to the consumer.

The supply chain management includes following functions :

- a) Suppliers management : The goal is to reduce the number of suppliers and get them to become partners in business in win-win relationship. Benefits are in reduced processing order processing cost, increase number of processing order, and reduce order processing cycle time.
- b) Inventory management : The goal is to shorten order-ship-bill cycle. It reduce the inventory level, improve inventory turns and eliminate out of stock occurrence.
- c) Distribution management : The goal is to move document related to shipping like purchase order, advance ship notices etc.
- d) Channel management : The goal is to quickly disseminate information about changing operational conditions to trading partners.
- e) Payment management : The goal is to link the company and the suppliers and distributor so that payment can be sent and received electronically.
- f) Financial management : The goal is to enable global companies to

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manage their money in various foreign exchange account.

g) Sales force productivity: The goal is to improve communication and flow of information among the sells, customers and production function.

vi) Work Group Collaboration Applications:

for a work group application, e-commerce presents a ubiquitous inter networking that enables easy and inexpensive connection of various organizational segments to improve communication and information sharing among employees to gather and analyze competitive data in real time.

E-commerce also facilitates sales force automation by enabling sales people to carry product and reference information in one portable device. It also facilitates video conferencing, document sharing and multimedia event. All these applications reduces the travelling cost.

Video conferencing is now the best established application and is expected to grow in coming years. It allows distant co-workers to communicate without expenses, time and inconvenience of travelling.

1.2) Network infrastructure for a E-commerce

Need of Networks:

Electronic commerce needs a network infrastructure to transport the contents. The emergence of electronic commerce application in health care, manufacturing, education and other industries are looking for network infrastructure which provide best quality of information transportation. Companies are upgrading their network infrastructure or creating new product and recognizing their company's life ^{better} on the I-way (Information Superhighway).

Information Superhighway (I-way):

The term I-way describes a high capacity, interactive electronic pipeline to home or office that is capable of simultaneously supporting a large number of electronic commerce application and providing interactive phone like connectivity between user and services and between users and other users.

The principle short coming of the existing communication infrastructure lies in its inability to provide integrated voice, data and video services but the business users require the integrated network. Thus, the concept of I-way was developed.

Market forces influencing the I-way :-

The success and failure of any innovation, product of services is a factor of market forces. Many market factors are influencing the development of I-way. This

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understanding is important because e-commerce applications are dependent on the underlying I-way. For example; if we choose a cable TV as our access ramp, we not able to develop two-way interactive application such as business information publishing tool like www.

1) Demand and requirement of market participants:

The demand and requirements various participants place on the network infrastructure are bound to be very different. To support as many roles as possible; in increasing number of alliance are developing between telecommunication, cable TV and entertainment companies. This partnership provides the way to fulfil the consumer demand for advance information, entertainment services and the equipment and devices necessary to provide them.

2) Strategic Alliance and the I-way infrastructure:

To ensure the construction of a broadly useful I-way strategic planning should take into account the need of communication, entertainment and information sectors. However, the resource requirement of building these three segments of I-way are driving companies to make maximum use of existing facilities through alliances to control cost and create test market.

Alliances are dominant for several resources such as they reduce risk, spread cost and allow firms to acquire costly expertise in different areas instantly.

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~~Imp.~~ Components of I-way :

Three major components make the I-way infrastructure. These infrastructure component are:

1. Consumer access equipment
2. Local on-ramps
3. Global information distribution network

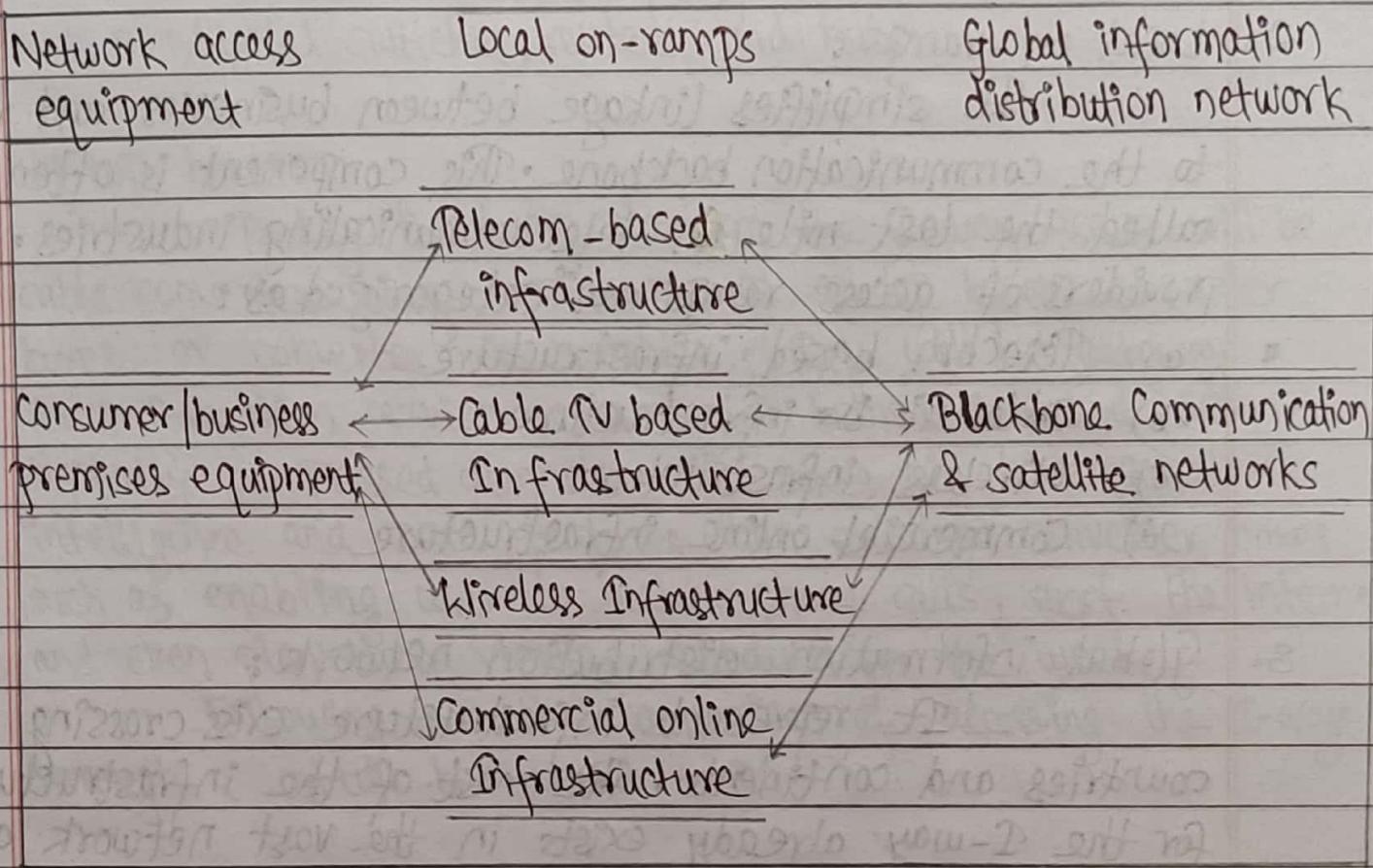


Fig :- Components of I-way infrastructure.

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1. Consumer access equipment:

This segment of I-way include hardware and software vendors who provide physical devices such as router and switches, access devices such as computer and setup boxes and software platform such as browser and operating system.

2. Local on-ramps:

It simplifies linkage between businesses and home to the communication backbone. This component is often called the last mile in telecommunicating industries. The providers of access ramps can be categorized as:

- a) Telecom based infrastructure
- b) cable TV based infrastructure
- c) Wireless infrastructure
- d) Commercial online infrastructure

3. Global information distribution network:

It represents infrastructure criss-crossing countries and continents. The most of the infrastructure for the I-way already exists in the vast network of fibre optics, coaxial cable, radio waves, satellites and copper wires spanning the globe. This backbone put in place over the last 3 decades by the telephone company.

Network access equipment:

Customer Premises Equipment (CPE) or Terminal equipment is a generic term for privately owned communication equipment that is attached to the network. We can broadly categorize into 3 parts:

1. Settop boxes
2. Computer based telephony
3. Digital switches, routers and hubs

1. Set-top boxes:

A key hardware platform the I-way access will be cable converter boxes also known as set top boxes, converter boxes or converter / descrambles. They will be gateway for information services, commercial transaction and 500 digitally compressed channels. These boxes will have greater intelligence and more features than existing converter boxes such as enabling user to make phone calls, surf the internet and even plan their viewing schedules for the week.

Following are the comparison of accessing the I-way through a settop box versus a PC.

- a) The display:- Computers won't have to adapt must to match the television strength but a television is a long way from matching a computer monitor's strength.
- b) The control:- There is a far more flexible and powerful way to interact with computers than television. Example: computer provides many interactive devices such as

keyboard, mouse, joystick, track ball, light pen, etc. whereas set top box provides handheld remote possibly joystick, track ball or other handheld controllers.

- c) The pipeline :- Existing cable television system can deliver a huge amount of information rapidly on one way. Computer traditionally talk to each other over phone lines which has limited capacity compared to cable. But new modems and networks allow high capacity cable lines.
- d) The brain :- The set top box is really a special purpose computer with powerful graphics and communication features but limited versatility. The set top box is largely dependent on a central computer of the interactive system but PC are very versatile and independent.
- e) Accessibility :- Nearly every household has a television and is familiar and comfortable but the people most likely to use interactive system may be the same ones attracted to the computers. The attraction of interactive computers is more than passive television watching but a significant part of public remains uncomfortable with computers.

2. Computer based telephony:

functions

This device combine video, data and facsimile, and enables user to send, store and receive information over wire line and wireless network. This software-intensive CPE product has been well received because they improve business productivity by reducing communication and travel expenses. CPE will continue to become more compactible with computing equipment.

3. Digital switches, routers and hubs:

switches: Like any other data, digital data passes through switches that route them to their intended destination either one or more recipient. Since the bundle of data are known as packet and the packet move through network at very high speed. This routing techniques is known as fast packet switches.

Routers: Routers are internetworking devices that intelligently connect local area networks and backbone wide area networks of various providers. Router allows companies to departmentalized and segment their network so that problem on one segment doesn't bring down another department.

Hub: In contrast to router, hub acts as a wiring centers for a large LANs. They can diagonalize line failures, measures and manage traffic flow and greatly simplify reconfiguring larger LANs. Adding switching technology to hub solves both the efficiency and predictability problem with the Ethernet LAN topology.

Public policy issues shaping the I-way :

It is expected that government will play an important role in defining the I-way. There are several major issues regarding the I-way.

1. Cost :-

The primary concern of constructing the I-way is cost. The cost of constructing the I-way is very high. Thus, a very important question arises who will pay for constructing the I-way.

2. Subsidies :-

The developer might hope subsidies, tax breaks, development business and other forms of encouragement. This arise the question such as what will these tax subsidies actually subsidise? Who will pay to extend the network to non-profit institute such as school, hospitals, police and fire departments?

3. Allocation of scarce resources :-

Some economist wondered whether huge investment in all aspects of I-way will be wasted because there is no strong evidence that market exists for the services it would offer.

4. Regulation :-

Some free enterprises argue that if the I-way is built with private fund, there should not be government

regulation.

5. Universal access :-

In the debate about the I-way architecture, one issue dominance all other issues in universal access. Economist argue that the market should decide who get access to the I-way. Other insist that I-way operator must provide universal access at reasonable cost.

6. Information privacy issues :-

Every key stroke such as internet purchase and enquiry can be tracked by the companies. The profiles of one member are accessible to all other members. Thus, some issue arises such as can vendor keep track of customer preferences? can they send this information to others? On what ground can they deny access? What will police surveillance be allowed?

7. Social and religious barrier:-

Cyber space is considered by many to be a representation of free speech and democracy. But some governments will be more protective of their cyber space than others. For many countries, free space is alien, the internet present interesting problems & policy issues. For other strongly religious countries where women have been denied voice and access to media.

1.3) The Internet as a Network Infrastructure

Introduction:

The internet is the most well-known component of Information Super highway network infrastructure. Today, the internet is an information distribution system spanning several continents. It is very general infrastructure targets not only one electronic commerce application but also a wide range of computer based services such as email, EDI (Electronic Data Interchange), information publishing, etc. Internet environment is a unique combination of postal services, telephone system, research libraries, supermarket and talkshow center that enables people to share and purchase information. This interchange takes place rapidly using fairly inexpensive and commonly available technology. In short, the internet is viewed as prototype for emerging I-way.

Internet terminology:

The internet is an interconnected network linking millions of computers and billions of users worldwide. The interconnected computers includes stand-alone computers, LANs, MANs and WANs. Simply, internet is a network of network.

LAN is characterized by its small geographical location which allows resources sharing and work group interaction within a single building. It has total management control residing with the local manager and consists of limited

number of users.

The term MAN is used to describe computer network or big LANs which connects thousand number of computers. It is owned by single or multiple organization.

WAN links several dispersed MANs and extend the principle of information resource sharing to several location.

Based on the protocol used, the internet can be broadly categorized into two categories:

I) Academic Internet :-

In the academic internet, all the computer uses the TCP/IP protocol. This internet is called core internet which consists of various government networks, campus networks and other international network.

II) Business Network :-

In the business network, the host computer uses protocols such as ISO/OSI - X.25 - based packet switching network, SNA - based BITNET and other protocols like FidoNet, Applelink, Mininet, etc.

Six stages of Internet Growth :

The growth of internet begin around 1965 when US department of defence (DOD) provides the design of computer network to link universities and military research laboratory. The six stages of internet growth are mentioned below:

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- 1) Experimental Network (from 1965)
- 2) Discipline specific Research (1980-1985)
- 3) General Research Networking (1985-1991)
- 4) Privatization & Commercialization (1991 - present)
- 5) Restricted public data network for research and education
- 6) National information infrastructure.

1) Experimental Network (from 1965):

It is the first stage of internet growth. It covers early years under the age of DOD ARPA and the province of a relatively small technical community, that group develop not only the technology but the cooperative mechanism that made it possible to scale and allow further innovation to occur

2) Discipline Specific Research (1980-1985)

The stage grew out the more general ARPA net and began to build international online communities. CSNET, for instance link computer science researchers from all over the world.

3) General Research Networking (1985-1991)

It is a third stage of internet growth. In this stage, NSFNET was established to allow exchange of information and access to remote resources within the research and education community.

4) Privatization and commercialization (1991 - present) :

The fourth stage involves removing governmental subsidies to regional network and dismantling barriers imposed by restrictive acceptable usage policies. The network extends far beyond the research community and today supports not only expanding backbone services but also commercial transaction and extensive connections for commercial organizations.

5) Restricted public data network for research and education :

As fifth stage, high performance computing and communication (HPCC) program linked to fundamental research on computer science and engineering. HPCC is a research and development program, high speed network to distribute information globally. HPCC has five basic objectives:

- i, To develop and support advance research and education networking services and capabilities for connecting researchers, educators, student in school and university, etc. Example:- NREN (National Research and Education Network).
- ii, To provide access to state-of-the-art high performance computing environment and incorporate new generation of scalable, parallel, high performance computer and software technologies into important application areas.
- iii, To generate fundamental knowledge that can lay the foundation for future advances in HPCC
- iv, To enhance innovation, technology transfer, productivity and industrial competitiveness through academic-industrial partnership
- v, To make advance computing and communication information

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infrastructure available to and usable by large segment of society.

6) National information infrastructure:

The sixth stage of the internet growth is the I-way and it is the ultimate goal of the internet growth. The objective of this stage is to extend networking everywhere and enable new consumer applications. The I-way is broad in scope and represents the convergence of computing, entertainment, telecommunication, internet, cable TV, publishing and information provider industries.

NSFNET Architecture & Components :

In mid 1980, National Scientific Foundation created five super computers centers on the pre-assumption that the availability of super computer power greatly expands computational possibility and stimulates wide range of scientific exploration. NSF wanted to make super computing resources available for academic research. It initially try to use ARPANet but this strategy fails because of military bureaucracy and staffing problem. In respond to this problem NSF decided to built its own network based on ARPANet technology. The NSFNet backbone initially connected the five super computing centers with 56 kbps telephones leased line.

When NSF realized that every campus must be connected with super computing centers and provide access to regional network and then on the backbone to the destination

network.

There are three level of architecture which are listed below:

(Interconnected backbone network NSFNET,
ESNET, NSI, MILNET, EUnet)

Mid-level regional networks (BARRnet, CERFnet, SURAnet)

Individual computers, organizations, campuses, universities,
research organization, etc.

Fig:- Structure of Internet Hierarchy

1) NSFNet Backbone :-

The NSFNet backbone service was the largest single government investment in the NSF funded program. The backbone is important because almost all network user throughout the world pass information to all or from members institutes connected to the NSFNet.

2) Mid level regional network :-

The mid level regional network are also called regional network. They are one of the elements of NSFNet three-tier architecture. They provide a bridge between local area organizations and the federally funded NSFNet backbone.

service. The network tends to vary from sub-state, state and multi-state coverage.

3) State and campus network :-

State and campus network link into regional network. The goal of state network is to provide local connectivity and access to wider area services for state government, higher education and research institutes.

Campus network includes university and college research laboratories, private companies and educational sites. These are most important component of network hierarchy.

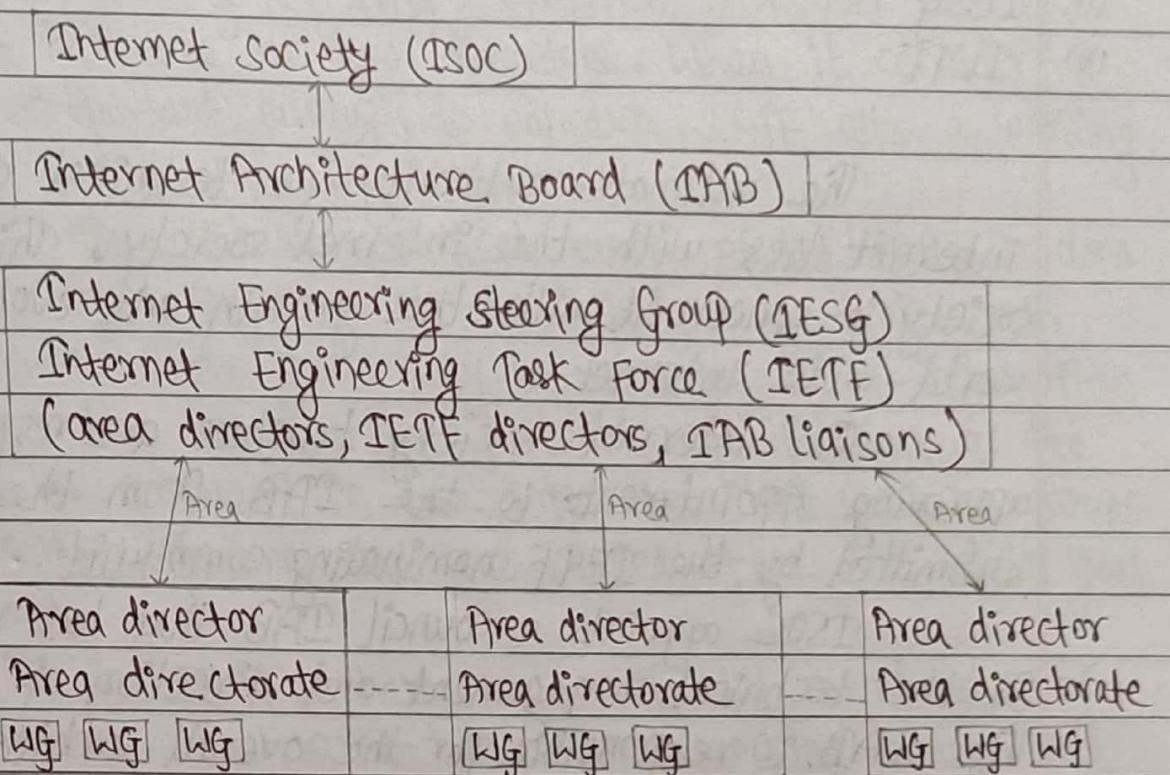
Movement of information on NSFNet :-

NSFNet is used for the variety of applications. For example; email provides a way of sending person to person message almost instantaneously. Enabling researcher separated by thousand of miles to collaborate. This process happens as below:

- The local network breaks the e-mail message into pieces called packets and then sends the packets through a type of switch called router which is a part of regional network.
- Then, the regional network connected with NSFNet leave the email in the receiver's mail box.

Internet Governance: The internet society

Governance Hierarchy



The internet is not a single unified network thus, it is not surprising that no-one body is controlling it. Although there are standards, no internet police exists to enforce them. There are many group exists that carry out central management functions for the internet such as inter-NIC and internet society.

The inter NIC register companies that are connected to the internet. The internet society has various engineering committees that helps to make technical recommendation for the future development of the internet. The internet governance

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hierarchy includes the following four groups:

- i) ISOC and its board of trustees
- ii) IAB
- iii) IESG
- iv) IETF

The ultimate authority for technical direction of the internet lies with the internet society. This professional society is concerned with the growth and evolution of the world-wide internet.

The internet society trustees are responsible for approving appointments to the IAB from the nominees submitted by the IETF nominating committees.

ISOC appoints a council IAB that has responsibility for the technical management and direction of the internet. The IAB is responsible for the overall architectural considerations in the internet.

The IAB is supported by the engineering task force. It is the protocol engineering and development arm of the internet. The IETF is the large open international community of network designers, operators, vendor and researchers concerned with the evolution of the internet architecture and the smooth operation of the internet. The internal management of the IETF is handled by the area directors.

The area directors and chair person of the IETF forms internet engineering steering group which handles the operational management of the internet standard process.

IETF Working groups:

The IETF is currently divided into functional areas as application internet, network management, operational requirements, routing, security, transport and user services. Each area has one or two directors. When it consider a problem important enough to concern, IETF sets a working group for the further investigation.

The actual technical work of the IETF is done in its working groups which are organized by topic into several areas. Their goal may be creation of an information document, the creation of protocol specification or the resolution of problem in the internet. Most working groups have a finite lifetime and are banded after the initial goal is achieved.

As in IETF, there is no official membership of a working group. Each area has several working groups and may also have bird of feathers (BoF) sessions. The BoF generally have the same goal as working group except that they have no long life and usually meet ones or twice. The purpose of BoF is to provide an informal forum for discussing the latest trends in the market, place that may be necessitate a working group for more detail enquiry.

The output of IETF working group is usually a request for comments (RFC) that is floated in the internet community ~~and~~ for comments and criticism. This process is outlined below:

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Market need identified by BOF	Goal milestone and chair for working group are hammered out.	Area director is informed	IAB & IESG are formed	Working group is formally obtained
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Fig :- Process of working group creation

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Unit - 2:

Chapter - 4

E-Commerce Security

Introduction:-

One of the most important issue concerned in the electronic commerce is security. Confidentiality, reliability, and protection of information against security threats is a crucial pre-requisite for the functioning of e-commerce. The discussion of security concern in e-commerce can be divided into two broad types :

- i) Client - server security
- ii) Data and transaction security

i) Client - server security:-

It uses various authorization methods to make sure that only valid user and program have access to information resources such as database. Access control mechanism must be set up to ensure that properly authenticated users are allowed access only to those resources that they are entitled to use. Such mechanism includes password protection, encrypted smart card, biometrics and firewalls.

ii) Data and transaction security:-

It ensures the privacy and confidentiality in electronic message and data packets including the authentication of remote users in network transaction for activities such as online payment. The goal is to defeat in any attempt to

assume another identity while involved in electronic mail or other form of data communication. Prevention measures include data encryption using various cryptographic measures.

Client - server network security problems:

Client - server network security problems are of

3 types :

- i) Physical security holes
- ii) Software security holes
- iii) Inconsistent usage holes

i) Physical security holes :-

It results when individual gains unauthorized physical access to a computer. For example: a public work room where it would be easy for hacker to reboot a machine into single user mode and tamper with files. Another problem is on the network hackers can gain access to network system by guessing the password of various users.

ii) Software security holes :-

It results when badly written program or privilege software are compromised into doing things they should not. For example:- "rlogin" hole which enables hacker to create a "root shell" or super user access mode that could be used to delete the entire file systems or create new account or password file.

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III) Inconsistent usage holes :-

It results when a system administrator assemble a combination of hardware and software such that the system is seriously weak from security point of view. The incompatibility of attempting two unconnected but useful things creates security holes. This type of problem is becoming common as software becomes more complex.

Protection method for client-server security :-

I) Trust based security :-

It means trust everyone and do nothing extra for protection. In this method, there is no restriction to access the information and assume that all users are trust worthy and competent for the use of shared network. This approach assumes that no one ever makes an explosive action such as getting root access and deleting all files. This approach is useful in the past but today this is no longer in use.

II) Security through obsecurity (STO) :-

It is the notation that any network can be secured as long as nobody outside its management group is allowed to find out anything about its operational details and users are provided information on a need-to-known basis. STO provides a false sense of security in computing system by information. For example :- hiding account password in binary files or script with pre-assumption that "nobody will

ever find them".

III) Password scheme :-

This method provides first level barrier to accidental intrusion. It do little about deliberate attack specially when common words or proper names are selected as password. The simplest method used by most hacker is dictionary comparison i.e. comparison a list of encrypted user password against a dictionary of encrypted common password. To beat this method expert recommend using minimum of 8-characterd length, miscalc password containing at least one non - alphabetic character and changing password periodically.

IV) Biometric system :-

It is the most secure level of authentication which includes some unique aspects of person's body. Biometric authentication was based on comparison of fingerprints, palm prints, retinal patterns, voice recognition, etc. This technique is very expensive to implement.

Security threats in client-server:

The security threats that is emerging in the electronic commerce world is mobile code (software agent) which in many ways resembles a traditional virus threats. Mobile code is executable program that has ability to move from machine to machine and also to invoke itself without external influence. This threat can be divided into two

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categories :-

- i) Software agents and malicious code threat
- ii) Threats to server

- i) Software agents and malicious code threat :-

The major threat to security from running client software results because of nature of the internet. The security threat arises when the downloaded data passes through local interpreter on the client system without the user knowledge.

Client threat mostly arises from malicious data or code. Malicious code refers to virus, worms, trojan horse, logic bombs and other abnormal software programs.

Malicious code is mistakenly associated with stand alone PC but can easily attack to the computer in the network.

Client must scan for malicious data and executable programs fragments, data transfer from server to the clients.

- ii) Threats to server :-

Threats to server consists of unauthorized modification of server data, unauthorized eavesdropping or modification of incoming data packets and compromise of server system by exploiting bugs in the server software. Compared to stand alone system, network servers are much more susceptible to attack. Network programs that involve remote file transfer are specially susceptible to eavesdroppers gaining access to the contents of file. Encryption can prevent eavesdropper from obtaining data travelling over unsecure networks.

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Server can also be attack with threats such as denial-of-service where a user can render the system unusable for legitimate users by damaging or destroying resources so that they cannot be used. Two most common forms of denial-of-service attack are: service overloading and message flooding. Server attack can be reduced by restricting access to critical account resources and files and protecting them from unauthorized users.

Access control mechanism:-

Operating system typically uses mechanism such as access control list that specify the resources, various user and groups are entitled to access. It uses various authentication methods to make sure that only valid users and programs have to access information resources such as database. Access control mechanism ensure that authenticated users are allowed access only to those resources that they are entitled to use. Such mechanism includes

- a) password protection
- b) encrypted smart card

firewall or proxy or both that is kept between two networks.

Firewalls :-

A firewall is a software program or hardware applications or combination of both that protects the resources of network from other networks. In other words, a firewall is a barrier between the corporate network and the outside world. It is a method of placing a device (a computer or a router) between the network

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and internet to control and monitor all traffic between outside wall and the local network. It can be implemented in both hardware and software or combination of both. A firewall system is usually located at the gateway point.

Firewall comes in several times and offers various level of security. Generally, firewall operate by screening packets and/or application that pass through them, provide controllable filtering of network traffic, allow restricted access to certain application and block access to everything else.

Types of firewalls & network security :-

There are basically four broad categories of firewalls:

- 1) Packet filtering
- 2) Circuit level gateway
- 3) Application Gateway
- 4) Stateful multi layer inspection firewalls

1) Packet filtering :-

It works at network level of OSI model or IP level of TCP/IP and are part of router. In this approach, each packet is compared to the set of criteria before it is forwarded or dropped. The advantages of this type of firewall is their low cost and low impact on network performance.

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2) Circuit level Gateway :-

This works at session layer of OSI model or TCP layer of TCP/IP. They monitor TCP handshaking between packets to determine whether a requested session is legitimate. Information passed to a remote computer through a circuit level gateway originated from gateway which is useful for hiding information for protected networks. They are relatively inexpensive and has advantages of hiding information about the private network they protect but they do not filter individual packets.

3) Application Gateway :-

They are similar to circuit level gateway except that they are application specific. They can filter packets at application layer of OSI model. They do not allow incoming or outgoing packets to access services for which there is no proxy (authority to represent sm1 or smth). Since they examine packets at application layer, they can filter application specific commands such as http: post & get. They can also be used to lock user activities and logins and offer a high level of security but have significant impact on network performance.

4) Stateful multi layer inspection firewalls:-

They combines the aspects of above three types of firewalls. They filter packets at network layer, determine whether session packets are legitimate and evaluate contents of packet at application layer. They offer high level of

security, good performance and transparency to users but they are expensive.

Security policies and firewall management :-

The firewall is a method of protection. Before putting a firewall, the administration who has the responsibility of designing, specifying and implementing or overseeing the installation of firewall must address number of management issues:-

- The first issue reflects the security policy of the organization. Security policies and practices dedicate how data must be protected. A firewall is embodiment of the security policy.
- The second issue reflect level of monitoring, redundancy and control i.e. what should be monitored, permitted and denied.
- The third issue is the cost of design implementation of firewall.

Firewall policies must be realistic reflection of the level of security in the entire network. Example; the system with the secret data should be isolated from the rest of corporate network.

Firewalls are for protection against threats such as viruses. A firewall cannot replace user security consciousness. In general, a firewall cannot protect against attack in which something is mailed or copied to an internal host and then executed. Firewall provides more than real security and acts as the corporate "ambassador" to the other user of the internet. Many corporation use their firewall system as a

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place to store public information about corporate products and services, files to download, bug fixes and so on.

Data and message security:

Transaction security issues can be divided into two types:

- 1) Data security
- 2) Message security

1) Data security:-

Electronic data security is important at a time when people are considering banking and other financial transaction by PCs. One major threat to data security is unauthorized network monitoring also called packet sniffing.

Sniffers attack begin when a computer is compromised and cracker install of packet sniffing program that monitors the network to which the machine is attached.

2) Message security:-

Threats to message security falls in 3 categories : confidentiality, integrity and authentication.

a) Confidentiality:-

It refers to the ability to ensure that message and data are available only to those who are authorized to view them. It is different from privacy which refers to ability to control use of information that customer provides about himself/herself. It prevents access to, or release of

information to unauthorized access.

b) Message and system integrity :-

It refers the ability to ensure that information being displayed on a website or transmitted or received over a internet has not been altered on a way by an unauthorized party. In other words, information received must have the same contents and organization as information sent. It must be clear that no one has added, deleted or modified any part of the message.

Confidentiality protects against the passive monitoring of data but the mechanism of integrity must prevent active attacks involving modification of data. Error detection codes, sequence numbers and encryption techniques are methods to enhance information integrity.

c) Message sender authentication identification:-

Authenticity is the ability to identify the identity of person/entity with whom we are dealing on the internet. Using encrypted information transferred from sender to receiver. The client and server must compare the origination address of transaction and message with information associated with each service gate to confirm that originated message is valid w.r.t to the gateway across which the message enters. Authentication in PC basically requires the user to prove his/her identity for each requested service.

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Encryption as the basic for data and message security:-

Sensitive information that must travel over public channel can be defended by encrypting it. Encryption is the mutation of any information in any form into a representation unreadable by anyone without a decryption key. The general scenario in case of a business transaction is as follows:

A wishes to send a purchase order to B in such way that only B can read it. A encrypt the purchase order called the plain text with an encryption key and send the encrypted purchase order called the cipher text to B. B decrypts the cipher text with the decryption key and read the purchase order. Here, hacker C may obtain the cipher text as it passes on the network but without the decryption key it is impossible to recover the message.

These are two types of cryptography :-

- i) Secret key cryptography
- ii) Public key cryptography

i) Secret key cryptography:-

It involves the use of shared key for both encryption by the transmitter and decryption by the receiver. Shared key technique suffer from the problem of key distribution, since shared key must be securely distributed to each pair of communicating parties.

To illustrate the working mechanism of secret key cryptography let us consider, A encrypt

a message with a secret key and e-mail the encrypted message to B. On receiving the message, B checks the header to identify the sender then unlocks his electronic key storage area and takes out the duplicate of a secret key then decrypt the message using secret key.

The generation, transmission and storage of key is called key management. To use secret key cryptography, one must deal with key management issue. In business environment, a company deals with thousands of online customers thus it is impractical to deal with individual customer for key management issue. Thus, we can assume that secret key cryptography is not dominant player in e-commerce. For a secret key cryptography, the widely accepted algorithm is DES (Data Encryption Standard).

II) Public key cryptography :-

A more powerful form of cryptography involves the use of public key. Public key techniques involves a pair of key; private key and public key. Information encrypted by the private key and can be decrypted only using corresponding public key. The private key is always kept secret and is used to encrypt the message. The public key is available to anyone and used to decrypt the message encrypted by corresponding private key. RSA (Rivest-Shamir-Adleman) is the most well known public key crypto-system for both encryption and authentication developed in 1977 AD.

DES → for large message

public key crypt.

secret key crypt.

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classmate

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Mixing RSA and DES :-

RSA allow two important function not provided by DES :→ secure key exchange without prior exchange of key and → digital signature. For encrypting message RSA and DES are combined as follow:

- i) First the message is encrypted with random DES key then before being sent over an insecure communication channel, the DES key is encrypted with RSA.
- ii) The DES encrypted message and the RSA encrypted DES key are sent over network. This protocol is known as RSA Digital Envelop.

Digital Public key Certificate:

A public key certificate is a data structure, digitally signed by certification authority that binds by a public key value to the identity of the entity holding corresponding private key. The latter entity is known as the subject of the certificate. A certificate is a copy of public key and identifier (number) digitally signed by a trusted party.

Digital signature:

Just like a physical signature, digital signatures are a method of guaranteeing somebody's identity. It is an unforgeable piece of data created through hash function and result is encrypted with the sender's private key.

The digital signatures are recently developed authentication mechanism. The digitally signed document can verify the recipient as well as the third party that the

document did not indeed originate from the person whose signature is attached and the document has not been altered since it was signed.

A secure digital signature system consists of two parts:-

- i) A method of signing document such that forgery is infeasible.
- ii) Method of verifying that signature was actually generated by whomever it represents.

Challenge - Response System (Authentication System):-

The merchant (server) use some form of authentication to ensure that the client is indeed who it claims to be. The merchant can choose from several challenge response authentication method such as smart card or third-party authentication.

i) Smart card or token authentication :-

A smart card computes password or encryption key and furnishes it directly to the computer for log in procedure. To defend against loss or theft, the card usually requires the user to enter a personal identification number as well.

ii) Third - party authentication :-

In third - party authentication system, the password or encrypted key itself never travel over the network. Rather an authentication server maintains a file about each registered user. At log on time, the server demand the entry of randomly chosen fact but this information is not sent to the

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server. Instead, the server use it to compute a token. The server then transmit an encrypted message containing the token which can be decoded with user's key. If the key was properly computed, the user can decrypt the message. The message contains an authentication token that allow users to log on to the network services. Kerberos is the popular third party authentication protocol.

Encrypted document and E-mail:-

E-mail users who desire confidentiality and sender authentication are using encryption. Encryption is simply intended to keep personal thoughts personal. There are two types of mechanism that can protect mail from unauthorized access; they are:

- I) PEM (Privacy Enhanced Mail)
- II) PGP (Pretty Good Privacy)

I) Privacy Enhanced Mail:

It is defined and purposed to provide secure e-mail over the internet but it is not officially adopted by the Internet Activity Board (IAB). PEM includes encryption, authentication and key management and allows use of both public key and secret key system. For each mail message, the specific encryption algorithm, digital signature algorithm, hash function and so on are specified in the header. PEM also provides support for non-repudiation which allows third party recipient of a forwarded message to verify the identity of a message originator (not just message).

forwarder) and also verify whether any of the original text has been altered.

Although PEM is not yet wide spread, a number of vendors are offering version of it in consumption with commercial e-mail application. Trusted information system has developed a free non-commercial implementation of PEM. Example:- RIPEM is a program developed by Mark Riordan which enables secure e-mail.

ii) Pretty Good Privacy :

It is an implementation of public key cryptography based on RSA. It is a free software package that encrypt e-mail. It provides secure encryption of document and data files and provides confidentiality by encrypting message to be transmitted or to be stored locally as files. For authentication, PGP employs RSA public key encryption scheme and MD-5 (Message Digest version 5), and a one way hash function to form a digital signature that assures the receiver that an incoming message is authentic.

The transaction sequence begins when the sender types and e-mail and MD-5 is used to generate a digital signature of the e-mail. The digital signature is then encrypted with RSA using the sender private key and the result is attached to the e-mail. The receiver uses RSA with the sender's public key to decrypt and recover the digital signature. The receiver then generate new digital signature for the recovered email and compared with the decrypted digital signature. If two matches, the matches is accepted as authentic. All this is.

done by the program automatically. PGP is already being widely used and its growth is increasing by the rapid increase in the internet use and increasing reliance on e-mail for everything.

2.2) Electronic Commerce and World Wide Web

Introduction :

E-commerce is broadly defined as a modern business methodology that addresses the desire of firm, consumer and management by reducing the cost and providing improved quality of goods and increasing the speed of services. It is a diverse concept which includes messaging based technology such as EDI (Electronic Data Interchange) and e-mail enabled applications combined with database and information management service. No single one of this technology can deliver full potential of e-commerce thus the requirement of integrated architecture to provide full strength of e-commerce applications. This integrated architecture is emerging in the form of www.

Architectural framework for E-commerce :

A framework is intended to define and create tools that integrate the information found in today's close system and allow the development of e-commerce applications.

The e-commerce application consists of six layers of functionalities or services as shown in figure below:

Application services

- C2B
- B2C
- Intra-organizational

Brokerage & data management

- Order processing :- mail-order houses
- Payment schemes :- Electronic cash
- Clearing houses or virtual mall

Interface layer

- Interactive catalogues
- Directory support functions
- Software agents

Secure messaging

- SMTP
- Encrypted E-mail, EDI
- Remote programming

Middleware services

- Structured documents (SGML, HTML)
- Compound documents (OLE, openDoc)

Network Infrastructure

- Wireless :- radio, cellular, etc.
- Wireline :- POTS, coaxial, etc.

i) E-commerce application Services :-

The application services layer of e-commerce will be made up of existing and future application built on the architecture. The different e-commerce application services are B2B, C2B and intra-organization.

ii) Brokerage and data-management:-

The information brokerage and management layer provide services integration through the concept of information brokerage. The information brokers are rapidly becoming necessary in dealing with the voluminous amount of information on the network.

iii) Interface and support service:-

Interface and support service layer provides interface for electronic commerce applications such as interactive catalogs and will support dictionary services.

iv) Securing messaging:-

It is the fourth layer and provides secure messaging services such as e-mail, enhanced fax and EDI.

v) Middle ware services:-

It is relatively new concept which is mediator between different software programs.

v) Network Infrastructure :-

It consists of wireless and wireline structure.

WWW as an Architecture :

Figure below shows a block diagram depicting a numerous pieces that constitute a web architecture. The architecture is made up of three primary entities :

- i) Client browser
- ii) Web server
- iii) Third party services

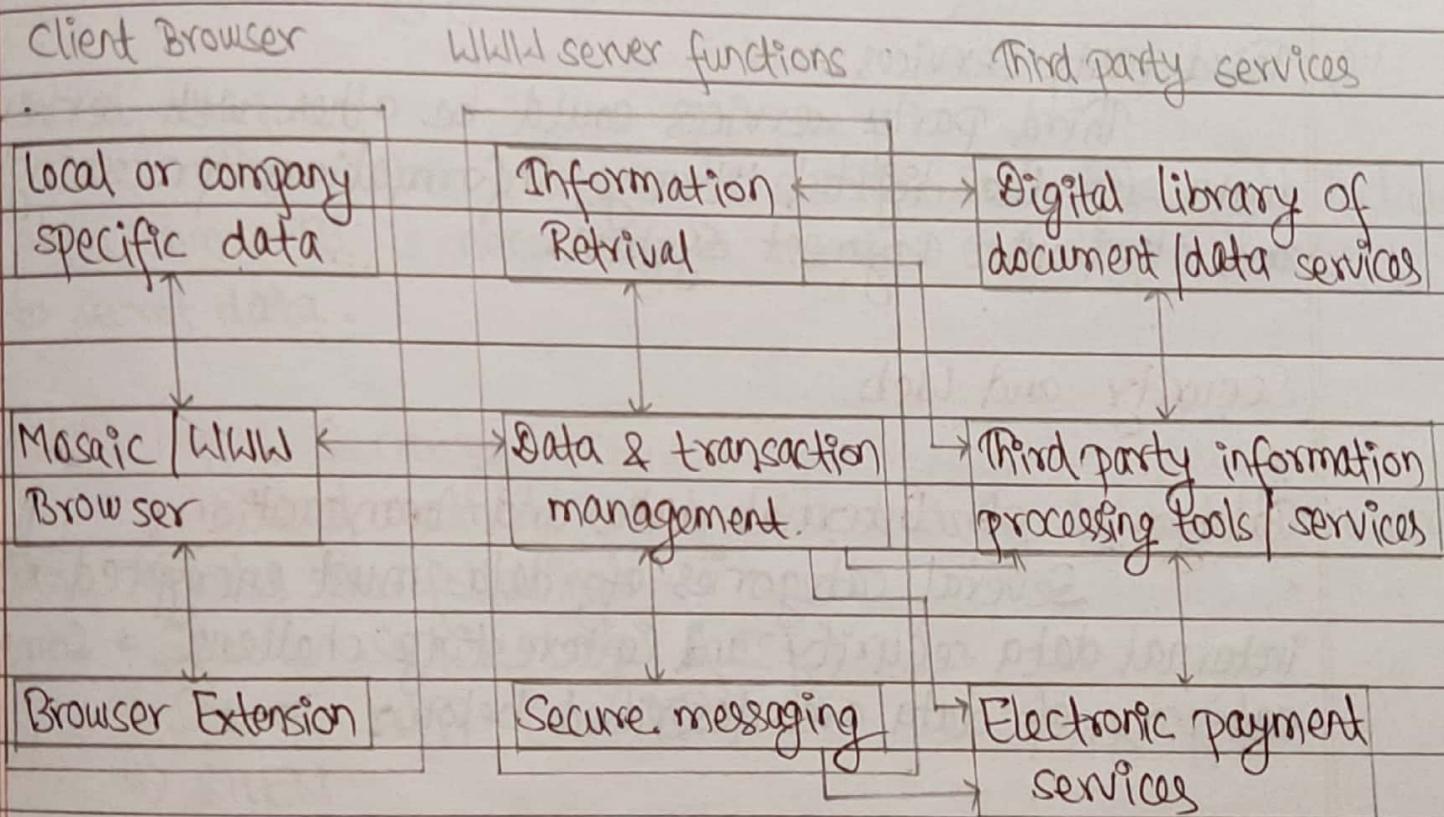


Fig:- Block diagram depicting an E-commerce .

I) Client browser:-

The client browser resides on the user's PC or workstation and provides an interface to the various type of contents.

II) Web server:-

The web server acts as an intermediary between client browser and third party services. Web server function can be categorized into information retrieval, data and transaction management and security.

III) Third party services:-

Third party services could be other web servers that make up the digital library, information processing tools and electronic payment system.

Security and Web

Categories of Internal data and transaction:

Several categories of data must be encrypted making internal data security an interesting challenge. Some category of data are described below:

I) Public data:-

These data have no security restriction and can be read by everyone. Such data should be protected from unauthorized modification because a reader may perform damaging actions on its contents.

ii) Copyright data :-

These data have content that is copyrighted but not secret. The owner of the data is willing to provide it but wishes to ensure that the user has paid for it. The objective is to maximize revenue and security.

iii) Confidential data :-

These data contains material that is secret but whose existence is not secret. Such data includes bank account statements, personal files and so on. Such materials may be referenced by public or copyright data.

iv) Secret data :-

These data's existence is secret. Such data might include algorithm. It is necessary to monitor and log all access to secret data.

WWW-based Security Scheme:

Several methods can provide security in web framework. These includes the following:

- i) Secure Socket Layer (SSL)
- ii) Secure-HTTP (S-HTTP)
- iii) SHEN

Electronic Commerce application
Secure HTTP
TCP-based application protocol
HTTP, SMTP, NNTP
Secure Socket Layer (SSL)
Internet Protocol

Fig:- Web
security
layer

I) Secure Socket Layer (SSL) :-

Netscape communication has proposed a protocol for providing data security layer between high level application protocol and TCP/IP. This security protocol called secure socket layer which provides data encryption, server authentication, message integrity and optional client authentication. SSL uses RSA security to wrap security information around TCP/IP based protocol.

SSL is layered beneath application protocols and above the internet protocol as shown in figure above. SSL provides a security "handshake" to initiate TCP/IP connection. This handshake results in the client and a server agreeing on the level of security they will use and fulfills any authentication requirements for the connection. Thereafter SSL's only role is to encrypt and decrypt the message stream.

The benefit of SSL is that it is not restricted to HTTP but can also be used for security of FTP and Telnet among other internet services.

II) Secure HTTP (S-HTTP) :-

S-HTTP assumes that the web and HTTP protocol are central to the e-commerce due to their installed base and ease of use. S-HTTP supports variety of security mechanism to HTTP client and servers which provides security service options appropriate to the wide range of potential end users possible on the web. The protocol provides symmetric capabilities to both clients and servers while preserving the

transaction model and implementation characteristics of the current HTTP.

S-HTTP works by negotiating the type of encryption scheme between client and server to ensure secure conversation. Several cryptographic message formats standards can be incorporated into S-HTTP client and server.

One advantage of S-HTTP is that it supports end-to-end secure transaction this means that multiple encryption decryption need not be done at every intermediate point but it works only with transaction that use HTTP.

SSL Vs. S-HTTP :

SSL and S-HTTP addresses different piece of security but they are not technologically incompatible that SSL and S-HTTP are not mutually exclusive. S-HTTP provides capabilities as SSL does not, and SSL provides capabilities as S-HTTP does not.

- SSL layers security beneath application protocol such as HTTP, FTP and Telnet whereas S-HTTP adds message or transaction-based security to HTTP by drawing on the approaches and philosophies of the message encryption standards such as PEM and PGP.
- SSL simply encrypts the message of given file and decrypt it at the another end of the transaction whereas S-HTTP is more comprehensive security package that include authentication of client's identity by the server through digital signal verification and other features.

III) SHEN :-

Because of US government export restriction, browser software with encryption algorithm cannot be sent overseas. To get around the problem W3C developed SHEN. It is same as S-HTTP and provides three separate security mechanisms as

- a) Weak authentication with low maintenance overhead and without patent or export restriction.
- b) Strong authentication through public key exchange.
- c) Strong encryption of message content.

2.3) Consumer Oriented E-commerce

Introduction:

The convergence of money, computing and network are the foundation of global market place. The four basic reasons why consumer oriented e-commerce came into existence are:

- i) The cost of processing many types of financial and retail transaction has been rising so rapidly thus there is necessary to develop new way to handle these transaction.
- ii) Competition in banking retailing sector has become so intensive that's why only those organizations that can provide superior customer service will continue to grow and progress.
- iii) The consumer themselves are feeding the fire of competition.

by demanding more services and greater convenience in their banking and shopping activities.

- iv) Technology is the key factor to process business activities electronically.

Some fundamental issues that must be included while developing consumer oriented electronic commerce. They are:

- i) Establishment of standard business process for buying and selling products and services in electronic markets.
- ii) Development of wide spread and easy to use implementation of merchantile protocols for order taking, online payment, service delivery, etc.
- iii) Development of transport and privacy method that will allow parties that have no reason to trust one another to carry unsecure commercial exchange.

Consumer oriented applications:

The wide range of consumer oriented applications can be classified into entertainment, financial, services and information, essential services and education and training. The operational rules for the four types of applications are as follows:

- i) Personal finance and home banking management.
- ii) Home shopping
- iii) Home entertainment
- iv) Micro-transaction of information.

3) Personal finance and home banking management :

Home banking is the newest technology that provides services such as direct deposit of payroll, online bill payment and telephone transfer. Home banking allows customer to avoid long line and gives them flexibility of doing their banking at any time. It is the opportunity to avoid building more bank branches and cut-off office expenses. Home banking service are often grouped as basic, intermediate and advanced.

a) Basic services :-

Basic services are related to personal finance. It includes checking and saving account statement reporting, round the clock banking with ATM, fund transfer, bill payment, status of payment, etc.

b) Intermediate services :-

It includes a growing array of home financial management services which includes household budgeting, updating stock portfolio values and tax return preparation. It includes a mixture of delivery mechanisms from phones, computers and even televisions. The problem with home banking is that it is expensive services that requires a PC, modem and special software such as computerized online bill payment system.

c) Advanced services :-

The goal of advanced services is to offer their

online customer a complete portfolio of life, home and auto insurance along with mutual funds, pension plans, home financing and other financial products. There is growing push in the banking and brokerage community to develop system that support advance services. These services range from online shopping to real time financing information.

15 Home shopping:

Home shopping is another example of consumer oriented applications. It is already in wide use and has generated a lot of revenue for many companies racing to develop online malls. These mall will enable customer to enter online stores, look at products, try on computerized clothes, see a reflection in a digital mirror and purchase with overnight delivery against credit card billing. There are two technologies that provides home shopping.

a) Television based shopping:-

The home shopping concept can be gain by using television. It includes shopping clothes, small electronics, house wires, jewellery etc. For example: take a remote control and get the fashion channel and see latest style and variety of merchandise

b) Catalog based shopping:-

In this, the customer identifies the variety of catalog that fit certain parameters such as safety, price and quality. The online catalog business consist of CD-ROM catalogs,

online interactive catalogs, etc.

III) Home entertainment :

Another application area of e-commerce is home entertainment. It allows customer to watch movies, play games, etc. For example; consider the following scenario: a customer wishes to watch a movie, he/she browses through an online movie archive by containing thousand of movies. After selecting a movie he/she send request to movie distributor in the form of electronic tokens. The distributor validates the token and transfer the movie to the TV set up box. The necessary safeguard that prevent any copying and reproduction of movie.

IV) Microtransaction of information :

The application allows small but repeated transaction without any overhead. For example; to make small money transfer, we need to develop a concept of small free banking transaction in the electronic banking world.

Desirable characteristics of E-market place :-

Following are the characteristics of consumer oriented electronic commerce:

1. Critical mass of buyer and seller:

The electronic commerce should be first place the customer go to find the product and services they need.

2. Opportunity for independent evaluation and for customer dialogue and discussion:

In the market place, customer not only buy and sell products and services but also compare notes on who has the best product and whose prices are feasible.

3. Negotiation and bargaining:

Buyer and seller need to be able to negotiate over conditions of mutual satisfaction including money, terms and conditions, delivery dates and evaluation criteria.

4. New product and services:

An electronic market place is an interactive information service that supports entire innovation process or the full of information about new services.

5. Seamless interface:

The biggest barrier to electronic trade is having all pieces of work together so that information can flow seamlessly from one source to another. This require standard interface.

6. Recourse of disgruntled buyers:

A feasible market must have a recognized mechanism for resolving disagreement between buyers and sellers. Market typically include a provision for resolving disagreement by returning the products.

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Ques: Merchantile process model:

It defines interactive model between consumer and merchant's for online commerce. This is necessary because to buy and sell a goods a buyer, seller and other party must interact in a way that represents some standard business process. This model can be viewed from both consumer and merchant perspective.

A) Merchantile model from consumer's perspective:

The online consumer expects to quality convenience, value, low price and control. To meet this expectation and understand the behaviour of online shopper, there is a need of business process model. The business process model from a consumer's perspective consists of seven activities that can be grouped into three phases as shown in figure.

Product/service search and discovery in the information space

Comparision shopping and product selection based on various attributes

→ Purchase
determination

Negotiation of terms. eg: price, delivery time

Placement of order

Authorization of Payments

→ Purchase consumption

Receipt of products

Customer services and support (if not satisfied in X days, return product)

→ Post purchase interaction

a) Pre-purchase preparation phase:-

It includes search and discovery for a set of products in the large information product capable of meeting customer's requirement.

b) Purchase consumption phase:-

It includes mercantile protocol that specify information and documents associated with purchasing and negotiating with merchant for suitable terms. It also includes electronic payment mechanisms that integrate payment into the purchasing process.

c) Post-purchase interaction phase:-

It includes customer service and support to address customer's complains, product returns and product defects.

a) Pre-purchase preparation phase:

It includes search and discovery for a set of product in the large information space capable of meeting customers requirement. From the consumer's perspective, any major purchase can be assumed to involve some amount of pre-purchase deliberation. The purchase deliberation is defined as elapsed time between consumer first thinking about buying and the actual purchase.

To understand the pre-purchase planning of any consumer, we need to know the behaviour of consumer. In general, consumer can be classified into 3 groups:

- i) Impulsive buyer: who purchase product quickly.
- ii) Patient buyer: who purchase product after making some comparison.
- iii) Analytical buyer: who do substantial search before making the decisions to purchase product or services.

The purchase can be categorized into following types:

- i) Specifically planned purchase: The need was recognized on entering the store and the shopper brought the exact item planned.
- ii) Generally planned purchase: The need was recognized, but the shopper decided in-store on the actual manufacturer of the item to satisfy the need.

- III) Reminder purchase: The shopper was reminded of the need by some store influence. The shopper is influenced by in-store advertisement and can substitute product readily.
- IV) Entirely unplanned purchase: The need was not recognized when entering to the shop.

Consumer Information Search process:

The information search is defined as the degree of care, perception and effort directed toward obtaining data information related to decision problem. The outcomes may be identical to those of traditional markets but the method for searching them may be different. In context of electronic commerce, information search can be classified into following types.

I) Organization search process:

The organization search can be viewed as a process through which an organization adopts to change in its external environment such as new suppliers, new products and new services. In this process, purchasing department inside organization search for information about specific course of actions such as purchase of equipment. This process is used to balance the cost of acquiring the information with the benefit of improved final decision.

2) Consumer search experience:

Understanding of the nature of search and discovery in the context of online shopping necessitates knowing what motivates various type of search. To understand consumer search, we also need to examine how buyers present buying situation.

3) Information brokers & brokerages:

To facilitate better consumer and organizational search, intermediaries are used. They are called information brokers and brokerages. Information brokerages are needed for three reasons: comparison shopping, reduced search cost and integration.

~~Imp~~ Purchase communication (consumption) phase:

This phase includes mercantile protocols that specify the flow of information and documents related with purchasing and negotiating with merchant for suitable form. This phase come after pre-purchase information phase. In this phase, all the search and identification of products is done. After identifying the products to be purchased, the buyer and seller must interact somehow to actual carry out the mercantile transaction. A mercantile transaction is defined as the exchange of information between buyer and seller followed by necessary payment.

A single mercantile model will not be sufficient to meet the needs of everyone. Figure below shows the simplified diagram of mercantile process model which include

following transaction.

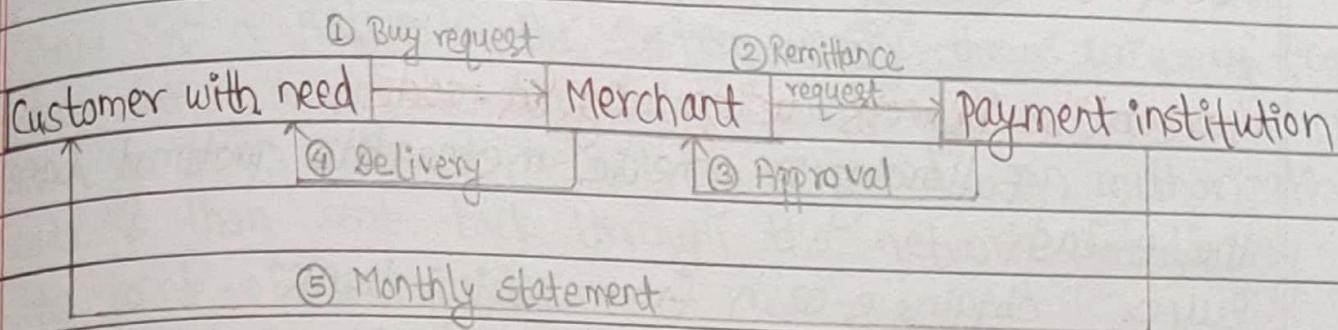


Fig:- Simplified online mercantile model

- i) Buyer contact vendor to purchase product or service through www, email, electronic catalog and telephone.
- ii) Vendor state price.
- iii) Buyer and vendor may or maynot engage in negotiation.
- iv) If satisfied, buyer authorize payment to the vendor with an encrypted transaction containing digital signature for the agreed price.
- v) Vendors contact his/her billing services to verify encrypted authorization for authentication.
- vi) Billing service decrypts authorization and checks buyers account balance or credit and transfer the required amount.
- vii) Billing service gives the vendor green signal to deliver product and sends the message giving detail of transaction.
- viii) After getting the message from the billing system, vendor delivers goods to buyer.
- ix) On receiving the goods, the buyer signs and deliver the receipt. Vendor then tell billing service to complete the transaction.
- x) At the end of billing cycle, buyer receive a list of transaction.

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Buyer can then either deny certain transaction or complain about over-billing.

Mercantile process using digital-cash:

Following is generic mercantile protocol based on the e-cash

- i) Buyer obtains e-cash from issuing bank
- ii) Buyer contact seller to purchase product
- iii) Seller states price
- iv) Buyer sends e-cash to seller
- v) Seller contacts his bank or billing services to verify the validity of e-cash.
- vi) Bank give ok signal to seller after ensuring that the e-cash has not been duplicated or spent on other products.
- vii) Seller deliver product to buyer.
- viii) Seller then tells bank to mark the e-cash as used currency

Mercantile transaction using credit card :

Two major components of credit card and transaction in the mercantile process are authorization and settlement. Following are the steps involved in retail transaction using credit card :

- I A customer presents a credit card for payment at a retail location. The card reader scans the information on the card's magnetic stripe
- II The point-of-sale software directs the transaction information to the local network access point. If the primary local network point cannot make a connection

to accept a transaction, it is automatically rerouted to a secondary access point.

- iii) Once in a network, the system verify the source of transaction and routes it to the appropriate authorization source where card holder's account record is reviewed. An authorization code is then sent back through the network for display on the point-of-sale device.
- v) The retail location initiates "close-out" transaction that bundles completed transaction information into a "batch". Transaction count and financial totals are confirmed between the terminals and network and the series of report can be printed out at the retailed location.
- v) The system gathers all complicated batches and process the data in preparation for settlement.

c) Post-purchase interaction phase:

This phase includes customer services to support, to address customer complains, product returns and product defects. It starts as long as there is payment for product or service. After the payment, there will be some issues that must be considered for better customer and merchant relationship. Returns and claims are important part of purchasing process that impact administrative cost, customer relation, etc. Along with these issues, the following issues must also be resolved.

1) Inventory issue:

To serve the customer properly, a company should inform a

customer right way when an item ordered is sold out

- ii) Database access and compatibility issues:
 Customer should allow more access right as possible
- iii) Customer service issues:
 Customer often have many questions about product
 that can be resolved only by talking to an order entry
 operators.

Inq. 10 marks
B)

Mercantile model from merchant's perspective:

The order-to-delivery cycle from the merchant perspective has been managed with standardization and cost. To achieve the better understanding, it is necessary to examine the order delivery cycle (ODC). The typical ODC includes at distinct activities, the actual detail of ODC vary from industry to industry and may differ for individual products and services. However, ODC has following generic steps as shown in figure below:

i) Order planning and order generation :

The order management cycle begins when an actual order is placed by the customer. The order planning leads into the order generation. Orders are generated in number of ways in e-commerce environment. The sales force broadcast ads, sends personalized e-mail to customer or create a www page.

Customer inquiry & order planning
Generation

→ Pre-sales
interaction

Cost estimation & pricing of product
services

Order receipt & entry

Order selection & prioritization

Product service
→ production
& delivery

Order scheduling

Order fulfillment & delivery

Order billing & account /payment
management

Post sales
interaction

Customer service & support

Fig:- Order management cycle in e-commerce.

b) Cost estimation and pricing:

Pricing is the bridge between the customer needs and company capabilities. The accountant of any organization tabulate cost and fixed price. Pricing depends on understanding the value of customer that is generated by each order, evaluating the cost of filling each order.

c) Order receipt and entry:

After an acceptable price code, the customer enters the order receipts and entries paid in Order Management cycle (OMC).

d) Order selection and prioritization:

Customer service representatives are responsible for choosing which order to accept and which to decline. The desirable orders are those that feed the company's capabilities and offer healthy profit. Companies that put effort in order selection and link it to their business strategies makes more money.

e) Order scheduling:

During this phase, the prioritized orders are kept into an actual production and operational sequence. This task is difficult because the different functional department such as sales, marketing, etc. may have conflicting goals and organizational imperatives.

f) Order fulfillment and delivery:

During this phase, the actual provision of product or service is made. Order fulfillment involves multiple functions and location that is, may be, manufactured in one location, warehouse in second and install in third. Some business fulfillment includes third party vendors. There should not be delay to delivery the orders.

g) Order billing and payment:

After the order has been fulfilled and delivered, billing is handled by the finance staffs. The billing function is designed to serve the needs and interest of the company not the customer.

h) Customer service and support:

This phase plays important role in all elements of company's profit such as customer value, price and cost. It includes elements as physical installation of the product, repair and maintenance, etc. Post sale service may affect customer satisfaction and company profitability for years.

2.4) Electronic Payment System

Introduction:

Electronic Payment Systems are becoming central to online business process innovation as companies look for ways to serve customer faster and at lower cost. Emerging innovations in the payment for good and services in electronic commerce promise to offer a wide range of new business opportunities.

Electronic Payment System and e-commerce are intricately linked given that online consumer must pay for products and services. Clearly, payment is an integral part of merchantile process and prompt payment is crucial. If the claims and debits of a various participants (individual, companies, banks and non-banks) are not balanced because of payment delay, then

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the entire business chain is disrupted. Hence, important aspect of e-commerce is prompt and secure payment, clearing and settlement of credit or debit claims.

But online seller face a problem like how will buyer pay for goods and services? What currency will serve as the medium of exchange in this new market place? If we rely on conventional payment methods such as cash, cheques, bank drafts or bills of exchange, the payment and settlement process will be bottleneck. So, electronic models of this conventional instruments are not suited for the speed required in e-commerce purchase processing. The new payment instruments are needed but must be secured, have a low processing cost and be accepted widely as global currency tender.

The demands of new payment instruments can be examined by looking following issues:

- What form and characteristics of payment instrument? - for example; electronic cash, electronic cheques, credits/debit cards will consumer use?
- How can we manage the financial risk associated with various payment instrument - privacy, fraud, mistakes as well as other risk?
- What security features needed to be designed to reduce this risk?

Types of Electronic Payment System:

Electronic Payment Systems grow rapidly in banking, retail, health care, on-line markets, and even government - in fact, anywhere money needs to change hands. Many organizations are motivated by the need to deliver products and services more cost effectively and to provide a higher quality of services.

Research in electronic payment system for consumer can be traced back to the 1940s, and first application (credit card) appeared soon after. In early 1970s, the emerging electronic payment technology was labelled Electronic Fund Transfer (EFT). EFT is defined as "any transfer of funds initiated through an electronic terminals, telephonic instruments, computer or magnetic tape".

Work on EFT can be segmented into three broad categories:

1. Banking and financial payments:
 - Large-scale or wholesale payments (eg: bank-to-bank transfer).
 - Small-scale or retail payments (eg: automated teller machines and cash dispensers)
 - Home banking (eg: bill payment).

2. Retailing payments:

- Credit cards (eg: VISA or MasterCard)
- Private label credit/debit cards (eg: S.C. Penney Card)
- Charge cards (eg: American Express).

3. On-line electronic commerce payments:

- Token-based payment systems
 - Electronic cash (eg: DigiCash)
 - Electronic cheques (eg: Netcheque)
 - Smart cards or debit cards (eg: Mondex Electronic Currency Card)
- Credit card-based payment systems
 - Encrypted credit cards (eg: 12345678 form-based encryption)
 - Third-party authorization numbers (eg: First Virtual)

Risks Associated with Electronic Payment System:

Electronic payment is a popular method of making payments globally. It involves sending money from bank to bank instantly - regardless of the distance involved. Such payment systems use Internet technology, where information is relayed through networked computers from one bank to another. Electronic payment systems are popular because of their convenience. However they also may pose serious risks to consumers and financial institutions. They are:

- I) Tax Evasion
- II) Fraud
- III) Impulse Buying
- IV) Payment conflict

I) Tax Evasion:

Businesses are required by law to provide records of their financial transactions to the government so that their tax compliance can be verified. Electronic payment however

can frustrate the efforts of tax collection. Unless a business discloses the various electronic payments it has made or received over the tax period, the government may not know the truth, which could cause tax evasion.

ii) Fraud :

Electronic payment systems are prone to fraud. The payment is done usually after keying in a password and sometimes answering security questions. There is no way of verifying the true identity of the maker of the transaction. As long as the password and security questions are correct, the system assumes you are the right person. If this information falls into the possession of fraudsters, then they can defraud you of your money.

iii) Impulse Buying :

Electronic payment systems encourage impulse buying, especially online. You are likely to make a decision to purchase an item you find on sale online, even though you had not planned to buy it, just because it will cost you just a click to buy it through your credit card. Impulse buying leads to disorganized budgets and is one of the disadvantages of electronic payment systems.

iv) Payment Conflict :

Payment conflicts often arise because the payments are not done manually but by an automated system that can cause errors. This is especially common when payment is done on a

regular basis to many recipients. If you do not check your payment slip at the end of every pay period, for instance, then you might end up with a conflict due to these technical glitches or anomalies.

Online Electronic Commerce Payment Category

Digital Token:

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

Entirely new forms of financial instruments are also being developed. One of them 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 institutions. Simply stated, electronic tokens are equivalent to cash that is backed by a bank.

Electronic tokens are of three types:

1) Cash or real-time:

Transactions are settled with the exchange of electronic currency. Eg: e-cash.

i) Debit or prepaid :

Users pay in advance for the privilege of getting information. Eg : smart cards and electronic purse.

ii) Credit or postpaid :

The server authenticates the customers and verifies with the bank that funds are adequate before purchase.
Eg: credit/debit cards and electronic cheques.

Electronic Cash (E-cash) :

Electronic cash (e-cash) is a new concept in online payment system because it combines computerized convenience with security and privacy that improves on paper cash. Its versatility opens up a host of new market and application. It is an attractive alternative for payment over the internet.

E-cash focus on replacing cash as the principle payment vehicle in consumer oriented electronic payment. Although it may be surprising to some, paper cash is still the most prevalent consumer payment instrument even after 30 years of continuous development in e-commerce payment system. Cash remains dominant form of payment for three reasons:

- i) Lack of trust in the banking system
- ii) Inefficient clearing and settlement of non-cash transaction.
- iii) Negative real interest rate paid on bank deposit.

Now lets compare cash to credit and debit cards.

- i) First they cannot be given away because technically they are identification cards owned by issuer and restricted to one user.

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- ii) They are not legal tender, given that merchants have the right to refuse to accept them.
- iii) Nor are credit and debit cards bearer instruments, their use requires an account relationship and authorization 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 a e-cash that has some of the properties of e-cash.

What is electronic cash?

Electronic cash is one of the instruments that can be used to conduct paperless transactions. Paperless transaction is a term used to describe financial exchange that do not involve the physical exchange of currency. Instead, monetary value is electronically credited and debited. E-cash or digital money is commonly used to conduct distant transaction, such as those between parties on the internet and those between parties in different countries.

In most cases, e-cash is equivalent to paper currency and can therefore be exchanged among individuals or spent for any types of goods and services. This financial instrument has played a large role in the increasing popularity of telecommuting.

People involved in electronic cash transfer may never acquire any paper currency. They may receive their funds electronically and use them electronically. This does not mean, however, that is impossible to get paper currency from

electronic cash. Electronic money can be converted into paper currency quite easily. This is possible because e-cash is commonly held in an account that can be accessed in several ways for example; through ATM.

Among many advantages, one of them is it eliminates the apprehension that many people feel about carrying and exchanging paper currency. Another is that, it can easily be converted to another currency, making travelling and international business substantially easier.

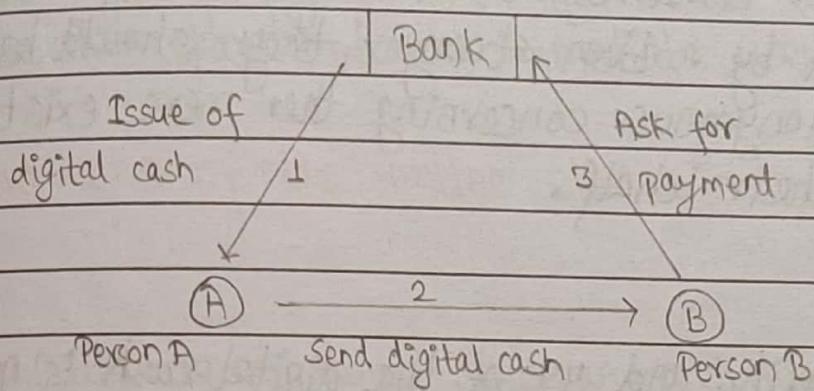


Fig:- Transaction of Electronic cash

Figure shows the basic operation of transaction of digital cash. User A obtains digital cash "coins" from bank. The user is now entitled to use the coins by giving them to another user B (may be merchant). B receives e-cash during a transaction and see that it has been authorized by a bank. They can then pay the cash into their account at the bank.

Ideal properties of a Digital Cash:

1. Secure:

Transaction of digital cash should be secure so that either of them or others will unable to alter or reproduce the electronic token.

2. Anonymous:

Parties should be able to do transaction without revealing their identity. Moreover, Bank should not know who paid or who was paid by. Even stronger, they should have the option to remain anonymous concerning the mere existence of a payment on their behalf.

3. Portable:

The security and use of the digital cash is not dependent on any physical location. The cash should be able to be stored on disk or USB memory stick, sent by email, SMS, internet chat or uploaded on web forms. Digital cash should not be restricted to a single, proprietary computer network.

4. Wide acceptability:

The digital cash is well-known and accepted in a large commercial zone. With several digital cash providers displaying wide acceptability, user should be able to use preferred unit in more than just a restricted local setting.

5. Off-line capable:

The protocol between the two exchanging parties is executed off-line, meaning that neither is required to be host-connected in order to proceed.

6. User-friendly:

The digital cash should be simple to use from both the sending perspective and the receiving perspective. Simplicity leads to mass use and mass use leads to wide acceptability. No a degree in cryptography should be required as the protocol machination should be transparent to the immediate user.

Pros and cons of the online electronic cash system:

Pros:

- i) Provide fully anonymous and untrashable digital cash.
- ii) No double spending problem.
- iii) No additional secure hardware required.

Cons:

- i) Communication overhead between merchant and the bank.
- ii) Huge database of coin records - the bank server need to maintain an evergrowing database for all the used coin's serial number.
- iii) Difficult to scale, need synchronization between bank servers.
- iv) Coins are not re-usable.

Electronic Checks (E-checks) :

When we write a check, we may assume that the piece of paper we write on will be deposited at a bank and processed manually. Electronic check conversion makes that process less and less likely. Instead of processing the piece of paper our paper check get turned into "electronic check".

How electronic checks work?

With electronic check, a check imager is connected to a small printer through a credit card terminal directly at the point of sale. When a customer presents a check, the check is scanned by the imager, the magnetic data (MICR) indicating the bank routing number and account number are read, and the amount of ~~am~~ the check is entered. The E-check process verifies the check by comparing the check's bank account and the customer's driver's license with a national negative database to determine if the account has a fraud history, is closed, or has had insufficient funds problems. If the check is approved, a receipt is printed for customer signature. The check and a copy of the signed receipt are returned to the customer. The captured data is used in the electronic transfer of money through the Automated Clearing House (ACH) system.

No. E. Student
2300 Mariner Square Drive
San Francisco, CA 95102

2228

Date _____

Pay To
The Order of

\$ _____

Dollars

I: 123456780 I: 2345678912344511 2228

I: 123456780 I: 2345678912344511

Routing/Transit No.

Account Number

2228

Check Number

Fig: Electronic Check Format.

Merchant benefits of converting checks to an electronic form:

- Saves time: no more bank runs or long teller lines.
- Lowers traditional bank fees like per item deposit and returned item fees.
- Funds quickly, usually within 2 business days of the original transaction.
- Secures customers personal and bank account information by returning the original item to the check writer.
- Provides customers complete transaction information for easy bank reconciliation, as well as providing sales information, like store name and location.
- Expandable equipment is simple and user friendly.

Impact of electronic checks:

- Electronic checks allow business to process payment more quickly. As a result, the money will come out of checking account sooner than we might expect.
- We need to make sure that we have enough money in account when we write a check, and we cannot rely on float time as much as we have in past.
- Keep a balance check book and consider some type of overdraft protection plan.

Where electronic check conversion happens?

Paper check may be converted to electronic check right in front of user or it may happens when user mail a check to somebody to pay a bill. Eitherway they are making an electronic check so that they can process payment electronically.

Electronic check disclosure and identification :

Business are supposed to notify you that they are making an electronic checks. If we are in store, there should be sign near the register that says they will turn your paper check into an electronic check. If we are mailing in a check to pay a bill, the company probably disclose their electronic check policy somewhere in the fineprint of an agreement or on the back of your statement. If the cashier drop check into a machine and hence it back to us when we make a purchase, they have used an electronic check.

Smart Cards :

A smart card is a device that includes an embedded integrated circuit chip (ICC) that can be either a secure microcontroller or equivalent intelligence with internal memory or a memory chip alone. The card connects to a reader with direct physical contact or with a remote contactless radio frequency interface. With an embedded microcontroller, smart cards have the unique ability to store large amount of data, carry out their own on-card functions (eg: encryption and mutual authentication) and interact intelligently with a smart card reader. Smart card technology is available in a variety of form factors, including plastic cards, fobs, subscriber identity modules (SIMs) used in GSM mobile phones and etc.

Types of Smart Cards:

There are two types of smart cards. They are:

- i) Contact smart card
- ii) Contactless smart card.

i) Contact smart card :-

A contact smart card must be inserted into a smart card reader with a direct connection to a conductive contact plate on the surface of the card (typically gold plated). Transmission of commands, data and card status takes place over these physical contact points.

ii) Contactless smart card :-

A contactless card requires only those proximity to a reader. Both the reader and the card have antennae, and the two communicate using radio frequencies (RF) over this contactless link. Most contactless cards also derive power for the internal chip from this electromagnetic signal. The range is typically one-half to three inches for non-battery-powered cards, ideal for applications such as building entry and payment that requires a very fast card-interface.

Two additional categories of cards are: dual-interface cards and hybrid cards.

A hybrid card has two chips; one with a contact interface and one with a contactless interface. The two chips are not interconnected. A dual interface card has a single chip with both contact and contactless interfaces. With dual-interface

(144)

cards, it is possible to access the same chip using either a contact or contactless interface with a very high level of security.

The chip used in all of these cards fall into two categories as well: microcontroller chips and memory chips. A memory chip is like a small floppy disk with optional security. Memory chips are less expensive than microcontrollers but with a corresponding decrease in data management security. Cards that use memory chips depend on the security of the card reader for processing and are ideal for situations that require low or medium security.

A microcontroller chip can add, delete, and otherwise manipulate information in its memory. A micro controller is like a miniature computer, with an input/output port, operating system, and hard disk. Smart cards with an embedded microcontroller have the unique ability to store large amount of data, carry out their own on-card functions (e.g: encryption and digital signature) and interact intelligently with a smart card reader.

The selection of a particular card technology is driven by a variety of issues, including:

- 1) Application dynamics
- 2) Prevailing market infrastructure ^{most influence}
- 3) Economics of the business model
- 4) Strategy for shared application cards.

Smart card are used in many application worldwide, including :

1) Secure identity applications:

Employee ID badges, citizen ID documents, electronic passports, driver's licenses, online authentication devices.

2) Health care applications:

Citizen health ID cards, physician ID cards, portable medical records cards.

3) Payment applications:

Contact and contactless credit/debit cards, transit payment cards.

4) Telecommunication applications:

GSM subscriber Identity Modules, pay telephone payment cards.

Debit and Credit cards:

Credit cards have been around since the 1950s, and debit cards were introduced in the mid-1970s. By 2006, there were 984 million bank-issued Visa and MasterCard credit and debit cards in the United States alone.

Though the two types of cards may be used interchangeably, there are notable differences between them.

Debit cards:

Debit cards are linked to our bank account so the money we spend is automatically deducted from our account. They provide a convenient alternative to cash, especially if we do a lot of shopping online. Debit cards can also help us to budget. If we use card to pay bills and day-to-day expenses and monthly statement will provide a good snapshot of how much we spend per month and where it's going. Another benefit is that, unlike credit cards, our bank balances goes down with each debit card transactions, so we are less likely to overspend.

With so many benefits to the debit card, why we use a credit card at all? There are three main reasons:

- i) We can spend more than we have
- ii) Postpone paying
- iii) Typically get better rewards and better protection than we do with debit cards.

Credit cards:

Credit cards basically allow us to use someone else's money (the card issuer's) to make a purchase while we pay the money back later. If we do so within the billing period (generally 15 to 45 days) we can avoid paying any interest on it. The problem arises, of course, when we don't pay the balance in full and are charged interest as well.

If we use them responsibly, credit cards can offer more advantages:

- 1) They help build our credit, as long as we pay our bills on time.
- 2) Some also offer rewards that can be used to get gifts,

- cash back or discount for products, services and special events.
- 3) They provide more protection if someone steals card or bank information.

Eg: If we notice fraudulent charge, we can claim and remove charge from balance. But with debit cards, processing may take a weeks and even we may have to deal with ~~decreased~~ dwindling bank balance or bounced checks.

Federal law also protects us if we need to dispute charges on a credit card, but not if we use a debit cards or other forms of payment because retailer already has our money. So there is less chance and no guarantee that we will get money back. But if we pay with credit card and card issuer can legally withhold payment from the retailer until they resolve the dispute, and we won't be charged.

Working Techniques of credit cards:

Credit card payment processing for the e-commerce electronic payment system takes place in two phases:

- 1) Authorization: getting approval for the transaction that is stored with the order.
- 2) Settlement: processing the sale which transfers the funds from the issuing bank to the merchant's account.

The flow charts below represent the key steps in the process starting from what a customer sees when placing an order through completing the sale and finishing with the merchant processing the sale to collect funds.

Benefits and Limitations of Credit cards:

Benefits:

- 1) Convenience: Credit cards can save our time and trouble - no searching for an ATM or keeping cash on-hand.
- 2) Record keeping: Credit card statements can help us to track our expenses. Some cards even provide year-end summaries that really help out at tax time.
- 3) Low-cost loans: We can use revolving credit to save today. (Eg: at a one-day sale), when available cash is a week away.
- 4) Instant cash: Cash advances are quick and convenient, putting cash in our hand when we need it.
- 5) Build positive credit: Controlled use of a credit card can help us to establish credit for the first time or rebuild credit if we have had problems in the past - as long as we stay within our means and pay our bills on time.
- 6) Purchase protection: Most credit card companies will handle disputes for us. If a merchant won't take back a defective product, check with our credit card company.

Limitations:

- 1) Overuse: Revolving credit makes it easy to spend beyond our means.
- 2) Paperwork: We will need to save our receipts and check them against our statement each month. This is good way to ensure that we haven't been overcharged.
- 3) High-cost fees: Our purchase will suddenly become much more expensive if we carry a balance or miss a payment.
- 4) Unexpected fee: Typically, we will pay between 2 & 4 percent just to get the cash advance; also cash advances usually carry high interest rates.
- 5) Deepening our debt: Consumers are using credit more than ever before. If we charge freely, we may quickly find ourselves in over our head - as our balance increases, so do our monthly minimum payments.
- 6) Homework: It's up to us to make sure we receive proper credit for incorrect or fraudulent charges.

UNIT- 4.1 Interorganizational Commerce Electronic Data Interchange (EDI)

Course outline:

- Introduction to EDI
- EDI vs. E-mail
- EDI benefits
- How EDI works
- EDI application in various fields
- Security and privacy issues of EDI
- EDI for e-commerce

Introduction to Electronic Data Interchange (EDI)

As a cost-conscious, highly competitive electronic commerce environment comes of age, businesses are looking at **electronic data interchange (EDI)** in a new light. EDI is defined as the inter-process communication (computer application to computer application) of business information in a standardized electronic form. In short, EDI communicates information for business transactions between the computer systems of companies, government organizations, small businesses, and banks.

Using EDI, trading partners establish computer-to-computer links that enable them to exchange information electronically. This allows businesses to better cope with a growing avalanche (too many) of paperwork: purchase orders, invoices, confirmation notices, shipping receipts, and other documents. With the aid of EDI, all these documents are in electronic form, which aliases more work automation to occur and even alters the way business is done.

Many industries see EDI as essential for reducing cycle and order fulfillment times. Manufacturers work with customers and suppliers to convert to an electronic exchange the huge volume of orders and records that now crawl back and forth on paper. In retailing, EDI can

provide vendors with a snapshot of what stores are selling, enabling them to recognize and meet their customer's needs much faster than in the past. In addition, it enables retailers and vendors to place orders and pay bills electronically, reducing time and the expense of paperwork.

The primary benefit of EDI to business is a considerable reduction in transaction costs, by improving the speed and efficiency of filling orders. Studies show that it takes up to five times as long to process a purchase order manually as it does electronically.

Ironically, despite these advantages, EDI is not (yet) widely used. It is estimated that out of millions of businesses in the United States, only 44,000 companies exchange business data electronically. Only about 10 percent of these companies use EDI for financial transactions. Moreover, no more than fifty banks have the capability of providing complete financial EDI services to their corporate customers. The joke in industry is that most companies are so unfamiliar with EDI they don't even know how to spell it.

Background of Electronic Data Interchange: EDI developed in the 1960s as a means of accelerating the movement of documents pertaining to shipments and transportation. Not until the mid-1980s, however, was the technique used in a wide range of industries—automotive, retail, transportation, and international trade. Its use is growing and it is set to become the standard by which organizations will communicate formally with each other in the world of electronic commerce.

Electronic commerce is often equated with EDI, so it is important to clarify that electronic commerce embraces EDI and much more. In electronic commerce, EDI techniques are aimed at improving the interchange of information between trading partners, suppliers, and customers by bringing down the boundaries that restrict how they interact and do business with each other.

Technically speaking, EDI is one well-known example of structured document interchange which enables data in the form of document content to be exchanged between software applications that are working together to process a business transaction.

(5)

Emphasis must be placed on the fact that EDI only specifies a format for business information, that the actual transmission of the information is tackled by other underlying transport mechanisms such as e-mail or point-to-point connections.

Defining EDI: Because of the different approaches in the development and implementation of EDI, there is no one consensus on a definition of EDI. A review of some of the prevailing definitions follows:

Electronic data interchange is the transmission, in a standard syntax, of unambiguous information of business between computers of independent organizations. [The Accredited Standards Committee for EDI of the American National Standards Institute)

Electronic data interchange is the interchange of standard formatted data between computer application systems of trading partners with minimal manual intervention. [UN/EDIFACT Training Guide]

Electronic data interchange is the electronic transfer, from computer to computer, of commercial and administrative data using an agreed standard to structure an EDI message. [Article 2.1, of the European Model EDI agreement]

EDI Layered Architecture: EDI architecture specifies four layers: the **semantic** (or application) layer, the standards **translation** layer, the packing (or **transport**) layer, and the **physical** network infrastructure layer as shown in figure below.

EDI semantic layer	Application level services	
EDI standard layer	EDIFACT business form standards	
	ANSI X12 business form standards	
EDI transport layer	Electronic mail	X435, MIME
	Point to point	FTP, TELNET
	World Wide Web	HTTP
Physical layer	Dial-up lines, Internet, I-way	

Fig: Layered Architecture of EDI

The **EDI semantic layer** describes the business application that is driving EDI. For a procurement application, this translates into requests for quotes, price quotes, purchase orders, acknowledgments, and invoices. This layer is specific to a company and the software it uses. In other words, the user interface is customized to local environments.

The information seen at the EDI semantic layer must be translated from a company-specific form to a more generic or universal form so that it can be sent to various trading partners, who could be using a variety of software applications at their end. To achieve this, companies must adopt universal EDI standards that lay out the acceptable fields of business forms. What complicates matters is the presence of two competing standards that define the content and structure of EDI forms: the **X12 standard**, developed by the American National Standards Institute (ANSI), and **EDIFACT**, developed by United Nations Economic Commission for Europe (UN /ECE).

When the trading partner sends a document, the EDI translation software converts the proprietary format into a standard mutually agreed on by the processing systems. When a company receives the document, their EDI translation software automatically changes the standard format into the proprietary format of their document processing software so that the company can manipulate the information in whatever way it chooses to.

Electronic Data Interchange versus E-mails

EDI document transport is far more complex than simply sending e-mail messages or sharing files through a network. These EDI documents are more structured than e-mail. What really differentiates EDI from messaging is its emphasis on the automation of business transactions conducted between organizations. In addition, EDI messages have certain legal status. For instance, if a buyer sends a supplier EDI purchase orders that specify the requirements, time of delivery, and quantity and the supplier does not uphold its end of the contract, it can be taken to court with the EDI trading agreements serving as evidence. Table below indicates some EDI properties which distinguish it from e-mail.

<i>Electronic Data Interchange (EDI)</i>	<i>Electronic Mail</i>
There is typically no human involvement in the processing of the information, as the interface has software-to-software orientation. The data are structured in a software-understandable way.	The data are not necessarily structured to be software-understandable. A human-to-software interface is involved at a minimum of one end of the interchange.
The interchange is composed by one software for interpretation by another software. If a reply is involved, it is composed by a software to be interpreted by another software.	The message is composed by a human and/or interpreted by a human and/or a reply is composed by a human and/or interpreted by a human.

Table: EDI versus E-mails

How EDI works?

The idea behind EDI is very simple. EDI seeks to take a form from a business application, translates that data into a standard electronic format, and transmit it. At the receiving end, the standard format is "untranslated" into a format that can be read by the recipient's 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 organizations 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 available. For example, Universities use EDI to exchange transcripts quickly. Auto manufacturers use EDI to transmit large, complex engineering designs created on specialized computers.

Figure below shows the information flow when paper documents are shuffled between organizations via the mailroom. When the buyer sends a purchase order to a seller, the relevant data must be extracted from the internal database and recorded on hard copy. This hard copy is then forwarded to the seller after passing through several intermediate steps. Sellers receive information in the form of letters and in some cases a vast number of facsimiles. This information is manually entered into the internal information systems of the recipient by data entry operators. This process generates a considerable amount of overhead in labor costs and time delays. The reproduction of information also increases the risk of errors caused by incorrect data entries.

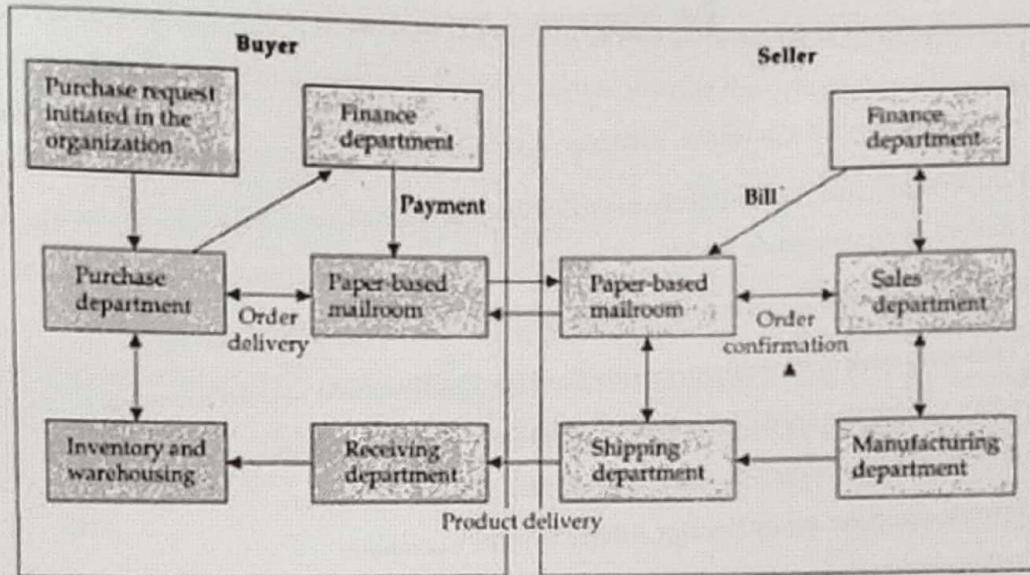


Fig: Information flow without EDI

This 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 by means of EDI. EDI can substantially automate the information flow and facilitate management of the business process, as illustrated in Figure below.

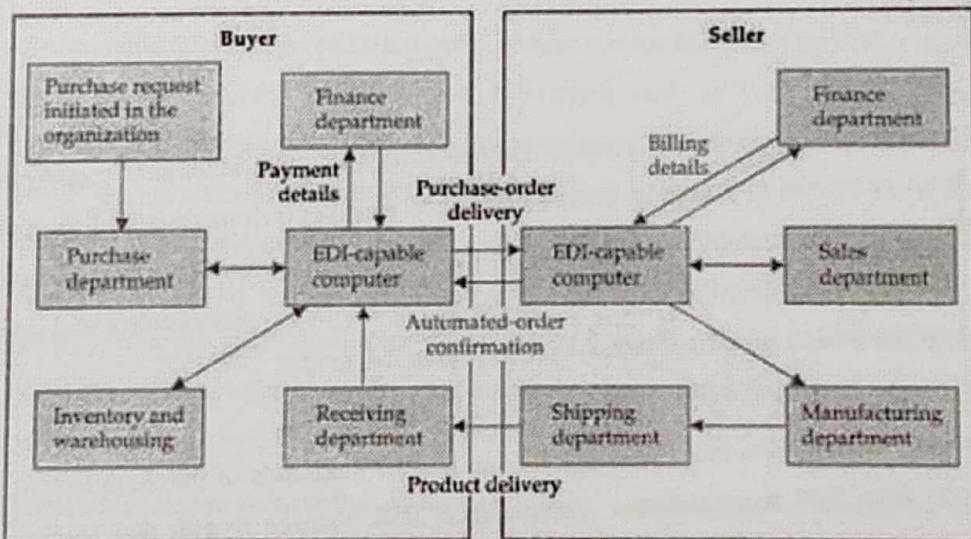


Fig: Information flow with EDI

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

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. The improved ability to exchange huge amounts of data in a fast and effective manner tends to speed up business processes.

Benefits of EDI

EDI can be a cost- and time-saving system, for many reasons. The automatic transfer of information from computer to computer reduces the need to rekey information and as such reduces costly errors to near zero. EDI transactions produce acknowledgments of receipt of data. Many firms are now finding that this acknowledgment can make the invoice obsolete and save many efforts now devoted to acquiring, receiving, and paying for goods.

For companies dealing with thousands of suppliers and tens of thousands of purchase orders a year, the savings from EDI are significant. For example, RJR Nabisco figures that purchase orders that previously cost between \$75 and \$125 to process now cost 93 cents. Companies can

also pay each other through "automated receipts settlement" or financial EDI, whereby electronic purchase order acknowledgments and shipping notices provide the data necessary for payment, further reducing paper.

Savings also accrue from the following improvements:

1. **Reduced paper-based systems.** EDI can impact the effort and expense a company devotes to maintaining records, paper-related supplies, and to the personnel required to maintain all of these systems. Electronic transactions takeover most of the functions of paper forms and through automation drastically reduce the time spent to process them. EDI can also reduce postage bills because of the amounts of paper that no longer need be sent.
2. **Improved problem resolution and customer service.** EDI can minimize the time companies spend to identify and resolve interbusiness problems. Many such problems come from data-entry errors somewhere along the way, and EDI can eliminate many of them. EDI can improve customer service by enabling the quick transfer of business documents and a marked decrease in errors land so can fill orders faster/ and by providing an automatic audit trail that frees accounting staff for more productive activities.

An example of problem resolution and customer service facilitated by EDI is the Vendor Stock Replenishment (VSR) initiated by retailers such as Wal Mart. This program requires that vendors maintain appropriate inventory levels in all stores. With VSR, stores do not run out of a product while suppliers or distributors wait for a purchase order from the headquarters. Suppliers and distributors send stock as soon as the store EDI system reports it is necessary and automatically bill the client. It cuts days, even weeks, from the order fulfillment cycle and ensures that the product is always on the shelf. The time savings come from not having to copy and fax/mail copies of invoices or purchase orders.

3. **Expanded customer/supplier base.** Many large manufacturers and retailers with the necessary clout are ordering their suppliers to institute an EDI program. Today, when

evaluating a new product to carry or a new supplier to use, the ability to implement EDI is a big plus in their eyes. These same companies tend to stop doing business with suppliers who do not comply with EDI.

EDI Applications in various fields of Business

Although EDI was developed to improve transportation and trade, it has spread everywhere. In short, EDI has grown from its original (and somewhat limited) use as expediter of the transfer of trade goods to facilitator of standard format data between any two computer systems.

An examination of EDI usage in various industries provides insight into the business problems that EDI is attempting to solve. We will present four very different scenarios in industries that use EDI extensively:

1. International or cross-border trade,
2. Financial EDI or electronic funds transfer (EFT),
3. Health care EDI for insurance claims processing, and
4. Manufacturing and retail procurement.

As these examples illustrate, companies have applied a number of EDI based solutions to improve business processes—for both strategic and competitive advantages. In some cases, EDI has transformed operational aspects of a company's business. Increased quality and cost reductions can significantly change industry standards of competition as innovators exert greater pressure on competitors to meet new standards of customer satisfaction and productivity. In others, EDI has shaped a company's marketing and distribution efforts by helping to create new distribution channels, develop new merchandising and market research methods, and introduce better customer service. In sum, major improvements in product manufacturing and customer service response time allow companies to be more competitive.

Let us describe the EDI business applications briefly:

1. International or cross-border trade

EDI has always been very closely linked with international trade. Over the last few years, significant progress has been made toward the establishment of more open and dynamic trade relations. Recent years have brought the General Agreement on Tariffs and Trade (GATT); the Free Trade Agreement (NAFTA) among the United States, Canada, and Mexico; and the creation of the European Union. These developments have meant the lifting of long-standing trade restrictions. Many countries, and in particular developing countries, have made significant efforts to liberalize and adjust their trade policies. In this context, trade efficiency, which allows faster, simpler, broader and less costly transactions, is a necessity. It is a widely held view that trade efficiency can be accomplished only by using EDI as a primary global transactions medium.

2. Financial EDI or electronic funds transfer (EFT)

Financial EDI comprises the electronic transmission of payments and remittance information between a payer, payee, and their respective banks. This section examines the ways business-to-business payments are made today and describes the various methods for making financial EDI payments.

Financial EDI allows businesses to replace the labor-intensive activities associated with issuing, mailing, and collecting checks through the banking system with automated initiation, transmission, and processing of payment instructions. Thus it eliminates the delays inherent in processing checks.

Types of Financial EDI: Traditionally, wholesale or business-to-business payment is accomplished using checks, EFT, and automated clearinghouses (ACH) for domestic and international funds transfer. ACH provides two basic services to industrial and financial corporate customers (including other banks): (1) fast transmission of information about their financial balances throughout the world, and (2) the movement of money internationally at rapid speed for settlement of debit/credit balances. Banks have developed sophisticated cash management systems on the back of these services that

essentially reduce the amount of money companies leave idly floating in low-earning accounts.

Thus, three principal types of noncash payment instruments currently used for business-to-business payments: **checks, electronic funds transfers, and automated clearinghouse (ACH) transfers.**

3. Health care EDI for insurance claims processing, and

Providing good and affordable health care is a universal problem. In 1994, the American public spent \$1 trillion on health care, nearly 15 percent of the gross domestic product (GDP). National health care expenditures have risen by 10.5 percent each year for the past eight years—more than double the rate of increase in the consumer price index. It is estimated that \$3.2 billion in administrative savings are expected to be achieved by switching from being paper-based to an EDI implementation. Employers could save \$70 million to \$110 million by using EDI for enrollment and to certify that a prescribed procedure is covered under the subscriber's health insurance contract.

4. Manufacturing and retail procurement.

Both manufacturing and retail procurement are already heavy users of EDI. In manufacturing, EDI is used to support just-in-time. In retailing, EDI is used to support quick response.

Just-in-Time and EDI: Companies using JIT and EDI no longer stock thousands of large parts in advance of their use. Instead, they calculate how many parts are needed each day based on the production schedule and electronically transmit orders and schedules to suppliers every day or in some cases every 30 minutes. Parts are delivered to the plant "just in time" for production activity.

Quick Response and EDI: Taking their cue from the efficiencies manufacturers have gained from just-in-time manufacturing techniques, retailers are redefining practices through the entire supply chain using quick response (QR) systems. For the customer, QR

means better service and availability of a wider range of products. For the retailer and suppliers, QR may mean survival in a competitive marketplace.

Much of the focus of QR is in reduction of lead times using event-driven EDI. Occurrences such as inventories falling below a specified level immediately trigger a chain of events including automatic ordering from one company's application directly into the other's application. In QR, EDI documents include purchase orders, shipping notices, invoices, inventory position, catalogs, and order status.

Security and privacy issues of EDI

Since in the case of EDI, we are dealing with trade between countries and corporations, issues of legal admissibility and computer security are important. Companies that deal with EDI often retain the services of a lawyer during the design of an EDI application so that the appropriate evidentiary/admissibility safeguards are implemented.

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 legal status better, let's take a quick look at contract law. It distinguishes three modes of communication types: instantaneous communication, delayed communication via the U.S. Postal Service (USPS), and delayed communication via non-USPS couriers:

1. Instantaneous, If the parties are face to face or use an instantaneous communication medium such as the telephone, an offer or acceptance is held operable when spoken.
2. Delayed (USPS and non-USPS). The "mailbox rule" provides that an acceptance communicated via USPS mail or via telegram, mailgram, and probably electronic messaging systems, is effectively communicated when dispatched, or physically deposited in a USPS and non USPS mailbox.

Messaging systems combine features of both instantaneous and delayed communications. A message's delay is a function of the specific application, message routing, network(s) traversed, system configuration, and other technical factors typically unknown to the user. So, who assumes liability? If the U.S. mail or an overnight express service does not deliver a contract to the right addressee, it can be held responsible for any business losses caused by the error. Of course, liability also depends on the situation. In the case of EDI, however, the courts haven't decided who is liable if an EDI network fails to transmit a document or transmits a document to the wrong party. There is no legal precedence in this area (yet!).

Digital Signatures and EDI: The cryptographic community is exploring various technical uses of digital signatures by which messages might be time-stamped or digitally notarized to establish dates and times at which a recipient might claim to have had access or even read a particular message.

If digital signatures are to replace handwritten signatures, they must have the same legal status as handwritten signatures (documents signed with digital signatures must be legally binding). For example, an on-line "notarized time-stamping" service has been suggested that would accept a message and return one showing the date, time, and a digital signature binding the notarized message content and received date and time to the digital public notary. The digital signature provides a means for a third party to verify that the notarized object is authentic.

Digital signatures should have greater legal authority than handwritten signatures. For instance, if a ten-page contract is signed by hand on the tenth page, one cannot be sure that the first nine pages have not been altered. If the contract was signed by digital signatures, however, a third party can verify that not one byte of the contract has been altered.

EDI for e-commerce

The economic advantages of EDI are widely recognized. But until recently, companies have

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been able to improve only discrete processes such as automating the accounts payable function or the funds transfer process. Companies are realizing that to truly improve their productivity they need to automate their external processes as well as their internal processes. This is the thrust of new directions in EDI.

New EDI services for electronic commerce are seen as the future bridge that automates external and internal business processes, enabling companies to improve their productivity on a scale never before possible. They present information management solutions that allow companies to link their trading community electronically—order entry, purchasing, accounts payable, funds transfer, and other systems interact with each other throughout the community to link the company with its suppliers, distributors, customers, banks, and transportation and logistics operations.

Another goal of new EDI services is to reduce the cost of setting up an EDI relationship. These costs are still very high because of the need for a detailed bilateral agreement between the involved business partners and for the necessary technical agreements. Therefore most successful EDI implementations are either in long-term partnerships or among a limited number of partners. With the advent of inter-organizational commerce, several new type of EDI are emerging that can be broadly categorized as **traditional EDI** and **open EDI**.

Traditional EDI: Traditional EDI replaces the paper forms with almost strict one-to-one mappings between parts of a paper form to fields of electronic forms called transaction sets. Traditional EDI covers two basic business areas:

- i) Trade data interchange (TDI) encompasses transactions such as purchase orders, invoices, and acknowledgments.
- ii) Electronic funds transfer (EFT) is the automatic transfer of funds among banks and other organizations.

Today, traditional EDI is divided into two camps: old EDI and new EDI. Old EDI is a term created by those working on the next generation of EDI standards in order to differentiate between the present and the future.

Old EDI refers to the current practice of automating the exchange of information pertinent to the business activity. Information that is generated by the business process of one computer is transferred electronically and effects a corresponding business process in another computer. Old EDI is also used to refer to the current EDI-standardization process (e.g., X12, EDIFACT) where tens of thousands of people in groups (or working committees) all around the world are attempting to define generic document interchanges (e.g., purchase orders) that allow every company to choose its own, unique, proprietary version (that is a subset of the original transaction set).

New EDI is really a refocus of the standardization process. With old EDI, the standardization is focused on the interchange structure, on the transaction set in X12 or the message in EDIFACT. With new EDI the structure of the interchanges is determined by the programmer who writes the business application program, not by the lengthy standards process.

Open EDI provides a framework where two potential trading partners can whip out an EDI structure for their potential partnership in the short time frame that it takes them to draw up and negotiate the legal contracts. The increased interest in open EDI is a result of dissatisfaction with traditional EDI. Open EDI is a business procedure that enables electronic commerce to occur between organizations where the interaction is of short duration. In essence, open EDI is the process of doing EDI without the upfront trading partner agreement that is currently signed by the trading partners before they commence trying to do business by EDI.

UNIT-3.2 THE CORPORATE DIGITAL LIBRARY

STRUCTURE

- 14.0 Objective
- 14.1 Introduction
- 14.2 Definition
- 14.3 Benefits of digital libraries
- 14.4 Issues and challenges in digital libraries
- 14.5 Requirements of digital libraries
- 14.6 Cost of digital libraries
- 14.7 Types of digital documents
- 14.8 Corporate Data Warehouses
- 14.9 Self-Assessment Questions

14.0 OBJECTIVE

After going through this lesson, you will be able to:

- ① Describe the concept of digital library
- ① Illustrate the benefits of digital library
- ① Identify the various issues and challenges involved in digital library
- ① Find out and justify the different requirements of digital library
- ① Highlight the various types of digital documents in digital library
- ① Explore the digital library scenario in India

14.1 INTRODUCTION

When thousands of people read any government report on the Internet, they retrieved the document from a major repository of government publications. Millions of such documents are now available through the World Wide Web which is ubiquitous as well as accessible anywhere/anytime. Is retrieving that report or other similar publications from the web equivalent to using a digital library? There is no broad, balanced collection of information

that meets particular selection criteria. Internet publications lack standardization and validation. Items have minimal cataloging or other bibliographic control. And, finally, effective retrieval of information is not guaranteed.

The "just-in-time" library

Imagine a perfect library situated somewhere out in cyberspace. The library is equipped with precise, replicable discovery tools and materials on every subject from all perspectives in a full range of formats. Users can connect to these library resources in many ways: from a catalog, index, abstract, or finding aid which link to full text, digital images, or other facsimile editions, or to metadata descriptions of textual or multimedia holdings from a local library whose resources can be delivered to users either onsite or by mail. Older titles are archived and preserved, available on demand. Help is offered in real time, 24 hours a day, and seven days a week. In essence, this virtual digital library can be used anytime, anywhere, and by anyone.

What we have imagined is a "just in time" rather than a "just in case" library. We have migrated from a state of scarcity to a state of abundance, transcending our geographic, legal and political boundaries, with librarians serving as knowledge navigators and learning facilitators. Our dream is for the emergence of a shared cyber library in which each of our individual institutions maintains its separate, unique identity, but offers direct, unlimited access to a rich collection of resources that are no longer limited by location, format, cost, time of day, or onsite restrictions.

14.2 DEFINITION

So what is a digital library? There is much confusion surrounding this phrase, stemming from three factors. First, the library community has used several different phrases over the years to denote this concept-electronic library, virtual library, library without walls and it never was quite clear what each of these different phrases meant. "Digital library" is simply the most current and most widely accepted term and is now used almost exclusively at conferences, online, and in the literature.

Another factor adding to the confusion is that digital libraries are at the focal point of many different areas of research, and what constitutes a digital library differs depending upon the research community that is describing it. For example:

- from an information retrieval point of view, it is a large database
- for people who work on hypertext technology, it is one particular application of hypertext methods
- for those working in wide-area information delivery, it is an application of the Web
- and for library science, it is another step in the continuing automation of libraries that began over 25 years ago

In fact, a digital library is all of these things. These different research approaches will all add to the development of digital libraries.

Third, confusion arises from the fact that there are many things on the Internet that people are calling "digital libraries," which-from a librarian's point of view-are not. For example:

- for computer scientists and software developers, collections of computer algorithms or software programs are digital libraries.
- for database vendors or commercial document suppliers, their databases and electronic document delivery services and digital libraries.
- for large corporations, a digital library is the document management systems that control their business documents in electronic form.
- for a publisher, it may be an online version of a catalogue.
- and for at least one very large software company, a digital library is the collection of whatever it can buy the rights to, and then charge people for using.

A fairly spectacular example of what many people consider to be a digital library today is the World Wide Web. The Web is a gathering of thousands and thousands of documents. Many would call this huge collection a digital library because they can find information, just as they can do banking in a "digital bank" or buy compact discs in a "digital record store." Yet, is the Web a digital library?



Thus, in examining the various examples of what are called digital libraries, it appears that librarians have been confused about what a digital library is, that the word "library" has been appropriated by many different groups to describe either their areas of research or signify a simple collection of digital objects.

So what is a working definition of "digital library" that makes sense? As a starting point, we should assume that digital libraries are libraries with the same purposes, functions, and goals as traditional libraries-collection development and management, subject analysis, index creation, provision of access, reference work, and preservation. A narrow focus on digital formats alone hides the extensive behind-the-scenes work that libraries do to develop and organize collections and to help users find information.

The institutions involved in the American Digital Library Federation came up with a similar notion of "digital library." It also emphasizes the traditional underpinnings of libraries-selection, access, and preservation-as well as the fact that digital libraries will necessarily be constructed to serve particular communities.

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 libraries will also include digital materials that exist outside the physical and administrative bounds of any one digital library
- digital libraries will include all the processes and services that are the backbone and nervous system of libraries. However, such traditional processes, though forming the basis digital library work, will have to be revised and enhanced to accommodate the differences between new digital media and traditional fixed media.
- digital libraries ideally provide a coherent view of all of the information contained within a library, no matter its form or format

- digital libraries will serve particular communities or constituencies, as traditional libraries do now, though those communities may be widely dispersed throughout the network.
- digital libraries will require both the skills of librarians and well as those of computer scientists to be viable.

Many corporations are finding that the most effective way to manage their business information is through a corporate library that provides the architecture to model, map, integrate, condense, and transform scattered information housed in digital documents and legacy databases into meaningful business information.

Today, the term digital library is widely used as the generic term for diverse information structures that provide organizations and workers access to the vast amount of internal information encoded in multimedia formats. It creates a unified repository of consistent business data for information processing. Companies can perform more substantive, accurate, and consistent analyses using the digital library as a foundation for decision support systems.

The digital library is not a monolithic entity but a loose collection of distributed on-line information sources-databases and electronic documents organized in a meaningful way. The term library is apt in this context because the fundamental mission of any library is to provide storage and physical access to the published document.

Digital libraries are of two types: electronic document-based digital libraries and structured data or database-oriented warehouses.

Document Digital Libraries

In the last four years, document processing and management has emerged from obscurity to challenge traditional notions of business data processing. We use the term document in the broadest sense, to denote all non-data records, including books, reports, paper materials, electronic files, video, and audio.

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The revolution of digital documents has been spurred by the availability of inexpensive networking technology and applications. It is also quite clear that new information generated outside of the relational database realm is done in digital document forms (word processing, spreadsheets, CD-ROMs, audio recordings, digital video, and others) and the rate of retrospective conversion (from paper to electronic form) is also growing.

From an electronic commerce perspective, a document digital library is simply a distributed network of interlinked information that is tailored for electronic publishing. It encompasses new types of information resources; new approaches to acquisition (especially with more sharing and subscription services); new methods of storage and preservation; new approaches to classification and cataloging; new modes of interaction with information; and shifts in organizational practices.

Data Warehouses

Data warehouses are designed as central information repositories for combining and storing vast amounts of historical and reference data from a number of different sources. These corporate data sources include mainframe databases, client-server relational databases, spreadsheets, text reports, flat files, and proprietary systems.

A data warehouse, simply stated, is a physical separation of an organization's operational data systems from its decision support systems. It includes a repository of information that is built using data from the far-flung and often departmentally isolated systems.

Building a data warehouse allows companies to optimize query times and enables managers to be consistent in their analysis.

Clearly, the approaches to developing and manipulating document libraries versus data warehouses are substantially different. The difference exists at the underlying content level and at the actual application level. Although the digital library promises to make it easy to

conduct electronic commerce, building the digital library itself is a challenging undertaking. That challenge can be broken down into three areas:

1. A need for a data model that provides an organization or schema
2. A strategy for populating that model with data
3. A way for users to get useful information out of the digital library

14.3 BENEFITS OF DIGITAL LIBRARIES

Here are some of the potential benefits of digital libraries.

- **The digital library brings the library to the user**

To use a library requires access. Traditional methods require that the user goes to the library. In a university, the walk to a library takes a few minutes, but not many people are member of universities or have a nearby library. Many engineers or physicians carry out their work with depressingly poor access to the latest information.

A digital library brings the information to the user's desk, either at work or at home, making it easier to use and hence increasing its usage. With a digital library on the desk top, a user need never visit a library building. The library is wherever there is a personal computer and a network connection.

- **Computer power is used for searching and browsing**

Computing power can be used to find information. Paper documents are convenient to read, but finding information that is stored on paper can be difficult. Despite the myriad of secondary tools and the skill of reference librarians, using a large library can be a tough challenge. A claim that used to be made for traditional libraries is that they stimulate serendipity, because readers stumble across unexpected items of value. The truth is that libraries are full of useful materials that readers discover only by accident.

In most aspects, computer systems are already better than manual methods for finding information. They are not as good as everybody would like, but they are good and improving steadily. Computers are particularly useful for reference work that involves repeated leaps from one source of information to another.

- **Information can be shared**

Libraries and archives contain much information that is unique. Placing digital information on a network makes it available to everybody. Many digital libraries or electronic publications are maintained at a single central site, perhaps with a few duplicate copies strategically placed around the world. This is a vast improvement over expensive physical duplication of little used material, or the inconvenience of unique material that is inaccessible without traveling to the location where it is stored.

- **Information is easier to keep current**

Much important information needs to be brought up to date continually. Printed materials are awkward to update, since the entire document must be reprinted; all copies of the old version must be tracked down and replaced. Keeping information current is much less of a problem when the definitive version is in digital format and stored on a central computer.

Many libraries provide online the text of reference works, such as directories or encyclopedias. Whenever revisions are received from the publisher, they are installed on the library's computer. The new versions are available immediately. The Library of Congress has an online collection, called Thomas, that contains the latest drafts of all legislation currently before the U.S. Congress; it changes continually.

- **The information is always available**

The doors of the digital library never close; a recent study at a British university found that about half the usage of a library's digital collections was at hours when the library buildings were closed. Materials are never checked out to other readers, miss-shelved or stolen; they are never in an off-campus warehouse. The scope of the collections expands beyond the walls of the library. Private papers in an office or the collections of a library on the other side of the world are as easy to use as materials in the local library.

Digital libraries are not perfect. Computer systems can fail and networks may be slow or unreliable, but, compared with a traditional library, information is much more likely to be available when and where the user wants it.

- **New forms of information become possible**

Most of what is stored in a conventional library is printed on paper, yet print is not always the best way to record and disseminate information. A database may be the best way to store census data, so that it can be analyzed by computer; satellite data can be rendered in many different ways; a mathematics library can store mathematical expressions, not as ink marks on paper but as computer symbols to be manipulated by programs such as Mathematica or Maple.

Even when the formats are similar, materials that are created explicitly for the digital world are not the same as materials originally designed for paper or other media. Words that are spoken have a different impact from words that are written, and online textual materials are subtly different from either the spoken or printed word. Good authors use words differently when they write for different media and users find new ways to use the information. Materials created for the digital world can have a vitality that is lacking in material that has been mechanically converted to digital formats, just as a feature film never looks quite right when shown on television.

Each of the benefits described above can be seen in existing digital libraries. There is another group of potential benefits, which have not yet been demonstrated, but hold tantalizing prospects. The hope is that digital libraries will develop from static

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repositories of immutable objects to provide a wide range of services that allow collaboration and exchange of ideas. The technology of digital libraries is closely related to the technology used in fields such as electronic mail and teleconferencing, which have historically had little relationship to libraries. The potential for convergence between these fields is exciting.

14.4 ISSUES AND CHALLENGES IN DIGITAL LIBRARIES

The highest priority of a library, digital or any other is to serve the research needs of clientele. The development, maintenance and extension of its collection and its technologies must be supportive as well as subordinate to his primary objective.

However, in digital library environment:

- Functions of authors, publishers, vendors, and users, etc. will vary. Both information professional and user will do the work of collection, storage, dissemination and organizational work. The user's work is however called as personal file collection. Anyone who has access to computer in a network can easily become a publisher. An author merely by posting messages to an online discussion group, she/he becomes a publisher. In such environment, information appears in one day and can be altered or disappear in the next day. In this situation, how to give a citation? How to collect a copy of the required information? How to organize the information? These are the debatable questions?
- Only digital information is disseminated; some are produced locally and most information is obtained by remote access; most of these information are less permanent in nature. In these circumstances, it is very difficult for the professional to decide: What should be organized? Who should do it? What standards to be followed?
- Users only locate the information; information is not usually structured, no rules or codes are followed and no one to control the information that is made available.
- The data or information will be of different type. To organize these data or information, we require cataloguing practice and it calls for an appropriate data model for organizing data with standard format. The tools like Gopher, Mosaic, etc.



help in cataloguing, searching and retrieval of information from these digital libraries.

- Specialized technologies are needed for compressing as well as for organization or information. Database management methods whether extended relational or object oriented, not only are needed to support direct use of data collection in digital library, but also will help to handle catalogues, royalty administration, security control and other services. Text analysis and information retrieval techniques are crucial for converting, indexing, representing, searching and presenting desired information.

The optimism and hype from the early 1990's has been replaced by a realization that building digital libraries will be a difficult, expensive, and long-term effort. Creating effective digital libraries poses serious challenges. The integration of digital media into traditional collections will not be straightforward, like previous new media (e.g., video and audio tapes), because of the unique nature of digital information--it is less fixed, easily copied, and remotely accessible by multiple users simultaneously. Some the more serious issues facing the development of digital libraries are outlined below.

Technical architecture

The first issue is that of the technical architecture that underlies any digital library system. Libraries will need to enhance and upgrade current technical architectures to accommodate digital materials. The architecture will include components such as:

- high-speed local networks and fast connections to the Internet
- relational databases that support a variety of digital formats
- full text search engines to index and provide access to resources
- a variety of servers, such as Web servers and FTP servers
- electronic document management functions that will aid in the overall management of digital resources

One important thing to point out about technical architectures for digital libraries is that they won't be monolithic systems. Instead, there will be a collection of disparate systems

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and resources connected through a network, and integrated within one interface, most likely a Web interface or one of its descendants. For example, the resources supported by the architecture could include:

- bibliographic databases that point to both paper and digital materials
- indexes and finding tools
- collections of pointers to Internet resources
- directories
- primary materials in various digital formats
- photographs
- numerical data sets
- and electronic journals

Though these resources may reside on different systems and in different databases, they would *appear* as though there were one single system to the users of a particular community.

Within a coordinated digital library scheme, some common standards will be needed to allow digital libraries to interoperate and share resources. The problem, however, is that across multiple digital libraries, there is a wide diversity of different data structures, search engines, interfaces, controlled vocabularies, document formats, and so on. Because of this diversity, federating all digital libraries nationally or internationally would be an impossible effort. Thus, the first task would be to find sound reasons for federating particular digital libraries into one system. Narrowing the field in such a manner would reduce the technical and political hurdles required to establish common practices. Further, because of the often uncertain futures of both de jure and defacto standards over time, what those standards are is unclear.

Building digital collections

One of the largest issues in creating digital libraries will be the building of digital collections. Obviously, for any digital library to be viable, it must eventually have a digital

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Building digital collections

One of the largest issues in creating digital libraries will be the building of digital collections. Obviously, for any digital library to be viable, it must eventually have a digital

collection with the critical mass to make it truly useful. There are essentially three methods of building digital collections:

- **digitization**, converting paper and other media in existing collections to digital form (discussed in more detail below).
- **acquisition of original digital works** created by publishers and scholars. Example items would be electronic books, journals, and datasets.
- **access to external materials** not held in-house by providing pointers to Web sites, other library collections, or publishers' servers.

While the third method may not exactly constitute part of a local collection, it is still a method of increasing the materials available to local users. One of main issues here is the degree to which libraries will digitize existing materials and acquire original digital works, as opposed to simply pointing to them externally. This a reprise of the old access versus ownership issue--but in the digital realm--with many of the same concerns such as:

- local control of collections
- long-term access and preservation

What about digital collection building in a coordinated scheme? There are many reasons why building digital collections is a good candidate for coordinated activity. First, acquiring digital works and doing in-house digitization are expensive, especially to undertake alone. By working together, institutions with common goals can gain greater efficiencies and reduce the overall costs involved in these activities, as was the case with retrospective conversion of bibliographic records. Second, it also reduces the redundancy and waste of acquiring or converting materials more than once. Third, coordinated digital collection building enhances resource sharing and increases the richness of collections to which users have access.

How can specific materials to be processed by a given institution be identified? Who collects and/or digitizes what materials could be based on factors such as:

- **collection strengths.** A particular library with a strong collection focus could be responsible for digitizing selected portions of it and adding new digital works to it.
- **unique collections.** If a library has the only copies of something, they are obviously the ones to digitize it
- **the priorities of user communities.** Such priorities will justify holding the materials locally, for example, because of the demands of a curriculum
- **manageable portions of collections.** When there is no other overriding criteria, then material can be divided up among institutions simply according to what is reasonable for any one institution to collect or digitize
- **technical architecture.** The state of a library's technical architecture will also be factor in selecting who digitizes what. A library must have a technical architecture up to the task of support a particular digital collection.
- **skills of staff.** Institutions whose staff don't have the necessary skills can't become a major node in a national scheme.

Yet, no matter how a collection is built-of materials digitized in-house, of original digital works, or of providing access to materials by pointing to other external resources-libraries in a collective must ensure it is preserved and made available in perpetuity. For example, if the only copies of digital works reside on a particular publisher's server, then what happens if the publisher goes bankrupt? Or if the market value of a particular work approaches zero? What if all of part of a digital collection of a library were lost, such as through some catastrophic event?

Digitization

Recall that one of the primary methods of digital collection building is digitization. What does this term mean exactly? Simply put, it is the conversion of any fixed or analogue media--such as books, journal articles, photos, paintings, microforms--into electronic form through scanning, sampling, or in fact even re-keying. An obvious obstacle to digitization is that it is very expensive. One estimate from the University of Michigan at Ann Arbor,

the organization responsible for the JSTOR project, puts the cost of digitizing a single page at \$2 to \$6 dollars US.

How do you go about deciding what parts of a collection to digitize? There are several approaches available, at least theoretically:

- **retrospective conversion of collections**-essentially, starting at A and ending up a Z. However ideal such complete conversion would be, it is impractical or impossible technically, legally, and economically. This approach can arguably be dispensed with as a pipe dream.
- **digitization of a particular special collection or a portion of one**. A small collection of manageable size, and which is highly valued, is a prime candidate.
- **highlight a diverse collection** by digitizing particularly good examples of some collection strength
- **high-use materials**, making those materials that are in most demand more accessible.
- ***ad hoc approach***, where one digitizes and stores materials as they are requested.
This is, however, a haphazard method of digital collection building.

These approaches can be used alone or in combination depending upon a particular institution's goals for digitization. Nested within these approaches are several criteria for selecting individual items. These include:

- their potential for long-term use
- their intellectual or cultural value
- whether they provide greater access than possible with original materials (e.g., fragile, rare materials)
- and whether copyright restrictions or licensing will permit conversion.

Metadata

Metadata is another issue central to the development of digital libraries. Metadata is the data that describes the content and attributes of any particular item in a digital library. It is

a concept familiar to librarians because it is one of the primary things that librarians do--they create cataloguing records that describe documents. Metadata is important in digital libraries because it is the key to resource discovery and use of any document. Anyone who has used Alta Vista, Excite, or any of the other search engines on the Internet knows that simple full-text searches don't scale in a large network. One can get thousands of hits, but most of them will be irrelevant. While there are formal library standards for metadata, namely AACR, such records are very time-consuming to create and require specially trained personnel. Human cataloguing, though superior, is just too labour extensive for the already large and rapidly expanding information environment. Thus, simpler schemes for metadata are being proposed as solutions.

The lack of common metadata standards-ideally, defined for use in some specified context-is yet another a barrier to information access and use in a digital library, or in a coordinated digital library scheme.

Naming, identifiers, and persistence

The fifth issue is related to metadata. It is the problem of *naming* in a digital library. Names are strings that uniquely identify digital objects and are part of any document's metadata. Names are as important in a digital library as an ISBN number is in a traditional library. They are needed to uniquely identify digital objects for purposes such as:

- citations
- information retrieval
- to make links among objects
- and for the purposes of managing copyright

Any system of naming that is developed must be permanent, lasting indefinitely. This means, among other things, that the name can't be bound up with a specific location. The unique name and its location must be separate. This is very much unlike URLs, the current method for identifying objects on the Internet. URL's confound in one string several items that should be separate. They include the method by which a document is accessed (e.g.,

HTTP), a machine name and document path (its location), and a document file name which may or may not be unique (e.g., how many index.html files do you have on your Web site?). URLs are very bad names because whenever a file is moved, the document is often lost entirely.

A global scheme of unique identifiers is required; one that has persistence beyond the life of the originating organization and that is not tied to specific locations or processes.

These names must remain valid whenever documents are moved from one location to another, or are migrated from one storage medium to another.

The issue of persistent naming raises it head in a coordinated scheme, as well. Persistent name is an organizational problem, rather than an engineering problem. Technically, a system to handle name is possible, however, unique identifiers will only persist if some institution takes responsibility for their management and migration from a current technology to succeeding generations of technologies. Thus, one goal of a coordinated digital library scheme would be to identify an institution or institutions that would take charge of issuing, resolving, and migrating a system of unique names.

Copyright / rights management

Copyright has been called the “single most vexing barrier to digital library development”. The current paper-based concept of copyright breaks down in the digital environment because the control of copies is lost. Digital objects are less fixed, easily copied, and remotely accessible by multiple users simultaneously. The problem for libraries is that, unlike private businesses or publishers that own their information, libraries are, for the most part, simply caretakers of information--they don't own the copyright of the material they hold. It is unlikely that libraries will ever be able to freely digitize and provide access to the copyrighted materials in their collections. Instead, they will have to develop mechanisms for managing copyright, mechanisms that allow them to provide information without violating copyright, called rights management.

Some rights management functions could include, for example:

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- usage tracking
 - identifying and authenticating users
 - providing the copyright status of each digital object, and the restrictions on its use or the fees associated with it
 - handling transactions with users by allowing only so many copies to be accessed, or by charging them for a copy, or by passing the request on to a publisher

Preservation

Another important issue is preservation-keeping digital information available in perpetuity. In the preservation of digital materials, the real issue is technical obsolescence. Technical obsolescence in the digital age is like the deterioration of paper in the paper age. Libraries in the pre-digital era had to worry about climate control and the de-acidification of books, but the preservation of digital information will mean constantly coming up with new technical solutions.

When considering digital materials, there are three types of "preservation" one can refer to:

- **the preservation of the storage medium.** Tapes, hard drives, and floppy discs have a very short life span when considered in terms of obsolescence. The data on them can be refreshed, keeping the bits valid, but refreshing is only effective as long as the media are still current. The media used to store digital materials become obsolete in anywhere from two to five years before they are replaced by better technology. Over the long term, materials stored on older media could be lost because there will no longer have the hardware or software to read them. Thus, libraries will have to keep moving digital information from storage medium to storage medium.
- **the preservation of access to content.** This form of preservation involves preserving access to the *content* of documents, regardless of their format. While files can be moved from one physical storage medium to another, what happens when the formats (e.g., Adobe Acrobat PDF) containing the information become obsolete? This is a problem perhaps bigger than that of obsolete storage technologies. One solution is to do data migration--that is, translate data from one format to another

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preserving the ability of users to retrieve and display the information content. However, there are difficulties here too-data migration is costly, there are as yet no standards for data migration, and distortion or information loss is inevitably introduced every time data is migrated from format to format.

- The bottom line is that no one really knows how yet how to best migrate digital information. Even if there were adequate technology available today, information will have to be migrated from format to format over many generations, passing a huge and costly responsibility to those who come after.
- **the preservation of fixed-media materials through digital technology.** This slant on the issue involves the use of digital technology as a replacement for current preservation media, such as microforms. Again, there are, as yet, no common standards for the use of digital media as a preservation medium and it is unclear whether digital media are as yet up to the task of long-term preservation. Digital preservation standards will be required to consistently store and share materials preserved digitally.

What can libraries jointly do in a coordinated scheme? They can:

- create policies for long-term preservation
- ensure that redundant permanent copies are stored at designated institutions
- help establish preservation standards to consistently store and share materials preserved digitally

14.5 REQUIREMENTS OF DIGITAL LIBRARIES

Digital library requires well-tested and proven information technologies including the multimedia kit. Much of the work in digital libraries is achieved through e-mail service, by participating in usenet(s), by accessing the databases or servers through networks, like Internet. Locally developed databases will contribute a lot to develop digital libraries. In other words, the components of digital libraries are;

- Local library system, with adequate PCs having LAN, local databases in machine readable form, CD-ROMs etc, provision to provide e-mail service, access to servers, and to remote databases etc.
- Networks, including the network of networks.
- A variety of system functions to coordinate, manage the entry and to retrieve data.
- Well-trained man power.

14.6 COST OF DIGITAL LIBRARY

The final potential benefit of digital libraries is cost. This is a topic about which there has been a notable lack of hard data, but some of the underlying facts are clear.

Conventional libraries are expensive. They occupy expensive buildings on prime sites. Big libraries employ hundreds of people - well-educated, though poorly paid. Libraries never have enough money to acquire and process all the materials they desire. Publishing is also expensive. Converting to electronic publishing adds new expenses. In order to recover the costs of developing new products, publishers sometimes even charge more for a digital version than the printed equivalent.

Today's digital libraries are also expensive, initially more expensive. However, digital libraries are made from components that are declining rapidly in price. As the cost of the underlying technology continues to fall, digital libraries become steadily less expensive. In particular, the costs of distribution and storage of digital information declines. The reduction in cost will not be uniform. Some things are already cheaper by computer than by traditional methods. Other costs will not decline at the same rate or may even increase. Overall, however, there is a great opportunity to lower the costs of publishing and libraries.

Lower long-term costs are not necessarily good news for existing libraries and publishers. In the short term, the pressure to support traditional media alongside new digital collections is a heavy burden on budgets. Because people and organizations appreciate the benefits of online access and online publishing, they are prepared to spend an increasing amount of their money on computing, networks, and digital information. Most of this money,

however, is going not to traditional libraries, but to new areas: computers and networks, Web sites and Webmasters.

Publishers face difficulties because the normal pricing model of selling individual items does not fit the cost structure of electronic publishing. Much of the cost of conventional publishing is in the production and distribution of individual copies of books, photographs, video tapes, or other artifacts. Digital information is different. The fixed cost of creating the information and mounting it on a computer may be substantial, but the cost of using it is almost zero. Because the marginal cost is negligible, much of the information on the networks has been made openly available, with no access restrictions. Not everything on the world's networks is freely available, but a great deal is open to everybody, undermining revenue for the publishers.

14.7 TYPES OF DIGITAL DOCUMENTS

The emerging spectrum of documents types range from the inflexible (imaging formats) to the most flexible or customizable (virtual documents).

In the first part of the document continuum, content is treated as a monolithic whole. Not until the second part does the structure of content become more important. In the third part, content is not assumed to be in one place but distributed on the network. And finally, as documents become more flexible they need to become smarter. They have to provide a framework for managing all the different pieces-data and applications-that are present. These smart documents are known generically as active documents or document oriented computing.

Document Imaging

Document imaging emulates microfiche and microfilm. An imaging system passes a paper document through a scanner that renders it digital and then stores the digital data as a bit-mapped image of the document. Keywords for each document that help in indexing and retrieval are entered during scanning. The problem with the imaging approach is that the output contains only images, not encoded text. Consequently, searching the text of a

document's image is possible only using the keywords that categorize that document. And without a specific, well-designed list of keywords, a large library of imaged documents would be created but not used effectively.

This class of documents is characterized by little or no formal "internal" structure and provides limited freedom to use documents in a non sequential manner. But imaging systems have their place. Insurance companies and other large firms often use imaging systems for processing high volumes of routine yet critical documents such as claims forms and supplier invoices. The benefit of being able to retrieve paperwork instantly instead of in days is obvious-time is money.

The following imaging standards are prominently used:

1. TIFF (tag image file format). Format for interchange of bit-mapped images. It was developed through an industry effort initiated by Aldus Corporation and has achieved de facto standard status.
2. ITU-TSS (International Telecommunication Union-telecommunications standardization sector) Group IV T.6 Facsimile. This standard is used for compression and exchange of bit-mapped files.

Structured Documents

A significant breakthrough in document management occurred when people realized that the document structure provides a clear description of document content. This important advance in electronic document manipulation goes by the name of structured documents. Structured documents apply data-base structuring capabilities to individual documents and document collections to allow tools to manipulate document content just like fields within database tables.

Structured documents provide the following capabilities:

1. Document formatting and rendering suits different information delivery vehicles or media. For example, companies are beginning to give their customers CDs containing electronic manuals in addition to providing hardcopy materials for those who prefer the more traditional. The reasons for this trend include reduced printing and packaging costs and faster updates of critical information.

Document rendering and presentation affects how users interact with onscreen help, educational materials, and documentation. For example, the audio rendering of documents opens up a new world for the visually handicapped.

2. The ability to create easily modifiable structures allows more dynamic documents and user interaction and manipulation, such as the ability to create bookmarks, highlight text, and write notes.

In other words, documents are no longer stagnant, but can be edited, cross-referenced, and linked to other items, such as graphics, video, photo, or voice scripts. These features bring the document to a multi-user, networked platform with the ability to collaborate with other users on the document.

3. Given the right structure and interface, electronic documents can be easier to search and query than its hardcopy counterpart or image counter-part. Multipleword (Boolean) and string searches are often used to locate and retrieve the information, either as parts of the document or the entire document itself.

A large array of standards and products are available to help create and manage structured documents, depending on the goal and task at hand. If document interchange between platforms and fidelity to document format is the main concern, a compound document architecture (ODA, RTF, or CDA) may suffice. If document structure and manipulation are paramount, then the overwhelming choice is SGML.

- SGML (standard generalized markup language)-an ISO standard for inter-change and multi formatting description of text documents in terms of their logical structure. SGML's biggest and most powerful supporter, the Department of Defense, has mandated SGML as the standard for electronic publishing in the Computer-Aided Acquisition and Logistics Support (CALS) program.
- ODA (office document architecture)-an ANSI and ISO standard for inter-change of compound office documents. In contrast to SGML, which describes document structure, ODA specifies both content and format, Despite all the work that went into the standard, ODA is not considered to be a major player in the future of electronic publishing.
- CDA (compound document architecture)-Digital Equipment Corp. CDA defines a set of ground rules-content and format-and services for the interchange of compound documents between applications. CDA compliant applications can revise each other's documents even if the applications are written in different languages, run under different operating systems, and are located on the far corners of a distributed network. The most prominent use of CDA can be found in Lotus Notes, the popular groupware software.
- RTF (rich-text format)- initially developed by Microsoft for interchange of text between Microsoft desktop products, RTF has become widely used by other textprocessing applications.

The table given below compares the advantages and disadvantages of these standards, of all these, the SGML standard seems to have the most momentum. SGML can "make text into a database," rendering it useful in the same way traditional databases are useful. It can provide editing, interchange, and search and retrieval capabilities. SGML provides these capabilities through the concept of descriptive or generalized markup.

Technology	Advantages	Disadvantages
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Document interchange formats (ODA, CDA, or RTF)	Generate platform and applicationindependent information; keep format and styling; some even support audio graphics, and fullmotion video.	Complex standards that require expertise to use; formats make users dependent on applications that can recognize the encoding used.
Document structure languages (SGML)	Allows the creation of documenttype definitions that are like software programs specifically for document manipulation.	SGML does not support non text elements. Extensions such as HyTime provide this capability.

Table : Comparing Structured Document Formats

Hypertext Documents

The value of information increases when it moves to areas where some entity-individual or software program-can make use of it. Hypertext is a way of making document-based information more mobile. Mobility of information is necessary for the following reasons:

- Information in enterprises is seldom located on one node or server but is distributed throughout the organization.
- Accessing and retrieving large monolithic documents is time consuming. A good management strategy is to split them into smaller pieces to reduce user waiting and network utilization time. For users who spend time referencing very long documents, searching for information, and looking for interrelated documents, the simple viewing/browsing, such as scrolling up and down pages, is certainly out of the question. Support for hypertext functionality, enabling cross-referencing and conditional branching to related parts of an electronic document, is an essential requirement.

- Reuse of document fragments for composing new documents is more effective when information stored on individual systems and servers across an enterprise can be accessed from remote locations.

Relationships between documents can be represented through hypermedia links (hyperlinks) that allow the production of complex, richly connected and cross-referenced bodies of knowledge. This structuring and navigation mechanism has been used effectively to deal with the presentation of large amounts of loosely structured information, such as on-line documentation or computer-aided learning.

Active Documents

Active documents (or compound documents) represent what is known as document-oriented computing. Active documents provide an interactive interface where all documents, applications, and data related to a particular task are assembled, arranged, and interlinked such a manner that the user can focus on the task at hand and be shielded from non task-related issues like access, storage, data formats, location, computing, or delivery mechanisms.

Active documents share the common goal of making the user's computing experience as easy and productive as possible, a goal that has remained an elusive but tantalizing prospect. As people use PCs for more and more complex tasks, often involving multiple programs and even a variety of media, they need to have better integration of various documents created by the diverse applications. This trend is evident in the shift taking place in the software development community from stand-alone, application-based computing toward integrated document-based computing.

14.8 CORPORATE DATA WAREHOUSE

Companies are focusing on developing data warehouses to leverage existing businesses and generate new growth opportunities. Today virtually every transaction and minute business detail in the corporate environment is recorded in databases in the hope that it will

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enable more effective decision making throughout the organization. Unfortunately, most of the corporate emphasis has been on storing data, while tools for accessing and transforming data into meaningful information have been somewhat ignored. As a result, business managers are forced to spend more time navigating the myriad sources of enterprise data than analyzing the information.

Take, for example, financial systems. In many companies, financial consolidation is done manually, with sales information from each outlet keyed into individual computer systems every night. The information is then sent to the corporate office, where it is posted to the mainframe accounting system, which has no analysis capabilities. Any analysis has to be completed via a second system by downloading the data, thus proving the process to be labor intensive and slow. Clearly there is a need for a central data warehouse that is populated with data automatically and provides effective retrieval and use of information.

The organizations buying into data warehousing for decision support exhibit the following characteristics:

- An information-based approach to decision making
- Involvement in highly competitive, rapidly changing markets with a large, diverse customer base for a variety of products
- Data stored in many systems and represented differently
- Data stored in complex, technical, difficult-to-decipher formats, making conversion for analysis difficult

Data warehouses are necessary as enterprise wide data increase in both volume and complexity, making it important to establish an information systems architecture that transforms scattered legacy data into useful information. The data warehouse performs the following functions:

- Allows existing transaction and legacy systems to continue in operation
- Consolidates data from the various transaction systems into a coherent set
- Allows analysis of vital information about current operations for decision support

Once the data are stored in the warehouse, companies can slice it several different ways, performing detailed, multidimensional “what-if” scenarios on various aspects of the companies’ operations. This capability enables users to gain insights into corporate performance and customer behavior that are not possible using disconnected operational computing systems.

Types of Data Warehouses

The term data warehouse is currently being used to describe a number of different facilities each with diverse characteristics. Some companies use all of the following components of data warehousing in combination, others just one:

- *Physical data warehouse*: This is an actual, physical database into which all the corporate data for the data warehouse are gathered, along with the schemas (information about data) and the processing logic used to organize, package, and preprocess the data for end user access.
- *Logical data warehouse*: This contains all the metadata, business rules, and processing logic required to scrub, organize, package, and preprocess the data. In addition, it contains the information required to find and access the actual data, wherever it actually resides.
- *Data library*: This is a subset of the enterprise wide data warehouse. Typically, it performs the role of a departmental, regional, or functional data warehouse. As part of the data warehouse process, the organization builds a series of data libraries overtime and eventually links them via an enterprise wide logical data warehouse.
- *Decision support systems (DSSs)*: These systems are not data warehouses but applications that make use of the data warehouse. They are also called executive information systems (EIS).

Advantages of Data Warehouses

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There are several advantages of the data warehouses. Few of them have been listed here:

Immediate information delivery

Data warehouses shrink the length of time between when common business events occur and when management is alerted to those events. For example, in many organizations, sales reports are printed once a month normally within a week after the end of each month. Thus, the June sales reports are delivered no later than the first week in July. Although useful, this forces management into making decisions on a historical basis; recent history to be sure, but history nonetheless. With a data warehouse, those same reports can be made available on a daily basis. Given this data delivery time compression, business decision makers can exploit opportunities that they would otherwise miss.

Data integration from across and even outside the organization

To provide a complete picture, data warehouses typically combine data from multiple sources, such as a company's order entry, payables, materials planning, sales, and warranty systems. Thus, with a data warehouse, it becomes possible to track all facets of the interactions a company has with each customer—from that customer's first inquiry, through the terms of their purchase, all the way through any warranty or service interactions. This makes it possible for managers to have answers to questions such as, Is there a correlation between where a customer buys our product and the amount typically spent in supporting that customer.

Future vision from historical trends

Effective business analysis frequently includes trend and seasonality analysis. To support this, warehouses typically contain multiple years of data. In the following chapters, we will explore many techniques for analyzing and drawing conclusions from the vast store of historical data contained within the data warehouse.

Tools for looking at data in new ways

Beyond the long-standing paper report, a data warehouse provides its users with tools for looking at and manipulating data in many different ways. Oftentimes, a color-coded map

speaks volumes over a simple paper report. An interactive table that allows the user to drill down into detail data with the click of a mouse can answer questions that might otherwise take months to answer using a more traditional approach.

Freedom from department resource limitations

One of the problems with information systems is that they usually require computer experts to use them. When a report is needed, the requesting manager calls the IS department. IS then assigns a programmer to write a program to produce the report. The report can be created in a few days or, in extreme cases, it may take over a year. With the advent of the data warehouse, end users create most of their queries and report themselves. Thus, if a manager needs a special (ad hoc) report for a meeting in half an hour, the manager can easily create that report without the help of the IS department or the departmental computer guru.

14.9 SELF-TEST QUESTIONS

1. What is a digital library? How it is different from traditional library?
2. Discuss the role of digital library in current scenario of LPG regime.
3. Discuss various issues involved in digital library.
4. What are major benefits of digital libraries?
5. List some major requirements of digital library.
6. What makes a digital library?
7. Discuss various types of documents available in digital library?
8. What is a data warehouse? Discuss major features of a data warehouse.