Banking and Technology

M.Com. , (Banking)

Semester – IV, Paper - III

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FOREWORD

Since its establishment in 1976, Acharya Nagarjuna University has been forging a head in the path of progress and dynamism, offering a variety of courses and research contributions. I am extremely happy that by gaining 'A' grade from the NAAC in the year 2016, Acharya Nagarjuna University is offering educational opportunities at the UG, PG levels apart from research degrees to students from over 443 affiliated colleges spread over the two districts of Guntur and Prakasam.

The University has also started the Centre for Distance Education in 2003-04 with the aim of taking higher education to the door step of all the sectors of the society. The centre will be a great help to those who cannot join in colleges, those who cannot afford the exorbitant fees as regular students, and even to housewives desirous of pursuing higher studies. Acharya Nagarjuna University has started offering B.A., and B.Com courses at the Degree level and M.A., M.Com., M.Sc., M.B.A., and L.L.M., courses at the PG level from the academic year 2003-2004onwards.

To facilitate easier understanding by students studying through the distance mode, these self-instruction materials have been prepared by eminent and experienced teachers. The lessons have been drafted with great care and expertise in the stipulated time by these teachers. Constructive ideas and scholarly suggestions are welcome from students and teachers involved respectively. Such ideas will be incorporated for the greater efficacy of this distance mode of education. For clarification of doubts and feedback, weekly classes and contact classes will be arranged at the UG and PG levels respectively.

It is my aim that students getting higher education through the Centre for Distance Education should improve their qualification, have better employment opportunities and in turn be part of country's progress. It is my fond desire that in the years to come, the Centre for Distance Education will go from strength to strength in the form of new courses and by catering to larger number of people. My congratulations to all the Directors, Academic Coordinators, Editors and Lesson-writers of the Centre who have helped in these endeavors.

Prof. Raja Sekhar Patteti
Vice-Chancellor
Acharya Nagarjuna University

M.Com (Banking)

SEMESTER-IV: Paper - III

BANKING AND TECHNOLGY (413CO21)

SYLLABUS

1. **IT in Banking**: Information Technology and its implications – Information Technology – Indian Banking Scenario – Initiatives and Trends.

2. **Applications in Banking**: Computer based information System for Banking and Electronic. Banking, Electronic Fund Management.

3. **Enabling Technologies of Modern Banking**: Electronic Commerce and Banking – Customer Relationship Management – Integrated Communication Networks for Banks

4. **Security and Control Systems**: Computer Security and Disaster Management System - Audit and Computer Crime – Security and Control Aspects of Emerging Banking Technologies.

5. **Planning and Implementation of Information System**: Security and Control Aspects of Emerging Banking Technologies – Data Warehousing and Data Mining – Designing and Implementing Computerization in Banking Sector.

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CONTENTS

LESSON -1

INFORMATION TECHNOLOGY AND ITS IMPLICATIONS

OBJECTIVES :

After reading this lesson, you will be able to understand :

- Understand the information technology.
- History of Computer.
- Definition of information technology.

STRUCTURE :

1.1 INTRODUCTION :

Technology has been defined as "systematic knowledge and action, usually of industrial processes but applicable to any recurrent activity". In providing tools and techniques for action, technology at once adds to and draws from a knowledge base in which theory and practice interact and compact. At its most general level technology may be regarded as definable specifiable way of doing anything. In other words, we may say a technology is a codified, communicable procedure for solving problems. Technology, Manfred Kochen observed impacts in three stages. First, it enables us to do what we are now doing, but better, faster and cheaper; second, it enables us to do what we cannot do now; and third, it changes our life styles.

Information technology is a recent and comprehensive term, which describes the whole range of processes for generation, storage, transmission, retrieval and processing of information. An attempt is made to discuss the components of information technology and to identify elements that really matter the investigation and implementation of new information technologies in information systems and services.

The banking sector is very important for the economic development of any country and hence it is regarded as the lifeline of any modern economy and also as an important financial pillar of the economy. Banking industry plays a crucial role in the functioning of an economy. Banking industry supports and fulfills all the financing requirements of

export/import, industry and agriculture, construction, business etc. with a high level of commitment. Any country's overall development is directly related with efficient working of its banking industry. Today's world economy is considering banks not merely as an organization to deal with money but as a pioneer of country's development. Banks are significant in terms of transferring deposits and credits to different fields of the economy. A country's economic wellbeing is reflected by its banking industry's wellbeing. Any economy's potential is reflected in the strength of its financial system, which largely depends on a good banking system. If banking system of a country is efficient it can successfully mobilize all the savings in fruitful sectors of the economy. An efficient banking system ensures the capability of banks to meet all the responsibility towards the depositors.

After Independence, Indian banks have assumed a significant job in the socio-economic development of the nation. Indian banking industry is suppressing all the other financial organizations as it holds greater than half of the assets of the sector. This era of reforms has been a marvelous phase for Indian banks due to the dynamic reforms in the financial sector.

Globalization and technological advances in information and communication are the two most influential powers that have affected all the sectors of the economy. It put pressure on all the sectors to work efficiently and aptly as per the challenges imposed by these two forces. Effective utilization of resources has become the need to face the challenges. Advances in technology is a major force driving businesses, it also impacts worldwide business environment since last many years. Thus, it has undoubtedly provided ease and convenience to the businesses. Not only this IT has dramatically changed the milestones of the businesses and hence in the modern world IT has become the necessity maintaining sustenance for all the businesses. IT has spread its roots deep inside the life of the people and hence it becomes really difficult to imagine a world without information technology.

Under the story line of IT, world economy has seen a huge advanced change in the ongoing past. Technological advances realize an expansion in per capita pay, either by lessening the measure of sources of info per unit of yield or by yielding more yields for a given measure of information. Innovative change in an economy, subsequently, alludes to changes in the information yield relations of production exercises. Thus, as an economy moves from lower to higher phases of improvement, there happens a move from easier to progressively advanced and complex strategies of production. "Information technology is defined as the modern handling of information by electronic means which involves its access, storage, processing, transfer and delivery (Ige, 1995)".

"Whitten et al. (2004) stated that information technology is an arrangement of people, data and processes that interact to collect, process, store and provide information output needed to support an organization."

In the most recent decade, practically every one of the divisions has gone in for a big investment in data innovation. One of the real territories of economy that has gotten recharged center as of late has been the financial segment and within the expansive ambit of the money related segment, it is the financial part that has been the epicenter of the scholarly world and strategy making similarly. Use of data innovation has changed the substance of banking industry from a much-ensured government office just for loaning and acquiring purposes to an autonomous industry. Banks have experienced a worldview transformation

from being supplier of conventional budgetary administrations to that of wide assortments of administrations, bringing about progressive changes in administration, backing and abilities. Banking is one of the ventures which include both high data substance of the item and high data power of procedure.

Information technology refers to the acquisition, processing, storage and dissemination of all types of information using computer technology and telecommunication systems. Innovation incorporates all issues related with the assistance of software engineering and innovation and with the plan, advancement, establishment and execution of data framework and applications. Data innovation engineering is a coordinated system for gaining and developing IT to accomplish vital objectives. It has both sensible and specialized parts. PC equipment and programming, voice, information, network, satellite, different media communications advancements, interactive media are application improvement apparatuses. These advancements are utilized for the information, stockpiling, handling and correspondence of data.

IT incorporates auxiliary tools, programming, firmware and comparable methods, administrations and so on. Current high output advancements are giving immense measures of the successions, articulations and useful information for genes and protein. A standout amongst the most troublesome difficulties is transforming this huge pool of data into valuable logical understanding and novel helpful items.

With the globalization patterns world over it is hard for any country huge or little, developed or developing, to stay disengaged based on what's going on around. For a nation like India, which is a standout amongst the most encouraging developing markets, such segregation is about inconceivable. All the more especially in the territory of Information innovation, where India has unquestionably an edge over its rivals, staying endlessly or consistency of the world patterns is illogical. Financial area when all is said in done and banking industry specifically is the biggest high-roller and recipient from data innovation. This attempts to relate the worldwide patterns in it with the Indian financial industry.

1.1.1 Concepts of Information Technology :

The term “Information technology” in English is derived from the French word “Informatique” and “Informatika” in Russian encompasses the notation of information handling. IT is a new science of collecting, storing, processing and transmitting information.

The word “Information Technology” is a combination of two words. One is information and other is technology. Information means knowledge, it can be a Bit or a Para or a Page. Technology is science of information handling, particularly using computers to support the communication of knowledge in technical, economic and social fields.

Information technology is a generic term that covers the acquisition, processing, storage and dissemination of information. It involves the application of computers and communication technology in the task of information handling and information flow from the generation to the utilization levels. It is restricted to systems dependent on microelectronics based combination of computers and telecommunication technologies.

Information technology (IT) is a technology which uses computers to gather, process, store, protect, and transfer information. Nowadays, it is impossible to imagine life without IT use of the term Information and communications technology (ICT) has become very common due to the reason that working on a computer which is not connected to the internet is impossible.

ICT basically alludes to as the collecting, keeping, controlling and disseminating information. It is the computerization of the methods; controls and information generation utilizing PCs, telecommunication, programming and subordinate tool, for example, Automated Teller Machine and Debit Cards. It is a term that by and large covers the saddling of electronic technology for the information needs of a business at all dimensions. ICT manages the physical gadgets and programming that connect different PC equipment segments and exchange information starting with one physical area then onto the next. Roger (2016) opined that ICT is collaboration among PCs and communication gadgets and structures a significant piece of the advanced world.

Subsequently, the enormous deficiencies in the financial business today are a wide spread disappointment with respect to senior administration in banks to get a handle on the improvement of technology and fuse it into their vital plans. "Yousafzai (2012) asserts that ICT Banking adoption is a complex and multifaceted process and joint consideration of customers' personal, social, psychological, utilitarian and behavioral aspects is more important than adoption itself and will ultimately result in the intended behavior". It is basic that every one of these developments went for having an aggressive edge is identified with the productivity of banks (Akombo, 2011).

Information technology (IT) is the utilization of any PCs, stockpiling, organizing and other physical gadgets, framework and procedures to make, process, store, secure and give-and-take all types of electronic information. Regularly, IT is utilized with regards to big business activities rather than individual or stimulation advances. The business utilization of IT envelops both PC technology and communication.

1.2 HISTORICAL DEVELOPMENT :

Information technology as a technical support for human thinking and communication, has been evolving aver thousands of years. New developments have been rapid over the last few decades. It is only recently that the term has been used as a collection term for the whole spectrum of technologies providing the ways and means to acquire, store, transmit, retrieve and process information.

According Manfred Kochen, any technology develops in three stages "In the first stage, technology enables us to do things, that we have been doing, but to do them better, cheaper and faster. In the second stage, technology provides new capabilities and enables us to do things that we had not been able to do previously. An in the third stage technology becomes an integral part of our activities, if affects the way we do things and changes our life style". Development in computer and communication technology has brought a
new dimension to the program of information handling. The introduction of microprocessor and microcomputers has made things easier. All these developments facilitate better and quicker services to the library user.

1.3 DEFINITION OF IT :

Information technology is new technology to apply to the creation, storage, selection, transformation and distribution of information of many kinds. The British department of industry considers information technology as science of handling, particularly computers, used to support the communication of knowledge in technical, economical, and social fields. It is defined as "The acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by microelectronics based combination of computing and telecommunication".

The term 'Information Technology' (IT) has varying interpretations. Macmillan Dictionary of Information Technology defines IT as "the acquisition, processing, storage and dissemination of vocal, pictorial, textual and numerical information by a micro-electronics-based combination of computing and telecommunications". Two points are worth consideration about this definition:

- The new information technology is seen as involving the formulating, recording and processing and not just transmitting of, information. These are elements in the communication process which can be separated (both analytically and in practice) but in the context of human communication they tend to be intertwined.
- Modem information technology deals with a wide variety of ways of representing information. It covers not only the textual (i.e., cognitive, propositional and verbalised forms, we often think under the head information), but also numerical, visual, and auditory representations.

UNESCO defines Information Technology as "scientific, technological and engineering disciplines and the management techniques used in information handling and processing information, their applications; computers and their interaction with man and machine and associated social, economic and cultural matters" (Stokes).

According toALAGlossary:-Information Technology (IT) is the application of computers and other technology to the acquisition, organization, storage, retrieval & dissemination of information.
Information Technology (IT) as defined by the information technology-Association of America (ITAA) is "the study design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. It deals with the use of electronic computers and computer software to convert, store, protect process, transmit, and retrieve information".

1.4 NEED AND IMPORTANCE OF INFORMATION TECHNOLOGY :

Education is a lifelong process therefore anytime anywhere access to it is the need .
Information explosion is an ever increasing phenomena therefore there is need to get access to this information.

Need :

- Education should meet the needs of variety of learners and therefore IT is important in Meetingthisneed.

- It is a requirement of the society that the individuals should possess technological literacy.
- We need to increase access and bring down the cost of education to meet the challenges of illiteracy and poverty-IT is the answer for this.

Importance :

- Access to variety of learning resources
- Immediacy to information
- Anytime learning
- Anywhere learning
- Collaborative learning
- Multimedia approach to education
- Authentic and up to date information
- Access to online libraries
- Teaching of different subjects made interesting
- Educational data storage
- Distance education
- Access to the source of information
- Multiple communication channels-e-mail, chat, forum, blogs etc.
- Access to open courseware
- Better accesses to children with disabilities
- Reduces time on many routine tasks

1.5 INFORMATION TECHNOLOGY IN BANKING SECTOR :

Banks and financial institutions are now offering many services that benefit their potential and current customers in many ways. The management have now seen that with the technology they have to keep up with the times in order to keep the customers happy and interested in their products [9, 14]. IT has also brought about stiff competition wars within the industry. IT also aids the employees of the bank as well as the banks and financial institutions themselves. Operations are now automated making life simpler and easier.

Telecommunication Mobile Operators, Internet Service Providers (ISPs), computer hardware manufacturers, software developers, mobile device manufactures and the operating software manufactures have all assisted in the giving the banking sector the much needed boost. Mobile devices meet the following criteria, having light operating software (mobile phones, smartphones, tablets and Personal Digital Assistant (PDA)) and being portable:

1.6 BENEFITS OF IT IN BANKING :

The general advantages IT brings are as follows and listed in the literature by Railienσa and Dangolania and Ahmadirezaeia (2011):

- **Globalization:** Information Technology has brought the world closer and allowed for information to be shared easily, quickly and effectively. Allowing for transactions to

be performed regardless of where an individual or business are located. Information Technology has broken down geographical boundaries making the global village so small.

- **Communication:** Information Technology has made communication easier, quicker, cheaper and more efficient. People are now able to communicate with each other from anywhere around the world. For example through video conferencing, email, texting, instant messaging, social networking, radio on the go, television on the go, voice calls and VoIP.
- **Cost Effectiveness and Operational Excellence:** Automation of processes for individuals and businesses means our daily lives have been transformed. Our daily lives have been made so much easier and economically effective. Cost effectiveness gives rise to profits realised and better pay for employees. Making daily lives easier and less strenuous working conditions. Transactions are achieved in the less amount of time compared to the days before automation. Fewer errors are made by the use of IT.
- **Bridging the Cultural Gap:** People from different nationalities and cultures are able to communicate amongst themselves and this allows for exchange of views and opinions which could better their lives, increase awareness and decrease prejudice.
- **Longer Working Hours:** Business hours are extended from the normal Monday to Friday and 8-5 working days. The business is virtually open 24 hours and 7 days a week. This applies to all businesses around the globe. The extended hours allows for business transactions to be conducted from anywhere and anytime of day. People are now allowed to purchase anytime and anywhere.
- **Creation of New and Exciting Jobs in the Field of IT:** Creation of new and interesting jobs within the Information Technology field. For example, would have computer programmers, system administrators, system analysts, technical specialists of hardware and software, web development, computer engineering and network administration.
- **Business Intelligence:** IT in banking gives competitive lead amongst other rivals. Crucial and essential information obtained will be used in making strategic business decisions. Information attained from competitors, individuals, business environment, internal operations and business partners.

1.7 PROBLEMS OF IT IN BANKING :

Mobile banking customers are at great risk of receiving fake SMS messages and scams from hackers and scammers. The loss of a person's mobile device often means that the customer's information can be accessed unlawfully. Gaining access to customer's mobile banking PIN and sensitive information. In order to have better experience with mobile banking customers need to have access to more Modern mobile devices such as Smartphone, PDA's and tablets. From the literature attained on Mobile Banking Adoption there are several key problems that were stated in the research. There are various problems customers face when using mobile banking. The problems being:

- **Security and Risk:** Mobile customers are susceptible to scammers. A customer receives a fraudulent email or SMS from a sender posing as a bank or financial institution. Requesting for the customer to send their bank account details. If and when a mobile device is stolen the customer is at great risk. Most customers automatically set their devices to save their personal information leaving the customers vulnerable to scammers. As consistent with Chitungo and Munongo [6] customers of mobile banking are uncertain with issues such as loss and theft by hacking thus discouraging the customers to adopt mobile banking.
- **Compatibility:** Banks offer the mobile banking services to all customers, some customers are limited to the number of services offered as they do not have compatible devices, consistent with research conducted by Al-Jabri and Sohail . Thus the customer is limited to several services only with the constraint of the type of mobile they have. Mobile applications designed can also be exclusively available to certain mobile phone brands .
- **Cost:** The cost of mobile banking occur if the customer does not have a compatible device, though if the customer does have a compatible device they may still incur data and text messaging costs. Extra costs for mobile banking service, for software.
- **Scalability and Reliability:** The banks need to ensure that mobile banking systems are working for customers to access the service from anywhere and anytime. There can be loss of customer confidence if mobile banking services are not met continuously, found to be consistent with Luo et al. and Gu et al.
- **Application Distribution:** Customers would expect that the mobile application would be updated, upgraded and downloads being available. On the other hand, there are numerous issues to ensure that the upgrade, update and downloads are implemented successfully [5].

1.8 INFORMATION TECHNOLOGIES AND APPLICATIONS USED IN BANKING SECTOR :

The technologies listed below are currently in use in the banking industry around the world. The technologies are still being utilized. The future will see more technologies being introduced and used in the developing and developed world. With the advancement of technology, will also assist in the infrastructure advancements. Here is a list of some old and new technologies used in banking today.

- **Automated Teller Machine (ATM):** The ATM is a technology in use world over. The ATM assists in customers being able to cash out money at any time when they need cash, thus replacing the human teller. A unique PIN number is used to identify the customer which is provided by the bank, the customer is to change this number to their own preferred number for security reasons. To use this service the customer has to have a bank account, debit or credit and PIN number. Money can be withdrawn from anywhere in the world. If withdrawn from another country or ATM a service charge will be issued for each transaction. The following are facilities available to the customer at the ATM; check their account balance, withdraw cash,

mini statement print out, PIN change, money transfer with linked bank accounts, pre-paid mobile top-up and credit card payment.

- **Mobile Banking:** Mobile Banking Application is the latest of technologies used in the banking sector that is offered to the customers. A customer has to have a smart phone, tablet or Personal Digital Device (PDA). An application is developed which has to be compatible with Windows, Android, iOS and other mobile phone operating software. The Mobile application is downloaded straight to the mobile device. The customer has to have an active Internet connection be it mobile data or Wi-Fi that they will be able to use on the go to be able to utilise mobile banking service. The features offered are balance enquiry, view of a mini bank statement, funds transfer, checking of recent account activity, create and update standing order and direct debit payments, finding the nearest bank branch and ATM's and making payments. In order to use the service of mobile banking the customer has to be registered for internet banking service and they are given the choice of creating their own password and memorable information. Mobile banking is a service that is offered free of charge. The customer has to register using an active mobile line. In addition a customer nowadays does not have to make a deposit physically in the bank they are able to take a picture of the cheque with their smart phone and are able to send the picture via mobile banking or deposit via the ATM.
- **Internet Banking:** One of the older technologies, where the aim of mobile banking was to go paperless. A customer accesses their bank account online by using and active Internet connection and is able to access the account balance enquiry, make payments, funds transfer, international money payments, create and update standing order and direct debit payments and check recent transactions. The customer accesses the website via a personal computer or laptop and the account information can be accessed from anywhere in the world. The following services can be accessed online; account balance enquiry, fund transfer among the accounts, create and update standing order and direct debit payments, remittance, account overview, account history, loan repayment, refill prepaid card and password change.
- **Video Teller Machine (VTM):** A new and innovative service available through the banks.

A customer can remotely connect to the customer service representative via the VTM for all banking transactions. VTM offer all branch banking services to the customers.

- **Secure Short Messaging Service (SSMS):** SSMS banking is used for customers to send and receive text messages on their mobile phones. Banks keep records of the customers mobile number, the customer is able to make enquires on their bank account. A customer has to register their mobile number to utilise the SSMS Banking service through the bank. The bank also sends the customer messages of each transaction that has occurred on the account. The customer will also be aware of the any transactions they did not make. A transaction is achieved by sending an SSMS to the Mobile Banking Service assigned number. The structured SMS has to have a

tag word which the bank provides. The SMS service interacts with the customer as the customer responds. Unlike SMS, which is “store and forward”.

- **SIM Application-toolkit:** The SIM Application Toolkit is stated as a standard SIM card with an interactive menu programmed into it, allowing for the customer to interact. The interaction is between the customer and the network, the exchange is done by the customer being shown an interactive menu and inputting of the information for the application to then display. The mobile network operators can send updates for the customers to their SIM cards over the network or to issue completely new SIM cards. The challenge being who will fit the bill, the customer or the network operator? The biggest advantage of implementing the SIM Based Applications for mobile network service providers and financial institutions, it guarantees the firms application is on the SIM and this therefore gives competitive advantage to the bank.
- **Near Sound Data Transfer (NSDT):** It is a fast, secure and convenient contactless payment technology used in mobile banking that utilizes any mobile phone. NSDT uses a onetime audio password that is issued every time a customer wishes to make payments to verify a transaction rather than using Secure SMS or USSD technologies. NSDT enables secure transactions on the Tag pay platform. NSDT transactions are executed through a customer's cellular and a dealer or operators' acceptance device for payment. Customer deposit money via a registered agent and the money goes into a virtual wallet. NSDT aims for all transactions are speed of Communication and data compression, security and cryptography, error detection and correction and lastly sound optimization and performance. Therefore, NSDT makes effective and excellent transactions, and can even be used in very noisy environments.
- **RFID Technology:** A bank card is embedded with a chip made for payment. Payment is made is simply made by placing the card in front of an RFID reader, and the payment is processed automatically.
- **Telephone Banking or Interactive Voice Response (IVR):** A customer has to register for the telephone banking service through the bank. Telephone Banking is an Information Technology (IT) that allows a customer to interact with the system once they place a call to a dedicated number provided by the bank. A customer interacts by selecting various options from a voice prompt system or can also speak to select options. The customer is to select the most applicable option when prompted to by the pre-recorded voice on the designated number for telephone banking. Voice prompt system utilises speech recognition which interprets the customer's voice. The customer must use simple words such as "yes", "no", or a number to select an option. Telephone Banking proves to be expensive as the customer has to make calls.
- **Wireless Application Protocol (WAP):** It is a technology utilized in mobile banking where the customer accesses the bank website via the Internet using a browser on the mobile phone. A customer is able to access their bank account information using the mobile which acts as a computer. The customer is able to gain access without having to download any software.

- **Unstructured Supplementary Service Data (USSD):** It is an SMS service with a menu and timed session. It is a standard that is utilized in all handset models. The customer has to choose from the list of options in the menu to continue as opposed to using sentences to reply.
- **A major advantage of USSD:** Have the customer replies quickly by choosing the applicable options from the menu. USSD allows for communication between the customer, mobile network and bank. To use the USSD service the customers SIM card is preinstalled with the commands required for the service. A customer uses the dedicated numbers for the USSD service provided by the bank or the mobile network operator. The customer starts the request by dialing the USSD service number, the mobile network operator returns a menu. The customer enters a choice from the available options.
- **Contactless Payments using Near Field Technology (NFC):** It is a two-way radio waves communication, as well as mobile contactless and wireless form of payment using a smart mobile devices which run compatible software and are also touched together within close proximity of each other. NFC is a short-range, high-frequency technology, which allows an exchange of information between devices within 10 cm. NFC was built upon the RFID technology. Allowing wireless communication and data exchange between devices. A device is either active or passive modes. Encryption is used to secure sensitive data, antivirus and phone lock must be used to secure the phone in case it's lost or stolen. As stated in the NFC website NFC technology is mostly popular in Europe, America and Asia. NFC aim is to keep the queues short, faster times for transactions to be processed, less cards to carry around as one just has to remember to carry their mobile device for payment.
- **Mobile Money:** Also referred to as mobile wallet, mobile payment and mobile money transfer. Mobile money service is used worldwide, mainly used in Africa for those with or without bank accounts. The service is provided by the mobile network operators who are in partnership with the commercial banks. The mobile money accounts can also be linked with a customer's bank account. The mobile money service is another way of banking money, without the hassle of opening a bank account. The money in the virtual "wallet" can be used to pay for anything for example buying of mobile credit, payment of bills, goods and services rendered. A PIN number is used to verify the transactions made. The service is at a cost to both the sender and receiver. Mobile Money customers have a virtual wallet where there funds are kept, they deposit, make payments and withdraw from funds.

1.9 KEYWORDS :

RFID Technology, Near Sound Data Transfer (NSDT), Video Teller Machine (VTM), Banking Sector, and Banking.

1.10 SELF ASSESSMENT QUESTIONS :

1. What is Information Technology in Banking?
2. What is the significance of Information Technology in Banking?

3. Explain Information Technologies Applications used in Banking Sector?

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Dr. D. Raja Sekhar

LESSON - 2

INFORMATION TECHNOLOGY IN BANKING

OBJECTIVES :

After reading this lesson, you will be able to understand:

- IT solutions to banks to take care of their accounting and back office requirements.
- IT also facilitates the introduction of new delivery channels--in the form of Automated Teller Machines, Net Banking, and Mobile Banking to provide large services to customers.
- Taking the help of IT to meet the challenges posed by the new economy changes

STRUCTURE :

2.1 INTRODUCTION :

With the globalization trends in all over world it is difficult for any nation big or small, developed or developing, to remain isolated from what is happening around. For a country like India, which is one of the most promising emerging markets, such isolation is nearly impossible. More particularly in the area of Information technology, where India has definitely an edge over its competitors, remaining away or uniformity of the world trends is untenable. Financial sector in general and banking industry in particular is the largest spender and beneficiary from information technology. This endeavors to relate the international trends in it with the Indian banking industry.

The last lot includes possibly all foreign banks and newly established Private sector banks, which have fully computerized all the operations. With these variations in the level of information technology in Indian banks, it is useful to take account of the trends in Information technology internationally as also to see the comparative position with Indian banks. The present article starts with the banks perception when they get into IT up gradation. All the trends in IT sector are then discussed to see their relevance to the status of Indian banks.

Information Technology has made a major impact on our lives. In everyday life, there is a small role of Information Technology in it. For example, from our communication to our leisure time there is a small role of IT in it. Information technology has been famous in our daily lives ever since the beginning of year 2000. IT has many advantages and disadvantages. Things that were once done manually or by hand have now become computerized operating systems, which simply require a single click of a mouse to get a task completed. With the aid of IT we are not only able to stream line our business processes but we are also able to get constant information in 'real time' that is up to the minute and up to date. The significance of IT can be seen from the fact that it has penetrated almost every aspect of our daily lives from business to leisure and even society. Before we can know about all the advantages and disadvantages of information technology, it is essential that we know what information technology is exactly, and why it has it come to play such an important role in our daily lives. Today information technology involves more than just computer literacy; it also takes into account how computers work and how these computers can further be used not just for information processing but also for communications and problem solving tasks as well.

2.2 INFORMATION TECHNOLOGY CONSIDERATIONS :

Since the early nineties, each Indian bank has done some IT improvement effort. The first and foremost compulsion is the fierce competition. While deciding on the required architecture for the IT consideration is given to following realities.

2.2.1 Meeting Internal Requirement: The requirements of the banks are different individually depending upon their nature and volume of business focus on a particular segment, spread of branches and a like. Many a time's banks do have the required information but it is scattered. The operating units seldom know the purpose of gathering the information by their higher authorities.

2.2.2 Effective in Data Handling: As stated earlier the banks have most of the needed data but are distributed. Further the cost of collection of data and putting the same to use is prohibitively high. The accuracy and timeliness of data generation becomes the causalities in the process. Best of the intentions on computerization are wished away because there is no visible reduction in cost /efforts/time required for the required data gathering.

2.2.3. Extending Customer Services: Addressing to rising customers expectations is significant particularly in the background of increased competition. In case bank A is unable to provide the required service at a competitive price and in an accurate manner with speed. There is always a bank IT at its next-door waiting to hire the customer. Awareness of customers about the availability of services and their pricing as also available options have brought into sharp focus the issue of customer satisfaction.

2.2.4. Creative Support for New Product Development: It has become necessary for the banks to vitalize the process of product development. Marketing functionaries needs a lot of information not only from the outside sources but also from within the banks. Banks are looking to retail segment as the future market places for sales efforts. Having full-fledged information of existing customer is the key for this purpose. The emergences of data requirement and an appropriate architecture to support the same are significant issues to be handled in this regard.

2.2.5. End-user Development of the Non-technical Staff: Banking being a service industry, it is the staffs at counters that deliver the products. In Indian scenario, virtual banking is likely to have a few more years to establish. The dependence on counter staff is unavoidable. The staffs are large in number and the majority is non-technical. The customer satisfaction levels at the counter determine the ultimate benefit of IT offensive. Giving due consideration to this aspect in choosing architecture in necessary.

2.3 BENEFITS OF IT IN BANKING :

Information Technology enables sophisticated product development, better market infrastructure, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified markets. Internet has significantly influenced delivery channels of the banks. Internet has emerged as an important medium for delivery of banking products and services.

The customers can view the accounts; get account statements, transfer funds and purchase drafts by just punching on few keys. The smart card's i.e., cards with microprocessor chip have added new dimension to the scenario. Collection of Electricity bills and telephone bills has become easy. No doubt banking services have undergone drastic changes and so also the expectation of customers from the banks has increased greater.

- **Globalization**: IT has not only brought the world closer together, but it has allowed the world's economy to become a single interdependent system. This means that we can not only share information quickly and efficiently, but we can also bring down barriers of linguistic and geographic boundaries. The world has developed into a global village due to the help of information technology.
- **Communication:** With the emergence of information technology, communication has also become cheaper, quicker, and more efficient. We can now communicate with anyone around the globe by simply text messaging them or sending them an email for an almost

instantaneous response. The internet has also opened up face to face direct communication from different parts of the world thanks to the helps of video conferencing.

- **Cost effectiveness:** Information technology has helped to computerize the business process thus streamlining businesses to make them extremely cost effective money making machines. This in turn increases productivity which ultimately gives rise to profits that means better pay and less strenuous working conditions.
- **Bridging the cultural gap:** Information technology has helped to bridge the cultural gap by helping people from different cultures to communicate with one another, and allow for the exchange of views and ideas, thus increasing awareness and reducing prejudice.
- **More time:** IT has made it possible for businesses to be open 24 x7 all over the globe. This means that a business can be open anytime anywhere, making purchases from different countries easier and more convenient.
- **Creation of new jobs:** Probably the best advantage of information technology is the creation of new and interesting jobs. Computer programmers, Systems analyzers, Hardware and Software developers and Web designers are just some of the many new employment opportunities created with the help of IT.
- **Milestone:** In India, banks as well as other financial entities entered the world of information technology and with Indian Financial Net (INFINET). INFINET, a wide area satellite based network (WAN) using VSAT (Very Small Aperture Terminals) technology, was jointly set up by the Reserve Bank and Institute for Development and Research in Banking Technology (IDRBT) in June 1999.

2.4 E-BANKING:

E-banking made its debut in UK and USA 1920s. It becomes prominently popular during 1960, through electronic funds transfer and credit cards. The concept of web-based baking came into existence in Europe and USA in the beginning of 1980. Only in the early 1990s has there been a start in the non-branch banking services. Many banks have modernized their services with the facilities of computer and electronic equipment's. The electronics revolution has made it possible to provide ease and flexibility in banking operations to the benefit of the customer. The e-banking has made the customer say good-bye to huge account registers and large paper bank accounts. The e-banks, which may call as easy bank offers the following services to its customers:

- Credit Cards/Debit Cards
- ATM
- E- Cheque
- DEMAT Accounts
- Mobile Banking
- EDI (Electronic Data Interchange)

Electronic banking is generally an extension of traditional banking, using the internet as an electric delivery channel for banking products and services. E-banking is a range of banking services that utilizes electronic equipment and includes Telephone banking, Net Banking, ATM, Debit/Credit Card. EFT, AFT etc. Many banks have modernized their services with the facilities of computer and electronic equipments. The electronics revolution has made it possible to provide ease and flexibility in banking operations to the benefit of the customer. The e-banking has made the customer say good-bye to huge account registers and large paper bank accounts.

The use of ATM‟s leads to the concept of „anywhere‟ and „anytime‟ banking.

Through the use of ATM cards, one can operate his bank account to withdraw money from any of the bank's ATM installed or available at the nearest site. This had broken down the time and apace barriers. The new banks providing some of the services exclusively through ATM"s. The growing popularity of personal computers, easy access to internet and World Wide Web (WWW), has increased the use of internet by banks as a channel for receiving instructions and also delivering their products and services to the customers This is generally referred to as „Internet Banking" are Net Banking. This is one of the newer form e-banking which is gaining popularity. Process of E- banking starts with opening the website and ends with making the payment. But this process is continuous running which are shown in the diagram given below:-

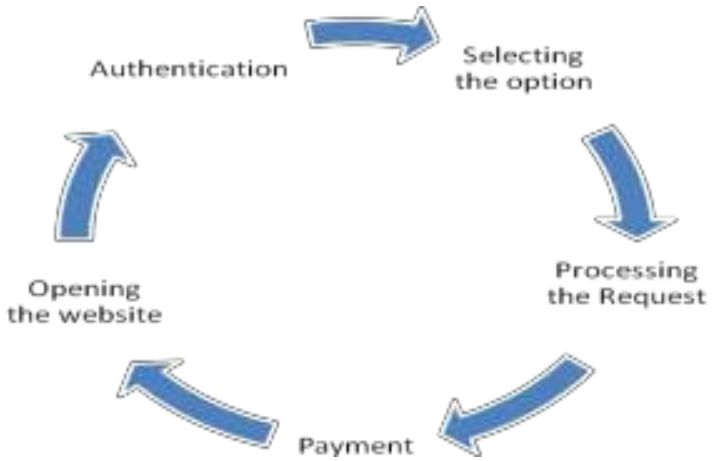

Fig 1: Process of E-Banking

2.4.1 Benefits of E-Banking:

The following are the benefits of E –Banking:

2.4.1.1 Benefits to Customer:

- Anywhere Banking -no matter wherever the customer is in the world. Balance enquiry, request for services, issuing instructions etc., from anywhere in the world is possible.
- Anytime Banking - Managing funds in real time and most importantly, 24 hours a day, 7days a week.
- Convenience acts as a tremendous psychological benefit all the time.
- On-line purchase of goods and services including online payment for the same.

2.4.1.2. Benefits to Bank

- Innovative, scheme, addresses competition and present the bank as technology driven in the banking sector market
- Reduces customer visits to the branch and thereby human intervention
- Inter-branch reconciliation is immediate thereby reducing chances of fraud and misappropriation
- On-line banking is an effective medium of promotion of various schemes of the bank, a marketing tool indeed.
- Integrated customer data paves way for individualized and customized services.

2.5 RECENT DEVELOPMENTS IN BANKING SECTOR :

The following are the recent developments in banking:

2.5.1 Internet Banking:

Internet is a networking of computers. In this marketing message can be transferred and received worldwide. The data can be sent and received in any part of the world. In no time, internet facility can do many a job for us. It includes the following:

- This net can work as electronic mailing system.
- It can have access to the distant database, which may be a newspaper of foreign country.
- We can exchange our ideas through Internet. We can make contact with anyone who is a linked with internet.

2.5.2 Society for Worldwide Inter-bank Financial Telecommunications (SWIFT) :

SWIFT, as a co-operative society was formed in May 1973 with 239 participating banks from 15 countries with its headquarters at Brussels. It started functioning in May 1977. RBI and 27 other public sector banks as well as 8 foreign banks in India have obtained the membership of the SWIFT. SWIFT provides have rapid, secure, reliable and cost effective mode of transmitting the financial messages worldwide. SWIFT is a method of the sophisticated message transmission of international repute. This is highly cost effective, reliable and safe means of fund transfer.

2.5.3 Automated Teller Machine (ATM) :

ATM is an electronic machine, which is operated by the customer himself to make deposits, withdrawals and other financial transactions. ATM is a step in improvement in customer service. ATM facility is available to the customer 24 hours a day. The customer is issued an ATM card. This is a plastic card, which bears the customer's name. This card is magnetically coded and can be read by this machine. Each cardholder is provided with a secret personal identification number (PIN). When the customer wants to use the card, he has to insert his plastic card in the slot of the machine. After the card is a recognized by the machine, the customer enters his personal identification number. After establishing the authentication of the customers, the ATM follows the customer to enter the amount to be withdrawn by him. After processing that transaction and finding sufficient balances in his account, the output slot of ATM give the required cash to him. When the transaction is completed, the ATM ejects the customer's card.

2.5.4 Bank Net :

Bank Net is a first national level network in India, which was commissioned in February 1991. It is communication network established by RBI on the basis of recommendation of the committee appointed by it under the (chairmanship of the Executive) director T.N.A. Lyre. Bank net has two phases: Bank net-I and Bank net- II.

Areas of Operation and Application of Bank Net

- The message of banking transaction can be transferred in the form of codes from the city to the other.
- Quick settlement of transactions and advices.

- Improvement in customer service-withdrawal of funds is possible from any member branch.
- Easy transfer of data and other statements to RBI.

2.5.5 Phone Banking :

Customers can now dial up the bank's designed telephone number and he by dialing his ID number will be able to get connectivity to bank's designated computer. The software provided in the machine interactive with the computer asking him to dial the code number of service required by him and suitably answers him. By using Automatic voice recorder (AVR) for simple queries and transactions and manned phone terminals for complicated queries and transactions, the customer can actually do entire non-cash relating banking on telephone: Anywhere, Anytime.

2.5.6 Tele-Banking :

Tele banking is another innovation, which provided the facility of 24 hour banking to the customer. Tele-banking is based on the voice processing facility available on bank computers. The caller usually a customer calls the bank anytime and can enquire balance in his account or other transaction history. In this system, the computers at bank are connected to a telephone link with the help of a modem. Voice processing facility provided in the software. This software identifies the voice of caller and provides him suitable reply. Some banks also use telephonic answering machine but this is limited to some brief functions. This is only telephone answering system and now Tele-banking. Tele banking is becoming popular since queries at ATM"s are now becoming too long.

2.5.7 Internet Banking :

Internet banking enables a customer to do banking transactions through the bank's website on the Internet. It is a system of accessing accounts and general information on bank products and services through a computer while sitting in its office or home. This is also called virtual banking. It is more or less bringing the bank to your computer. In traditional banking one has to approach the branch in person, to withdraw cash or deposit a cheque or request a statement of accounts etc. but internet banking has changed the way of banking. At present one can operate all these type of transactions on his computer through website of bank. All such transactions are encrypted; using sophisticated multilayered security architecture, including firewalls and filters. One can be rest assured that one's transactions are secure and confidential.

2.5.8 Mobile Banking :

Mobile banking facility is an extension of internet banking. The bank is in association with the cellular service providers offers this service. For this service, mobile phone should either be SMS or WAP enabled. These facilities are available even to those customers with only credit card accounts with the bank.

2.5.9 NRI Banking Services :

This technology has been embraced in countries like India, USA, UAE, just to mention but a few. Since many people go abroad to work, they have a need of supporting their families. So technology has made it simple for them to send money to their loved ones easily.

2.5.10 Any where Banking :

With expansion of technology, it is now possible to obtain financial details from the bank from remote locations. Automated Teller Machines are playing an important role in

providing remote services to the customers. Withdrawals from other stations have been possible due to inter-station connectivity of ATM‟s. The Rangarajan committee had also suggested the installation of ATM at non-branch locations, airports, hotels, Railway stations, Office Computers, Remote Banking is being further extended to the customer's office and home.

2.6 IMPACT OF IT ON BANKING SYSTEM :

The banking system is slowly shifting from the Traditional Banking towards relationship banking. Traditionally the relationship between the bank and its customers has been on a one-to- one level via the branch network. This was put into operation with clearing and decision making responsibilities concentrated at the individual branch level. The head office had responsibility for the overall clearing network, the size of the branch network and the training of staff in the branch network. The bank monitored the organization's performance and set the decision making parameters, but the information available to both branch staff and their customers was limited to one geographical location.

The modern bank cannot rely on its branch network alone. Customers are now demanding new, more convenient, delivery systems, and services such as Internet banking have a dual role to the customer. They provide traditional banking services, but additionally offer much greater access to information on their account status and on the bank's many other services. To do this banks have to create account information layers, which can be accessed both by the bank staff as well as by the customers themselves. The use of interactive electronic links via the Internet could go a ling way in providing the customers with greater level of information about both their own financial situation and about the services offered by the bank.

2.6.1 Impact of IT on Privacy :

Data being stored in the computers is now being displayed when required on through internet banking, mobile banking, ATMs etc. all this has given rise to the issues of privacy and confidentially of data are:

The data processing capabilities of the computer, particularly the rapid throughput, integration, and retrieval capabilities, give rise to doubts in the minds of individuals as to whether the privacy of the individuals is being eroded.

So long as the individual data items are available only to those directly concerned, everything seems to be in proper place, but the incidence of data being cross referenced to create detailed individual dossiers gives rise to privacy problems.

Customers feel threatened about the inadequacy of privacy being maintained by the banks with regard to their transactions and link at computerized systems with suspicion.

2.7 CHALLENGES :

- It has not been a smooth sailing for banks keen to jump onto the IT bandwagon. There have been impediments in the path like the obduracy once shown by trade unions who felt that IT could turn out to be a threat to secure employment,

- Further. The banks face difficulties to expand its branch networks in remote areas due to lack of facilities. Another challenges the banks have had to face corners the inability of banks to retain the trained and talented personnel, especially those with a good knowledge.
- Increasing used of IT in banks has also brought up security concerns. The passing of IT Act has come as a boon to the banking sector and banks should now ensure to abide strictly by its covenants. An effort should be also made to cover e-business in the country's consumer's laws.
- The choice of right channel, justification of IT investment on ROI, E-Governance disclosures, customers relationship management, penetration of IT in rural areas, outsourcing of IT operations are the major challenges and issues in the use of IT in banking operations.

Important Business Challenges:

- Meet customer expectations on service and facility offered by the bank.
- Customer retention.
- Managing the spread and sustain the operating profit.
- Retaining the current market share in the industry and the improving the same.
- Competition from other players in the banking industry.

Important Operational Challenges:

- Frequent challenges in technologies used focusing up grades in hardware and software, attending to that implementation issues and timely roll out.
- Managing technology, security and business risks.
- Defined and implemented efficient processes to be able to reap benefits off technology to its fullest potential.
- Upgrading the skill of work force spread across the country.

2.8 FUTURE OUTLOOK IN INDIA :

IT has no doubt changes the overall pattern of banking system. The banking today is redefined and re-engineered with the use of IT and it is sure that the future of banking will offer more sophisticated services to customers with the continuous product and process innovations. But IT can be fully useful only if they enable to met the challenges in the present environment. In India it can be successful only if it is properly implemented in rural areas also. There is also need to maintain privacy and confidentiality of data. Many nations deem privacy to be a subject of human right and consider it to be the responsibility of those who concerned with computer data processing for ensuring that the computer use does not revolve to the stage where different data about people can be collected, integrated and retrieved quickly. Another important responsibility is to ensure the data is used only for the purpose intended. For this, there is a need to implement IT and other Cyber laws properly. This will ensure the developmental role of IT in the banking industry. Technology is going to hold the key to future of banking. So banks should try to find out the trigger of change. The approach of the IT concept to the rural area may also be adopted. More and more regional languages software's could be introduced to attract more and more people from rural area also. The surplus manpower generated by the use of IT should be used for marketing new schemes of the banks.

2.9 CONCLUSION :

Indian public sector banks that hold around 75 % of market share do have taken initiative in the field of IT. Awareness and appreciation of IT are very much there. What is needed is a "big push" the way it was given in the post nationalization period for expansionary activities. Information technology offers enormous potential and emancipated various opportunities to the banking sector. It provides cost-effective, rapid and systematic provision of services to the customers. Applications of IT in banks enables sophisticated product development, reliable techniques for risk management, brings transparency to the system and helps banking sector reach geographically distant and diversified markets. IT and communication networking system have crucial impact on money, capital and foreign exchange market. Banks should have a clear strategy driven from the top and should ensure proper management of risks involved in internet banking through adopting effective polices, procedures, and controlling measures. Policy makers and supervisors must continuously assess the existing framework and should introduce required modification in it.

2.10 KEYWORDS :

Information Technology, Considerations, Data Handling, Development, Tele-Banking, Mobile Banking, Internet Banking and Phone Banking.

2.11 SUGGESTED QUESTIONS :

1. What are the advantages of IT in Banking?
2. What are the challenges of IT in Banking?
3. What are the recent developments of IT in Banking?
4. Discuss the Impact of Information Technology and Role of Banking?

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LESSON - 3

INDIAN BANKING SCENARIO

OBJECTIVES :

After reading this lesson, you will be able to understand:

- The recent trends in Indian Banking Industry.
- Various challenges faced by banks in the changing scenario.
- Opportunities available for Indian Banking Industry.
- The role of Information Technology in Indian Banking Industry.

STRUCTURE :

3.1 INTRODUCTION :

Banks are the oldest, biggest and fastest growing financial sector in India. Banks meets the needs of farmers, businessman, entrepreneurs, Government and other segments of the society. Banks provide the contribution to the economic growth of a country by mobilizing the financial resources for productive purposes. Banking is the process or activity used by the banks for providing services to the customers. The banking industry in India has a huge canvas of history. Bank accepts the deposits for the purpose of lending or investment, withdrawal either by cheque, draft or otherwise. Now a day, Banks are using electronic mode for providing better, efficient, frequent, transparent, speedy services to customers. E-Banking or Internet banking is a form of electronic bank that provides financial services for the individual client by the means of internet. E-Banking provides benefits to consumers in terms of ease and cost of transaction through internet, telephone or electronic delivery.

With the reforms in 1991, the Indian banking sector has witnessed an unprecedented growth. The major factors contributing to growth are, increase in retail credit demand, proliferation of ATMs and debit cards, decreasing NPAs due to Securitization, improved macroeconomic conditions, diversification, interest rate spreads, and regulatory and policy changes. Certain trends like growing competition, product innovation and branding, focus on strengthening risk management systems, emphasis on technology have emerged in the recent past. The Banking sector has been immensely benefited from the implementation of superior technology during the recent past, almost in every nation in the world. Productivity enhancement, innovative products, speedy transactions and transfer of funds, real time information system and efficient risk management are some of the advantage derived through the technology. India’s banking sector has made rapid strides in reforming itself to the new competitive business environment. Technological infrastructure has become an indispensable part of the reforms process in the banking system.

The financial sector reforms have provided the necessary platform for the banking sector to operate on the basis of operational flexibility and functional autonomy, thereby enhancing efficiency, productivity and profitability. The reforms also brought about structural changes in the financial sector and succeeded in easing external constraints on its operation, introducing transparency in reporting procedures, restructuring and recapitalizing banks and enhancing the competitive element in the market through the entry of new banks. The ongoing revolution in information and communication technology has, however, largely bypassed the Indian banking system given the low initial level of automation. The competitive environment created by financial sector reforms has nonetheless compelled the banks to gradually adopt modern technology, albeit to a limited extent, to maintain their market share. Banks continue to be the major financial intermediaries with a share of 64% of total financial assets. However, non-bank financial companies and development finance institutions are also emerging as alternative sources of funding. In India, foreign banks account for only around 8% of the total assets of the banking system. Further, domestic households are not allowed to place deposits abroad. Similarly, conditions for accessing overseas capital markets by domestic corporate have been stringent, in terms of size, maturity, pricing, etc. The impact of the entry of foreign banks on domestic banks is likely to depend on various factors such as the structure, strength and competitiveness of domestic banks, the share of foreign banks and the regulatory/supervisory framework.

3.2 HISTORY OF BANKING IN INDIA :

There are two different phases in the history of banking in India:

3.2.1 Nationalization Stage :

After Independence, in 1951 the All India Rural Credit survey, committee recommended amalgamation of the Imperial Bank of India and ten others banks into a newly established bank called the State Bank of India (SBI). The Government of India accepted the recommendations of the committee and introduced the State Bank of India bill in the Lok Sabha on 16th April, 1955 and it was passed by Parliament and got the president's assent on 8th May 1955. The Act came into force on 1st July, 1955 and the Imperial Bank of India was nationalized in 1955 as the State Bank of India.

The main objective of establishing SBI by nationalizing the Imperial Bank of India was "to extend banking facilities on a large scale more particularly in the rural and semi-urban areas and to diverse other public purposes." In 1959, the SBI (Subsidiary Bank) act was proposed and the following eight state-associated banks were taken over by the SBI as its subsidiaries.

3.2.2 Banking Scenario :

The Indian Economy has shown a remarkable resilience despite mixed trend in international scenario. During the year several major policies measures/reforms. Designed to enhance the efficiency of the banking system were taken. These include legislative initiative to reduce the proportion of Government holding in the equity of nationalized banks, insurance of revised norms for entry of new banks in the private sector, norms for banks to undertake insurance business, renewed efforts aimed at speedy recovery of Non-performing Assets through setting up of additional Debt recovery tribunals, providing a simplified non-discriminatory and non- discriminatory mechanics for recovery of NPAs. Further keeping in view the importance of lower interest rates in accelerating the industrial and expertly growth,

the Reserve Bank of India announced several measures such as reducing the interest rate payable on savings bank deposits of banks, cutting the bank rate, Repo rate. Cash Reserve Ratio, etc, consequently, most of the bands effected reductions in their lending and deposit rates during the year. In the monetary and credit policy for the year 2009-2010, the RBI has announced several reforms measures with a view to moving towards international best practices and to ensure greater transparency such as adoption of 90 days norm for recognition of loan impairment from the year ending 31.03.2010, etc. The monetary and credit policy measure initiated by RBI for the year 2009-2010 lay emphasis on making provision for adequate liquidity two meet credit growth and support revival of investment demand. It has reduced Cash Reserve Ratio (CRR).

3.3 PRODUCTS AND SERVICES OFFERED BY BANKS :

Broad Classification of Products in banks are classified into three types:

- Retail Banking.
- Trade Finance,
- Treasury Operations.

Retail Banking and Trade finance operations are conducted at the branch level while the wholesale banking operations, which cover treasury operations, are at the hand office or a designated branch.

3.3.1 Retail Banking :

- Deposits
- Loans, Cash Credit and Overdraft
- Negotiating for Loans and advances
- Remittances
- Book-Keeping (maintaining all accounting records)
- Receiving all kinds of bonds valuable for safe keeping

3.3.2 Trade Finance :

- Issuing and confirming of letter of credit,
- Drawing, accepting, discounting, buying, selling, collecting bills of exchange, promissory notes, drafts, bill of lading and other securities.

3.3.3 Treasury Operations :

- Buying and selling of bullion. Foreign exchange
- Acquiring, holding, underwriting and dealing in shares, debentures, etc.
- Purchasing and selling of bonds and securities on behalf of constituents.

The banks can also act as an agent of the Government or local authority. They insure, guarantee, underwrite, participate in managing and carrying out issue of shares, debentures, etc. Apart from the above-mentioned functions of the bank, the bank provides a whole lot of other services like investment counseling for individuals, short-term funds management and portfolio management for individuals and companies. It undertakes the inward and outward remittances with reference to foreign exchange and collection of varied types for the Government.

3.4 COMMON BANKING PRODUCTS :

Some of common available banking products are as follows:

3.4.1 Credit Card :

Credit Card is "post paid" or "pay later" card that draws from a credit line-money made available by the card issuer (bank) and gives one a grace period to pay. If the amount is not paid full by the end of the period, one is charged interest.

A credit card is nothing but a very small card containing a means of identification, such as a signature and a small photo. It authorizes the holder to change goods or services to his account, on which he is billed. The bank receives the bills from the merchants and pays on behalf of the card holder. These bills are assembled in the bank and the amount is paid to the *hsmk* by the card holder totally or by installments. The bank charges the customer a small amount for these services.

The card holder need not have to carry money/cash with him when he travels or goes for purchasing. Credit cards have found wide spread acceptance in the 'metros' and big cities. Credit cards are joining popularity for online payments. The major players in the Credit Card market are the foreign banks and some big public sector banks like SBI and Bank of Baroda. India at present has about 3 million credit cards in circulation.

3.4.2 Debit Card :

Debit Card is a "prepaid" or "pay now" card with some stored value. Debit Cards quickly debit or subtract money from one's savings account or if one were taking out cash. Every time a person uses the card, the merchant who in turn can get the money transferred to his account from the bank of the buyers, by debiting an exact amount of purchase from the card. To get a debit card along with a Personal Identification Number (PIN).

When he makes a purchase, he enters this number on the shop's PIN pad. When the card is swiped through the electronic terminal, it dials the acquiring bank system- either Master Card or Visa that validates the PIN and finds out from the issuing bank whether to accept or decline the transaction. The customer never overspread because the amount spent is debited immediately from the customers account. So, for the debit card to work, one must already have the money in the account to cover the transaction. There is no grace period for a debit card purchase. Some debit cards have monthly or per transaction fees.

3.4.3 Automatic Teller Machine :

The introduction of ATM's has given the customers the facility of round the clock banking. The ATM's are used by banks for making the customers dealing easier. ATM card is a device that allows customer who has an ATM card to perform routine banking transaction at any time without interacting with human teller. It provides exchange services. This service helps the customer to withdraw money even when the banks ate closed. This can be done by inserting the card in the ATM and entering the Personal Identification Number and secret Password.

ATM's are currently becoming popular in India that enables the customer to withdraw their money 24 hours a day and 365 days. It provides the customers with the ability to withdraw or deposit funds, check account balances, transfer funds and check statement information. The advantages of ATM's are many. It increases existing business and generates new business. It allows the customers in availing following services:

- To transfer money to and from accounts,
- To view account information,
- To order cash.
- 0 To receive cash.

3.5 ADVANTAGES OF ATM :

The following are the advantages of ATM:

3.5.1 To the Customers :

- ATM's provide 24 hrs. 7 days and 365 days a year service,
- Service is quick and efficient
- Privacy in transaction
- Wider flexibility in place and time of withdrawals.
- The transaction is completely secure - you need to key in Personal Identification Number (Unique number for every customer).

3.5.2 To Banks :

- Alternative to extend banking hours.
- Crowding at bank counters considerably reduced.
- Alternative to new branches and to reduce operating expenses.
- Relieves bank employees to focus a more analytical and innovative work,
- Increased market penetration.

ATM's can be installed anywhere like Airports, Railway Stations, Petrol Pumps, Big Business arcades, markets, etc. Hence, it gives easy access to the customers, for obtaining cash.

The ATM services provided first by the foreign banks like Citibank, Grind lays bank and now by many private and public sector banks in India like ICICI Bank, HDFC Bank, SBI, UTI Bank etc. The ICICI has launched ATM Services to its customers in all the Metropolitan Cities in India, By the end of 1990 Indian Private Banks and public sector banks have come up with their own ATM Network in the form of "SWADHAN". Over the past year up to 44 banks in Mumbai, Vashi and Thane, have became a part of "SWADHAN" a system of shared payments networks, introduced by the Indian Bank Association (IBA).

3.5.3 Electronic Funds Transfer (EFT):

Many modern banks have computerized their cheque handling process with computer networks and other electronic equipments. These banks are dispensing with the use of paper cheques. The system called electronic fund transfer (EFT) automatically transfers money from one account to another. This system facilitates speedier transfer of funds electronically from any branch to any other branch. In this system the sender and the receiver of funds may be

located in different cities and may even bank with different banks. Funds transfer within the same city is also permitted. The scheme has been in operation
since 7, February, 1996, in India.

The other important type of facility in the EFT system is automated clearing houses. These are the computer centers that handle the bills meant for deposits and the bills meant for payment. In big companies pay is not disbursed by issued cheques or issuing cash. The payment office directs the computer to credit an employee's account with the person's pay.

3.5.4 Tele-Banking :

Tele-Banking refers to banking on phone services a customer can access information about his/her account through a telephone call and by giving the coded Personal Identification Number (PIN) to the bank. Tele-banking is extensively user friendly and effective in nature.

- To get a particular work done through the bank, the users may leave his instructions in the form of message with bank.
- Facility to stop payment on request. One can easily know about the cheque status.
- Information on the current interest rates.
- Information with regard to foreign exchange rates.
- Request for a DD or pay order.
- D-MAT Account related services.
- And other similar services.

3.5.5 Mobile Banking :

A new revolution in the realm of E-banking is the emergence of mobile banking. On-line banking is now moving to the mobile world, giving everybody with a mobile phone access to real-time banking services, regardless of their location. But there is much more
to mobile banking from just on-lie banking. It provides a new way to pick up information and interact with the banks to carry out the relevant banking business. The potential of mobile banking is limitless and is expected to be a big success. Booking and paying for travel and even tickets is also expected to be a growth area.

3.5.6 Internet Banking :

Internet banking involves use of internet for delivery of banking products and services. With internet banking is now no longer confirmed to the branches where one has to approach the branch in person, to withdraw cash or deposits a cheque or requests a statement of accounts. In internet banking, any inquiry or transaction is processed online without any reference to the branch (anywhere banking) at any time.

The Internet Banking now is more of a normal rather than an exception due to the fact that it is the cheapest way of providing banking services. As indicated by McKinsey Quarterly research, presently traditional banking costs the banks, more than a dollar per person, ATM banking costs
cents and internet banking costs below 4 cents approximately. ICICI bank was the first one to offer Internet Banking in India.

3.6 RECENT TRENDS IN BANKING IN INDIA :

The Indian banking industry has transformed itself in a big way. The various new trends witnessed by banking sector are as follows:

3.6.1 Electronic Payment Services *:*

Now-a-days we witness some concepts like e-governance, e-mail, e-commerce, e-tail etc. In the same manner, a new technology is being developed in US for introduction of e-cheque, which will eventually replace the conventional paper cheque. India, as harbinger to the introduction of e -cheque, the Negotiable Instruments Act has already been amended to include; Truncated cheque and E-cheque instruments.

3.6.2 Real Time Gross Settlement (RTGS*):*

Real Time Gross Settlement system was introduced in India since March 2004, through which electronics instructions can be given by banks to transfer funds from their account to the account of another bank. The RTGS system is maintained and operated by the RBI and provides a means of efficient and faster funds transfer among banks facilitating their financial operations. As the name suggests, funds transfer between banks takes place on a "Real Time" basis. Therefore, money can reach the beneficiary instantly.

3.6.3 Electronic Funds Transfer (EFT) :

Electronic Funds Transfer (EFT) is a system whereby anyone who wants to make payment to another person/company etc. can approach his bank and make cash payment or give instructions/authorization to transfer funds directly from his own account to the bank account of the receiver/beneficiary. Complete details such as the receiver's name, bank account number, account type, bank name, city, branch name etc. should be furnished to the bank at the time of requesting for such transfers so that the amount reaches the beneficiaries" account correctly and faster.

3.6.4 Electronic Clearing Service (ECS) :

Electronic Clearing Service is a retail payment system that can be used to make bulk payments/receipts of a similar nature especially where each individual payment is of a repetitive nature and of relatively smaller amount. This facility is meant for companies and government departments to make/receive large volumes of payments.

3.6.5 Automatic Teller Machine (ATM*) :*

Automatic Teller Machine is the most popular device in India, which enables the customers to withdraw their money 24 hours a day 7 days a week. It is a device that allows customer who has an ATM card to perform routine banking transactions without interacting with a human teller. In addition to cash withdrawal, ATMs can be used for payment of utility bills, funds transfer between accounts, deposit of cheques and cash into accounts, balance enquiry etc.

3.6.6 Point of Sale Terminal:

Point of Sale Terminal is a computer terminal that is linked online to the computerized

customer information files in a bank and magnetically encoded plastic transaction card that identifies the customer to the computer. During a transaction, the customer's account is debited and the retailer's account is credited by the computer for the amount of purchase.

3.6.7 Tele - Banking :

Tele Banking facilitates the customer to do entire non-cash related banking on telephone. Under this device Automatic Voice Recorder is used for simpler queries and transactions. For complicated queries and transactions, manned phone terminals are used.

3.6.8 Mobile Van Banking :

along with technological advancement, a whole bank side can compress right laptop, which can be carried anytime by a method, there by developing a many selections in cellular banking. Many banks also have started mobile/motorbike banking.

3.6.9 Lobby Banking *:*

Reception banking provides the a world-wide-web banking kiosk, cell phone banking, examine drop capability and ATM, all in a tailor created lobby, such as premises. Pretty much, it implies machine, primarily based, staff- much less banking where in every transactions are generally executed simply by self- managed machines.

3.6.10 Electronic Data Interchange (EDI) :

Electronic Data Interchange is the electronic exchange of business documents like purchase order, invoices, shipping notices, receiving advices etc. in a standard, computer processed, universally accepted format between trading partners. EDI can also be used to transmit financial information and payments in electronic form.

The banks were quickly responded to the changes in the industry; especially the new generation banks. The continuance of the trend has re-defined and re-engineered the banking operations as whole with more customization through leveraging technology. As technology makes banking convenient, customers can access banking services and do banking transactions any time and from any ware. The importance of physical branches is going down.

3.7 CHALLENGES:

The following are the challenges of electronic banking:

3.7.1 Customer Satisfaction*:*

Today in sector customers are more value oriented in their services because they have alternative choices in it. So that each and every bank have to take care about fulfill of our customers satisfaction. Banks to provide several services for which they have to expanse in service, social banking with financial possibilities, selective up-gradation, computerization and innovative mechanization, better customer services, effective managerial culture, internal supervision and control, adequate profitability, strong organization culture etc. Therefore banks must be able to provide complete personal service to the customers who come with expectations.

3.7.2 Retail Lending :

Recently banks have adopted customer segmentation which has helped in customizing their product folios well. Thus retail lending has become a focus area particularly in respect of financing of consumer durables, housing, automobiles etc., Retail lending has also helped in risks dispersal and in enhancing the earnings of banks with better recovery rates.

3.7.3 Indian Customers:

The biggest opportunity for the Indian banking sector today is the Indian customers. The Indian customers now see to fulfill his lifestyle aspirations at a younger age with an optimal combination of equity and debt to finance consumption and asset creation. He represents across cities, towns and villages i.e. in rural areas. Consumer goods companies are already tapping this potential is for the banks to make the most of the opportunity to deliver solutions to this mark.

3.7.4 Technological Challenges:

It is due to lack of awareness regarding technology that customers are not gaining momentum in its used. There is lack of proper infrastructure for the installation of E-delivery channels.

3.7.5 Security Problem:

The main disadvantage of e-banking is the security problems that surround it. It's fact that making transactions online posses a much bigger risk compared to making transactions in a physical branch. This is due to hacking problems and identity theft.

3.8 OPPORTUNITIES :

The various opportunities that the new trends bring for the development of banking sector are mentioned below:

3.8.1 Internet Banking:

It is clear that online finance will pickup and there will be increasing convergence in terms of product offerings banking services, share trading, insurance, loans, based on the data warehousing and data mining technologies. Anytime anywhere banking will become common and will have to upscale, such up scaling could include banks launching separate internet banking services apart from traditional banking services.

3.8.2 Retail Lending:

Recently banks have adopted customer segmentation which has helped in customizing their product folios well. Thus retail lending has become a focus area particularly in respect of financing of consumer durables, housing, automobiles etc., Retail lending has also helped in risks dispersal and in enhancing the earnings of banks with better recovery rates.

3.8.3 Rural Area Customers:

Contributing to 70% of the total population in India is a largely untapped market for banking sector. In all urban areas banking services entered but only few big villages have the banks entered. So, that the banks should tap the rural market in the years to come.

3.8.4 Offering Various Channels:

Banks can offer so many channels to access their banking and other services such as ATM,

Local branches, Telephone banking, mobile banking, video banking etc to increase the banking business.

3.8.5 Other Opportunities:

There are many other opportunities in future in the field of Indian banking sector e.g. to enter new business and new markets, to improve efficiency, to deliver high level of customer services.

3.9 INFORMATION TECHNOLOGY IN BANKING :

Indian banking industry is going through IT revolution. A combination of regulatory and competitive reason has led to increasing importance of total banking automation in the Indian Banking Industry. Information Technology is basically used in two different ways in banking, firstly in Communication and Connectivity and secondly in Business Process Re-engineering. Information technology enables sophisticated product development, better market infrastructure, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified markets. To compete in today's economic environment, it is imperative for the Indian Banks to adopt the latest technology. Banks not only need greatly enhanced use of technology to the customer friendly, efficient and competitive business, but they also need technology for providing newer products and newer forms of services in an increasingly dynamic and globalize environment. Information technology offers a chance for banks to build new systems that address a wide range of customer needs including many that may not be imaginable today.

- It is becoming increasingly imperative for banks to assess and ascertain the benefits of technology implementation. Banks should use technology with precautions and the safety nets.
- The increasing use of technology in banks has also brought up „security" concerns. To avoid any pitfalls or mishaps on this account, banks ought to have in place a well-documented security policy including network security and internal security. The passing of the Information Technology Act has come as a boon to the banking sector, and banks should abide such rules and regulations. An effort should also be made to cover e-business in the country's consumer laws.
- Some are investing in it to drive the business growth, while others are having no option but to invest, to stay in business. The choice of right channel, justification of IT investment on ROI, e-governance, customer relationship management, security concerns, technological obsolescence, mergers and acquisitions, penetration of IT in rural areas, and outsourcing of IT operations are the major challenges and issues in the use of IT in banking operations. The main challenge, however, remains to motivate the customers to increasingly make use of IT while transacting with banks. For small banks, heavy investment requirement is the compressing need in addition to their capital requirements.
- The banks may have to reorient their resources in the form of reorganized branch networks, reduced manpower, dramatic reduction in establishment cost, increasing the skills of the staff and innovative ways of attracting talented managerial pool. The Government of India and the Reserve Bank of India (RBI) on their part would strengthen the existing norms in terms of governing and directing the functioning of these banks. Banks needs to strengthen their audit function. They would be evaluated based on their performance in the market place.

3.10 FUTURE PROSPECTS :

Everyone today is convinced that the technology is going to hold the key to future of banking. The achievements in the banking today would not have make possible without IT revolution. Therefore, the key point is while changing to the current environment the banks has to understand properly the trigger for change and accordingly find out the suitable departure point for the change. Although, the adoption of technology in banks continues at a rapid pace, the concentration is perceptibly more in the metros and urban areas. More and more programs and software in regional languages could be introduced to attract more and more people from the rural segments also.

3.11 CONCLUSION :

The banking today is re-defined and re-engineered with the use of Information Technology and it is sure that the future of banking will offer more sophisticated services to the customers with the continuous product and process innovations. Thus, there is a paradigm shift from the seller's market to buyer's market in the industry and finally it affected at the bankers level to change their approach from "conventional banking to convenience banking" and "mass banking to class banking". The shift has also increased the degree of accessibility of a common man.

3.12 KEYWORDS :

Automatic Teller Machine ATM, Electronic Clearing Service (ECS), Electronic Funds Transfer (EFT) and Real Time Gross Settlement (RTGS).

3.12 SELF ASSESSMENT QUESTIONS :

1. Explain the role and functions of Electronic Banking in India?
2. Explain the functions of IFCI?
3. Critically evaluate the working of SIDCs and SIICs?
4. What is the significance of SFCs in promoting small industry?

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LESSON - 4

INITIATIVES AND TRENDS IN BANKING

OBJECTIVES:

After reading this lesson, you will be able to understand:

- Understand the series of technology initiatives in Indian banking system
- RBI initiatives in electronic payment system
- Describes the trends in retail' banking and the changes in banking system as whole due to emergence of computer networks.

STRUCTURE :

4.1 INDIAN BANKING TECHNOLOGY INITIATIVES :

The liberalization and globalization of the Indian economy has thrown up new challenges to the banking system in the form of competition from new breed of private sector banks, foreign banks and other non banking financial institutions, apart from the growing expectation from the customers and the government, and to achieve international standards. The transformation from the totally manual accounting to computerized environment calls for mobilization of all available resources as well as to equip the staff to manage affairs in the new environment.

Reserve Bank of India has formulated number of committees to go into the various aspects of banking from time to time. Of these, the three committees under the chairmanship of Dr. C.Rangarajan, Shri W.F,Saraf and Slnl K.S.Shere havc gone into the topic of computerization in banking industry and suggested corresponding changcs needed to be introduced in the various acts and provisions which govern banking industry. The recommendations of these three committees are summarized in this unit. For proper adoption and implementation of technology it is necessary that the bankers should be aware of the various recommendations made by the various committees.

4.1.1 Dr. C. Rangarajan Committee on Computerization of Banks in India- 1989:

As per the Rangarajan Committee the purpose of computerization was improvement in customer service, house-keeping, decision making and productivity. To meet these objectives, banks have to move away from the use of dedicated, stand-alone machines. Some of the issues covered in this report are:

Branch Computerization: The top 100 banking centers account for 59% of total bank deposits and 65% of the total bank credit as on 30.06.1989. However, computerization of all the branches at each of the 100 centers would result in dissipation of energy and thinly spreading the resources available. Moreover, many of these centers may not have adequate infrastructure facilities. Attention of the banking industry must, therefore, be focused on the top 30 big activity centers. Considering the need to show demonstrable impact on customer service and also taking into account the infrastructure constraints relating to power supply, computer support an maintenance and the state of telecom links, it is recommended that the thrust of bank computerization for next 5 years should be to fully computerize the 2000 lo 2500 large branches.

At the branch level, the attempt should be to provide prompt customer service by giving Indian Banking Scenario: a choice to the customer to go to any free counter convenient to him unlike the system Initiatives and Trends of dedicated counters. Further, connectivity between branches would also need to be established to effect instantaneous transfer of funds and facilitate effective monitoring and control.

Computerization at branch level can be through one of the following three alternatives: i) Each of the selected branches can have a super-micro, mini or super-mini, with required number of on-line terminals at the counters and back-office. The system at I the branch would be linked over BANKNET's data communication lines to its own f central computer (mini/ super-minim mainframe), in the same center, which would serve as a back-up. Connectivity would be provided through BANKNET and /or I through public data network.

Each of the selected branches may have PCs operating under LAN, wit11 a mini- , computer as server. Branches will be connected with each other and the nodal point of Reserve of' India, through BANKNET, directly or through concentrators. The computer system of a proximate branch would serve as back up to another branch. I. It would be possible to avoid separate host systems for each bank.

On-line terminals or PCs at the counter and back-office at each branch, could be hooked on to one central system for that bank, which may have suitable safeguards against failure (fully fault tolerant system). Leased lines can be used, backed up by I dial-up lines. This alternative subsumes availability of reliable telecom lines.
In the first two or three years, banks may take up about 500 large branches with daily voucher load of 1500 and above for total computerization. Installation of software and hardware for these branches will have to be determined on the basis of achieving total computerization within a specified time frame. In case some of these branches have already installed ALPMs, the same may suitably re-deployed with necessary modification either within the branches themselves or elsewhere such as training establishments or used as PCs in other areas.

The remaining about 1500 to 2000 branches, with daily voucher load between 750 to 1500 vouchers could be taken up in the second phase. It would however be necessary to start even

now with computerization of all back-office operations in these branches and later extend the scope of computerization to front office activities in a modular fashion. However it will have to be ensured that the software developed and the hardware selected is capable of taking such modular additions in a phased manner it should be ensured that it is possible to establish connectivity between the branches at later stages.

After the branches are fully computerized, banks may gradually connect them within a center and between as may be dictated by operational needs and availability of reliable DOT lines.
RO/ZO/HO computerization: All ROs/ZOs (and Local Head Office of SBI) numbering about 920 and non-computerized head offices should bc taken up for computerization during the plan period, After allowing for the progress expected till 1989, about 600 ROs/ ZOs/ Divisional Offices may have to be computerized. The sizing of the configuration of the system at the ROIZO may be done on the basis of present and additional volume of' work devolving on the Regional1 Zonal Offices. The responsibilities of the head office would increase, besides having to meet the future requirements on account of' BANKNET, SWIFT, etc. Banks may make concerted efforts to acquire and operationlize e the mainframe at the earliest.

- **ATMs:** Taking into account the Indian experience and the typical Indian conditions, it is felt that this kind of service may be provided by the banks. Improvements in banking services can also be brought about by tapping the feasible and socially acceptable alternative solutions and wider use and acceptability of credit cards. As proposed by IBA, a small network of ATMs may be tried out, to begin within Mumbai. by installing Cash Dispensers and ATMs at strategic locations such as airports, railway stations etc. on a shared basis by banks. In course of time, the network can be replicated in other major cities, depending upon its efficiency and cost effectiveness.
- **Teller System:** To further improve customer service at the mechanized branches, the counter staff operating the terminals/ ALPMs, should be vested with powers for passing cheques, making payments and accepting deposits up to specified limits. This would facilitate the single-window service approach.
- **Signature Storage/Retrieval System:** Signature verification may be made easier by selectively introducing signature storage and retrieval systems. Larger branches can have their own scanning equipment, while smaller branches can share a common scanner.
- **On-line terminals at corporate customer sites:** When communication network is extended within a city and across 30 cities, it should be possible to provide facilities for on-line enquiry and transmitting instructions to the bank, through terminals provided to valued corporate customers, if necessary, at additional cost to the customer.
- **Customer authentication:** The computerization scenario envisages the possibilities of the customer doing banking business at any branch of his bank, other than where he maintains the account, to begin with in the same citj and later in other cities also. Customer authentication can be facilitated through laminated, tamper-proof machine readable cards issued to the customer, which can also serve as credit cards. Specimen signature carried on the face of the card, coupled with a secret personal identification number keyed in by the customer should serve as adequate identification.
- **Credit Cards:** Single, 'All Bank Credit Cards', with machine readable magnetic strips embedded at the reverse, containing essential customer information, need to be

introduced and encouraged for wider use. Such cards will act as conduits for channeling the flow of funds into the banking sector, besides greatly reducing the pressure on the cheque clearing system. Subsidized or free card reading equipment can be provided to merchant establishments. Credit clearing system on the lines of the GIRO system prevalent in some European countries may be considered for implementation in the country in the long run.

- **Raining:** The banks would have to resort to judicious selection and training of personnel mainly from within the banks. Recruitment from outside, may be done to supplement he trained workforce, especially at levels of System Analysts, EDP Managers and CPPD Chiefs. All induction programs should also contain a component of training related to information technology. The trained officers should remain in computer section for 5 to 7 years to derive optimum results, after which they can go back lo main stream. Training institutes of the banks as well as NIBM would need to augment and strengthen their faculty and infrastructure facilities. The scheme of sponsorship for training in computers may be integrated with overall training strategy, so that there is no mismatch between demand and supply of skills. Banks could also consider setting up separate institution for training in computers and communications.

4.1.2 W.S. Saraf Committee on Technological Issues -1994 :

Traditionally, the banking system is the established medium of settlement of economic transactions. In fact, the payment and settlement system holds the key for efficient economic activity. A sluggish payment sygpin acts as a limiting factor in an economy, which otherwise has potential for rapid growth. More specifically, it comes in the way of growth of capital market activity, trading and other market operations. It is therefore necessary that in. the growing economy, the payment and settlement systems are improve and updated to subserve their role. The nature and type of process, involved in these systems are such that the computer and communication technologies can be adopted with greater advantage in terms of efficiency and speed.

The technological solutions in the payments system area have ranged from the introduction of Magnetic Inlc Character Recognition Technology (MICR) for cheque processing at the four metropolitan centers which included standardizing cheque forms and MICR grade paper, computerization of settlement operations, Operationalisation of BANKNET (leased line terrestrial network connecting banks and the RBI at New Delhi, Chennai, Mumbai, Calcutta, Hyderabad, Nagpur and Bangalore) for flat fire transfers, Expansion of MICR technology to other centers through public sector banks, computerization of Government Accounts and Accounting of currency chest transactions.

The new payment products introduced over the last few years are the two way inter-city cheque collection at the four metros, one-way inter-city cheque collection by offices of RBI and few clearing houses of SBI with the metros, Electronic Clearing Service (Debit and Credit) to cut short the time lag in collection of cheques, Delivery versus Payment (DvP) system for Government Securities transactions and Electronic Funds Transfer on a pilot basis.

The recommendations are as follows:

An Electronic Fund Transfer (EFT) system may be set-up. The BANKNET communications network may be the carrier. The fund settlement may be effected at the

originating and the destination centers through the account of banks, maintained at the banks managing the respective clearinghouses. The ultimate goal of the EFT is to facilitate funds transfer between two bank branches. To start with, message transfers to the destination centers may be in a batch mode. High value institutional fund transfers (Rupees 10 million and above) may be batched every hour while the retail customers transfers may be hatched at the end of the day.

A DvP System in SGL transactions may be introduced at tlic Public Debt Office, Mumbai. This may later be extended to other major centers. The DvP System will cover SGI, accounts of all those institutions who are also having currant accounts at the Reserve Bank (Deposit Accounts Departments). Settlement may be on gross basis both for securities (i.c. SGL) transactions in the Public Dept Office and current account (i.e. funds) transactions in the Deposit Account Department. The concept of 'Clearing Bank' may be introduced for extension of DvP mode to all trading in Government Securities. Once the DvP system stabilizes, the system of screen based reporting of SGL transactions should be introduced. SGL Transfer Form may be replaced by electronic screen format.

Funds settlement in respect of Government transactions may be delinked from submission of scrolls and documents (challans paid cheques) to the Pay and Accounts Offices (PAO) of Government Departments. Reporting of transactions of RBI for fund settlement and forwarding of scrolls to PAO may take place simultaneously. Bank branches undertaking Government business may communicate the net receipt and payment position by PC Modem/ telcx/ telegrams to their respective focal point branches on the same day, for further communication of the consolidated figures electronically to their Link Cells at Nagpur. The Link Cells would consolidate and forward the data files on floppies, tapes or directly to computer to GAS, Nagpur before n prescribed time of fun settlement.

RBI may explore the feasibility of using NICNET for electronic reporting of currency chest transactions. Dial-up connectivity though PC Modern may also be used.

National Clearing Cells of RBI may use the BANKNET for reporting the particulars of unpaid items of inter-city clearing on the network to the originating centers and for sending the credit advises to the banks. The collection cycle in RBI's National Clearing service can further be reduced by adopting this system. Coverage of RBI's National Clearing of Inter-city Cheques may be extended. To start with, the centers which are already connected in one way clearing may be linked for two way clearing.

All banks and financial institutions authorized by RBI to deal in foreign exchange business may join SWIFT. All 'A' category branches of banks authorized to deal in foreign exchange may be linked to their respective SWIFT operating center at Mumbai. All 'B' category forex dealing branches may also be connected to the respective SWIFT operating centers at Mumbai in a phased manner.

To promote credit culture in India , a Society of Card Issuers may be constituted. The Indian Banks Association may take the initiative in forming such a Society. This Society could be useful to establish proper procedures on prevention of fraud, monitor merchant establishments and make card business more profitable. For effective utilization of the resources of the proposed SPNS, the ATM card to be issued may be multipurpose card. Besides ATM cards this network may also connect Point of Sale (PoS) terminals, Branch

Teller Machines (BTMs) and cash dispensers. The network should also provide connectivity to slilart card as also other cards such as VISA, MasterCard and AMEX.

4.1.3 K.S.Shere Committee on Legislative Aspects of E-Banking - 1996 :

The committee made comparative study of the legal framework existing in some other countries and analyzed the EFT issues in .the light of present status of technology and legal provisions in India, and made the following general recommendations.

Short term measures: I. A judicious combination of regulatory and contractual models at this stage of development of technology in the country is ideal for introducing by the Reserve Bank of India, a country-wide EFT system for inter-bank and interbank credit transfers.

To start with, a sing12 national level inter-bank and intrn-bank Funds transfer system may be introduced immediately.

A Customer Contract, governing the banker- customer relationship to be adopted ,by the participating banks in the ElT system.

The administration and co-ordination of the Em' System operations s should be 1 assigned to the Nodal Department with the requisite manpower having technical I know how of the design and operation of the system.

When Reserve Bank considers that multiple EFT system should be developed and regulated and yet a stage has not been reached where a full-fledged legislation can be enacted, it would be sufficient if the Reserve Bank of India act is amended by introduction of a separate chapter dealing with EFT system and power is conferred on the bank to draft regulations necessary therefore.

When multiple EFT' system develop, for the purpose of regulating, defining and determining rights and obligations of the system providers and system users, a flexible statutory model empowering a central regulatory authority, preferably the Reserve Bank, be promoted for administration of the statute with enough rule making powers.

Payment systems initiatives Payment and Settlement Systems has been focused attention globally. Several studies have been initiated by the Bank of International Settlements, with the formation of the Committee on Payments and Settlement Systems (CPSS), on this vital area, with particular reference to G-10 Economics.

4.1.4 Payment Systems Generic Architecture :

- **Domestic Model :** In this model, each bank is built as a hierarchy of nodes in a tree. In order banks, because of' their branch banking concept, the tree has levels. In a newer small bank the tree has a single node which is often referred to as STAR topology. The trees are linked through the RBI. This model is independent of the bank size, branch location and levels of technology in use. Such a model would work provided the same architecture at the network level and application level exist and are compatible at points of interconnection of trees.
- **Cross Border Model :** This model can be used for cross border payments. This could be achieved in the initial phase by connecting the Bank Level Server (BES) to the existing SWIFT Computer Based Terminal (CBT) of the banks. All cross-border messages would be routed from the BLS to the CBT and onto the SWIFT Network as is currently being done. In the second phase the INFINET and the SWIFT Access Point (SAP- the Gateway for SWIFT in India) could be connected for a seamless flow of message traffic.

4.1.5 Indian Financial Network : INFINET

The INFINET is a closed user group network for the banking sector (public sector, private sector, co-operative sector, offices of foreign banks and RBI) in India. The Department of Telecommunications, Government of India has allocated transponder space on INSAT 2C. In the first phase the network has been made open to all the public sector banks and RBI. Membership to private banks, co-operative banks and branches of foreign banks is proposed to be given in phases. In fact moves are afoot to extend the coverage of the network to all entities who have a current account with the Deposit Accounts Department of the Reserve Bank and a Subsidiary General Account for holding Government securities in the Public Debt office of the Reserve Bank to cover all debt market transactions.

Standards for SMART Cards In the context of the guidelines given by the RBI for the introduction of debit1 smart cards by banks, standards for SMART cards for retail payment have been finalized based on the pilot project on SMART cards conducted by IIT, Powai. The Working Group submitted its Report in January, 2000.

4.2 BANKING TRENDS :

4.2.1 Transforming Consumer Banking Through Internet :

For more than 15 years, industry experts have predicted that home electronic banking would finally reach a critical mass of consumer acceptance and that it would soon be commonplace to pay bills and access financial accounts from home. Today, online banking is a reality, both in rapidly growing consumer acceptance and in the financial results being seen by institutions that are deploying state-of-the-art electronic banking. The factors affecting on-line banking are:

- With the rise of the Internet and standard TCP/IP networking, banks can now offer online banking without dial-in lines, modems and all of the necessary equipment and people needed to support them.
- The development of universal standard protocols such as OFX and Integrion Gold make it easier for Sinancia1 institutions to support online banking without any investment in client software development. Today, developing an online banking solution using OFX, for example, allows a bank to please both types of consumers while removing all of the costs associated with the development, distribution and support of client software. A well-designed solution will automatically allow users of the predominant consumer financial software packages such as Microsoft Money and Intuit's Quicken to access statements, pay bills and initiate transactions. At the same lime, the system permits access via the Internet for customers who don't need full financial planning but want a full range of transaction and account access features such as bill payment, fund transfers and statement review. In both cases, the burden of client software support and development has shifted to either the Web browser developer or the financial planning software developer. The bank is free to focus on the critical areas in which it can add value for its customers: back-end system functionality, product design, marketing and customer support. More importantly, both the bank and its customers can begin using online banking.
- Another major change affecting the acceptance of online banking is the' availability of effective and reliable transaction security systems. One of the biggest concerns about online consumer banking has always been the security of the systems and the protection of sensitive transaction data. While security remains a major issue for both

the bank and its customers, there are solutions that permit an unprecedented degree of security, reliability and protection from misuse.

- **Internet Banking as a Strategic Necessity:** Given the wealth of opportunities the Internet creates for financial services companies, and the accelerated pace with which banks are going online, having an Internet presence will become a strategic necessity for most banks, thrifts and other financial services institutions. To understand this, consider the affect of ATMs on the banking industry. From 1977 to 1988, Citibank, an early adopter of ATM technology, increased its market share in New York City from 4% to 13.4%. In its early stages, the ATM was a source of strategic differentiation for Citibank and other early adopters. But, as the technology was deployed more widely, the source of value associated with having ATM technology shifted. Today, ATM technology doesn't differentiate a bankoit's expected by consumers as a basic service offering. ATMs have migrated from a differentiator to a strategic necessity

Internet banking will also follow the same path as ATMs, migrating from a strong competitive differentiator to a basic and expected service. Consumers will expect to be able to check balances, pay bills, transfer funds and review transactions from anywhere, much as they now expect to be able' to retrieve cash wherever they go in the world. N online banking strategy that is consistent with its overall goals.

- **The Opportunity for Internet Banking:** The Internet poses enormous opportunities for banks, thrifts and other financial services institutions to fundamentally reshape their organizations. The benefits of the Internet permeate an organization from marketing and sales to back office and operational functions. These benefits have caused financial organizations to view the Internet as more than a marketing communications tool and to begin to successfully employ the Internet as a new channel for their services. Some of the most relevant benefits of Internet banking follow:
- **Increase Customer Satisfaction:** Internet banking allows customers to access banking services round the clock. Like ATMs, Internet banking empowers customers to choose when and where they conduct their banking. An American Banking Association and Gallup Poll survey revealed that the primary reason customers maintain an account with a particular financial services institution is convenience. This implies that in order to retain custom.ers today, banks need to offer their services through multiple distribution channels: physical branches, telephones, ATMs, kiosks, screen phones, PCs, and the Internet. The Inorc delivery channels a bank offers and the more functions available on an Internet site, the more convenient it becomes for customers to conduct business6and the higher the rate of customer acquisition that a bank is likely to experience.
- **Expand Product Offerings:** Internet banking allows financial services institutions to capture a larger percentage of their customers' asset base. Today, banks and thrifts compete with brokerage houses, insurance companies and mutual fund companies for a growing share of consumers' financial assets. The Internet allows banks to offer new services brokerage, mutual funds, insurance, mortgages, car loans and credit cards6cither directly or indirectly from their Web sites. Banks or branch offices that don't offer these services have the opportunity to co-brand offerings with specialty companies. These Limited co-branded specialty offerings are often pre-packaged turnkey solutions that require limited marketing attention but provide immediate benefits. For example, many community hanks offer instant approval of consumer and mortgage loans via the Internet and telephone. Rather than build this capability

themselves, they outsource the processing of the data to a third-party loan processing company.

In many cases, relationships can be structured to allow institutions to participate in the revenue stream that is being created between their customers and the partner organizations. Perhaps most importantly, they allow institutions to maintain and control the relationship with their customers, while offering superior services that they might not otherwise be able to provide.

- **Increase Customer Retention:** One of the primary reasons people change banking institutions is that they have relocated from one area to another and, as a matter of convenience, desire a bank that provides access and services in their new location. While many banks offer ATM, bank-by-mail and telephone banking services, customers often find that these services do not meet all of their needs. With the rise of Internet banking comes the ability to conduct most, if not all, of a typical customer's banking online, either via Web access or through personal finance software. The services that are offered online may be exactly the same as those available through a combination of telephone, ATM and bank-by-mail. However, customers using an online "branch" do not report feeling the same degree of isolation or the perception of being "second-class" banking customers. When a comprehensive online, banking system is designed, an online "branch" gives customers the perception of actually visiting the bank, interacting wit11 employees and conducting business, rather than trying to use the services of some physical branch from a remote location. Online branches have been shown to dramatically reduce the loss of customers due to relocation.
- **Extend Geographic Reach:** Many banks that have significant online banking systems report that in addition to increased customer retention rates after physical relocations, they are seeing new customer growth outside their home regions. And this growth comes from new customers who have never lived in the bank's home region and will likely never visit a physical branch. Supplemented by national ATM networks, bank- by-mail services and telephone banking, some banks have begun marketing their services nationwide without having any physical locations outside their home territory. This extension of a bank's geographic "draw" area to include virtually anyone on the Internet is often one of the most overlooked benefits of a well-designed, well-marketed online banking system.
- **Identify Profitable Customers:** Internet allows companies to capture transaction and customer information more readily than any other financial service delivery channel. In addition to using this information to market special products and services, some organizations use customer data to determine whether or not a particular customer, or an entire customer segment, is profitable.

A comprehensive customer database facilitated by a Web site helps to identify which customers are most profitable and to target special offerings to maintain their loyalty. Not surprisingly, most banks find that Internet banking customers tend to be the most profitable ones. A 1996 Booz, Allen & Hamilton study showed that the average online banking customer uses 3.2 banking products (compared to two for the average customer). It also showed that in particular segments, Internet customers are 011 average three times as profitable as non-Internet customers.

Banking Transaction Costs

Channel	*Average cost Per transaction*
Full Service Branch	$ 1.07
Telephone	$ 0.54
ATM	$ 027
PC Banking	$ 0.02
Internet	$ 0.01

[Source: Booz Allen & Hamilton banking Survey, July 1996]

Table 4.1

Reduce Overall Costs: 1nt.ernet banking reduces a bank's costs in two fundamental ways: it minimizes the cost of processing transactions and reduces the number of branches required to service an equivalent number of customers. According to the American Banking Association, the average cost for a full-service branch transaction is roughly $1.07. Since an Internet banking transaction links directly to the back-end processing system, an Internet transaction costs roughly $0.01.

The savings associated with Internet transactions are even greater due to the small incremental cost of servicing additional Internet customers compared to the large cost of opening a new branch. It's important to note, however, that many banks don't anticipate realizing the true benefit of' transaction cost reduction until a larger percentage of their customers use the Internet as a primary delivery channel.

4.2.2 The Networked Bank :

The financial services industry is rapidly moving into the information age, which may refer to as the networked economy. The economy is the integration of people and institutions obtaining information, transacting business, entertaining and educating themselves in a connected world with electronic networks as the underlying backbone. This electronic backbone supports many interfaces including bank branches, ATMs, noncash kiosks, trading desks, stock exchanges, call centers, remote personal computers and smart card connections.

4.3 CONCLUSION :

Reserve Bank of India has formulated number of committees to go into the various aspects of banking from time to time. Of these, the three Rangarajan, SaraE and Shere committee have gone into the topic of computerization in banking industry and corresponding changes needed to be introduced in the various acts and provisions which govern banking industry. The Reserve Bank of India in the Monetary and Credit Policy for the year 1999-2000 announced that the Real Time Gross Settlement System (RTGS) would he made operational in the country in the next fifteen to eighteen months.

The opportunities for Internet banking are to increase customer satisfaction, expand products, to increase customer retention expand geographic reach, cross sell services, identify profitable customers, and identify new fee services. Internet presence for a bank will be developed in Sour phases: Marketing and Promotion , Light Interactivity, Full Transactions and Services, and Strategic Usage. The networked bank can be described by its three major components - Access channels, Customer information and relationship management, and Core back-office system.

The five major technologies that enable the networked bank are: human centric. technologies, networks, saleable processors, intelligent agents and new tools such as objects and data mining. 'The strategies that a bank can choose to compete as a networked bank are : Customer-centric strategy, Life-event strategy, and Commodity strategy.

4.4 KEYWORDS :

ROIZO, All Bank Credit Cards, NICNET, Master Card AMEX, and INFINET.

4.5 SELF ASSESSMENT QUESTIONS :

1. Discuss the short and long term measures suggested by Shere committee on legal aspects of e-banking?
2. Explain the generic architecture of payment system?
3. Discuss the opportunities for Internet banking?
4. What me the tasks of developing an on-linc banking site?
5. Explain the technologies that enable the networked bank?
6. What are the new rules of competing created by the networked economy?
7. Discuss the strategies for a bank to compete as networked bank?

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LESSON - 5

COMPUTER BASED INFORMATION SYSTEM FOR BANKING

OBJECTIVES :

After going through this unit, you should be able to:

- Understand the mechanism involved in the system development life cycle,
- Differentiate between various stages of system analysis and design,
- Appreciate the efforts involved in and criticality of each stage.

STRUCTURE :

5.1 INTRODUCTION :

Regardless of where the data or information processing system has been implemented, what functional area it addresses, what level of management it caters to and who has designed, developed and implemented it, the growth of an information system passes through various identifiable stages and all these stages put together are referred to as the System Development Life Cycle.

The system size, complexity and coverage do not affect these stages. Any system designed for processing of information revolves around a life cycle that begins with the recognition of the problem and ends up with development and implementation of the system.

To appreciate the stages involved in design and development of an information system and the efforts required to build up these systems, it is a must that managers should be

familiar with the distinct stages of this cycle. The present study unit discusses these steps and related issues.

5.2 MODELS OF INFORMATION SYSTEMS :

The information systems are considered to be evolved through three different levels of systems. They are:

i. **Conceptual System:** Every information processing system is evolved by way of a concept when somebody imagines that the organization should have such and such a system to accomplish such and such an objective. A system so conceived may or may not be attained in reality. A conceptual model is no more than an idea.

ii. **Logical System:** When the conceived system model is further worked out to design new ways to accomplish the objective set out in the conceptual system, it becomes the logical system design. A logical system design necessarily includes understanding of the flow of information, logic of processing and input-output relationships. The Data Flow Diagrams Flow Charts etc. are the basic components of the logical models.

iii. **Physical Systems:** When the logical models are developed to actually deliver the desired results, it is referred to as a physical system model. The physical system model can be tested and implemented. It consists of the programs, data files and documentation.

5.3 SYSTEM DEVELOPMENT LIFE CYCLE :

System development is a vital process and it consists of the following identifiable stages:

i. Problem Definition
ii. Feasibility Study
iii. System Analysis
iv. System Design
v. System Development
vi. Implementation
vii. Post- implementation Maintenance & Review

In practice, these steps may or may not be clearly defined in a given system, and there is a possibility of an overlap of these stages. It is quite likely that while the system analyst is working on a particular stage, he is also considering possible solutions related to the next phase. There is always a possibility of coming back from an advanced stage to revise or review the decisions taken in the earlier phases.

Errors are costly in system analysis and design. But these become more and more costly as you keep going from an earlier stage to an advanced stage. It could be seen from Figure 5.1. The cost of fixing an error detected n the earlier stages is lesser as compared to the same detected at a later date. The simple reason for this is that an early detection of error will necessitate revision of fewer decisions whereas a late detection of an error will require revision of all the steps taken so far. So utmost care is necessary on part of the system designers, while going through various stages.

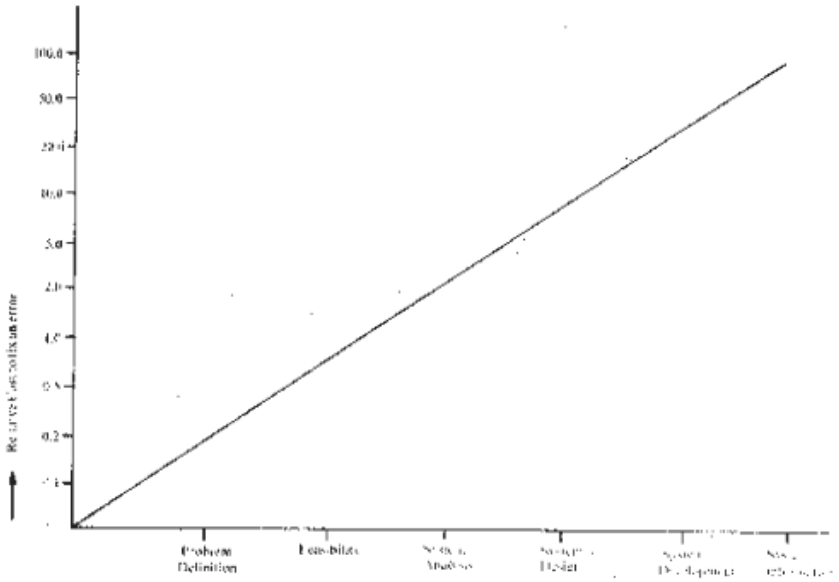

Fig. 5.1 Stages and cost of fixing an error

Every stage of the system development life cycle is marked by an identifiable end-result as well as sub- activities. These stages and the various activities involved are given in Table.1

Tabel 1

Stage	End Result
Problem definition	Statement of Scope and Objectives. Performance Criteria.
Feasibility Study	Economic/Technical/Political/Feasibility Report. Financial Viability and Modification of System Scope & Objectives, if any,
System Analysis	Logical Model of the system consisting of details such as data flow diagrams,data dictionary, etc.
System Design	Alternative solutions along with revised cost-benefit analysis, hardware specifications, manpower requirements, plan for implementation, user sign- off, test plans, formal system test procedures, security, audit and operating procedures.
System Development	Actual programming as per the user sign- off, compilation and testing of the programmes.
System Implementation	Training of the user, staff, system documentation, implementation.
Post- implementation maintenance & Review	Refined and Tuned system along with revised documentation, satisfied users.

5.4 PROBLEM DEFINITION :

Organizations face problems during their operations and come across opportunities which could be converted into profitable solutions. Whenever there is an opportunity and/or

problem in the existing system or when a system is being developed for the first time the organization considers designing a new system for information processing.

The organization may face a problem or get an opportunity due to:

i. A new product/plant/branch/market/process
ii. A failure of an existing system
iii. Inefficiency of an existing system
iv. Programming errors in the existing system

Therefore, a thorough analysis of the situation is required. For identifying problems and /or opportunities, we scan:

i. The performance of the system
ii. The information being supplied and its form
iii. The economy of processing
iv. The control on the information processing
v. The efficiency of the existing system
vi. The security of the data, software, equipment, personnel etc.

After identifying the problem, it is defined and a general direction for solving this problem is also determined. The project boundaries are also defined. The management also establishes the terms of reference as well as the resources to be provided for the project.

5. 5 FEASIBILITY STUDY :

After the user has identified the need for a new system, his requirements are determined and the terms of reference are established. The proposed system has to be viewed from the practical utility and acceptability dimension. A few questions which are usually asked during this stage are:

i. Analyze whether the proposed system is worth developing?
ii. Analyze the proposed system contribute by way of improved efficiency, productivity or organizational effectiveness?
iii. Analyze the system improves information availability and be cost-effective?
iv. Analyze what will be the system development costs and will these be justifiable?
v. Analyze how will the user departments take this system and what will be the overall impact of this system on the organization?

The key considerations involved in the feasibility analysis are:

i. Economic
ii. Technical
iii. Behavioral Aspects

The economic feasibility will only consider the cost/benefit analysis of the proposed project. The benefits are always expected to be overweighing the costs.

The technical feasibility always focuses on the existing computer hardware and software. This also includes the need for more hardware or software and the possibility of procuring/installing such facility.

The behavioral feasibility includes a study of the organizational behavior. An estimate of how strong the user reaction will be to the new system will have to be made at this stage.

The final output of this step is a feasibility report having discussions on Financial Feasibility, Economic Viability, Technical Feasibility and Social Acceptability of the proposed system.

5.6 SYSTEM ANALYSIS :

The system analysis includes review of the existing procedures and information flow. Decision making and individual information needs at various levels in different functional areas are also reviewed. The system analysis phase primarily focuses on isolation of deficiencies from the existing system.

The fundamental activities involved in the system analysis are:

i. Definition of the overall system.
ii. Separation of the system into smaller and manageable parts.
iii. Understanding the nature, function and interrelationship of various subsystems.

The analysis of the information systems could be done with the help of various tools of system analysis. Some of the tools which are available with the system analysts are:

i. **Review of Documentation**: Documentation on the existing system could be reviewed and analyzed to study the objectives, reports, procedures being followed and equipment being used. The only limitation with this technique is that the documentation on any existing system is never complete and up-to-date.

ii. **Observation of the Situation**: The system under study can always be observed by getting involved in the system. The system analyst can work in the system or can be a mere observer. The exercise is time consuming and costly. Also it has an inherent limitation of the fact that the analyst may never be able it observe the intricacies of the system.

iii. **Conducting Interviews**: The system analyst can conduct interviews with the user managers and ask questions related to their job responsibilities. The interviews could be formal or informal ones and may span over a period of time. The limitation of this tool is that the user manager may not be able to explain the problem in detail.

iv. **Questionnaire Administration:** A printed structured or unstructured questionnaire may be administered to find out the information needs of individual managers. The questionnaire survey does help in saving time as compared to interviews as well as gets more committed data. But it is impossible to design an exhaustive questionnaire to cover various aspects of the system under study.

The analysts use a combination of all the tools to analyze an existing system. The analysis phase is a time consuming phase and yet a very crucial phase. The final output of this phase is a functional specification report of the existing system.

5.7 SYSTEM DESIGN :

If the system analyst's phase defines the way things are, the system development phase defines the way things should be for the same problem.

The system development phase includes mapping of the business requirements of the managers on to the proposed system. The conceptual design of the model which has been developed in the problem definition stage is enlarged to understand the actual flow of data and the logical model is developed. The logical model is worked out to finally develop and test the physical system in the system development phase.

The system design should be as hardware and software environment independent as possible. The system development team should always keep in mind the cost-effectiveness. This phase includes development of the following:

i. Output Definitions
ii. Input Definitions
iii. Data Element Dictionary
iv. Program Specifications
v. System Specifications

During the system development, the analysts also undertake the codification and compressing of the data to:

i. Use lesser magnetic storage space.
ii. Commit lesser mistakes while entering data.
iii. Maintain uniformity of data.
iv. Incur lesser cost in entering, updating, processing and storage of data.

v. **Output Definitions:** Are there detailed reports, screen and file layouts which will be outputted by the programs throughout the system? The system analyst is required to consult the user in finalizing the system outputs.
vi. **Input Definitions:** The data coming into the system has to come through some input formats and these formats are defined by the design of input documents.
vii. **Data Element Dictionary:** A Document which contains authentic details of each and every data item used in the system is called a data dictionary. The data dictionary contains the following details regarding the data items:
viii. Name Description Source Usage Maintenance Storage Organization
ix. **Program Specifications:** The actual logic up for individual programs is defined in the Program specifications by way of decision tables, decision trees and program flow charts. The program flow charts could be drawn for individual programs or parts of the programs. These tools are necessarily used for storing the logic of processing in individual programs for future reference. The logic could also be stored by using English language which is also referred to as pseudo code.
x. **System Specifications**: The system specifications include description of the relationships of various modules of the system among each other and relationships between different programs within a subsystem. Though the system specifications do not give the details of logic being followed, it gives the flow of processing among the

programs, files and reports. Apart from using descriptive English, the system developers also use System Flow Charts for depicting system specifications.

The end result of this phase is a design specification report which includes the existing system, the proposed system, system flow charts, modular design of the system, print layout charts, data file designs etc.

5.8 SYSTEM DEVELOPMENT :

Following the modular design of the proposed system, the system analysts assign specific responsibilities to the programmers who develop and test the programs. The development and testing of the systems take place in a phased manner:

i. Development and testing of the individual programs
ii. Development and testing of the individual programs as a part of the system modules
iii. Development and testing of the system modules as a part of the major subsystems
iv. Development and testing of the major subsystems as a part of the proposed system.

The development of the system includes writing of the actual programs to handle data. Excellent programming skills and experience are required for this phase of the system development life cycle. The basic activities involved in this phase are:

i. Checking of the program specifications received from the system development stage and expanding these specifications
ii. Breaking the system modules into smaller programs and allocating these programs to the members of the system development team
iii. Producing the program code in the chosen computer programming language
iv. Defining the interfaces between various programs and designing tests for checking their interfaces
v. Ensuring the data availability for individual and integrated testing
vi. Checking the quality of the code and its adherence to the established standards
vii. Prepare the documentation for each one of the programs
viii. Receiving the user data for acceptance testing
ix. Getting the user sign - off after the acceptance testing

For development of the proposed system, it its important that all possible support should be provided to the development team. This support includes availability of:

i. Office Space
ii. Relevant Data
iii. Secretarial Assistance
iv. Access to key functionaries throughout the system development effort.

The final output of this phase is a fully developed and tested software system along with complete documentation and testing results.

5.9 SYSTEM IMPLEMENTATION :

Once the system has been declared fully developed and tested by the development team, it is ready for implementation with the user department. The involvement of the user is

necessary throughout the project duration, but the user involvement is critical during this phase.

The implementation includes the following activities:

i. Planning for implementation
ii. Preparing the schedule for implementation
iii. Procurement of hardware
iv. Installation of software
v. Operation and testing of software on hardware
vi. Recruitment of operating personnel
vii. Motivation and training of the selected personnel and users
viii. Conversion of data files from old system
ix. Final changeover
x. Operation and production

Once the system has been implemented, the systems group provides outside support to the user group and trains the user group to handle production and operations of the system.

5.10 POST - IMPLEMENTATION MAINTENANCE AND REVIEW :

Though the system is thoroughly tested before the implementation, yet the system is never foolproof and errors always continue to exist. Therefore, there is a need to have a systems person to look after the system and maintain it even during the operation and production. The system maintenance could be because of any of the following reasons:

i. Minor changes in the processing logic
ii. Errors detected during the processing
iii. Revision of the formats of the reports
iv. Revision of the formats for data inputs

Also the management is keen to know the quality of the system developed and the standards which have been followed. There is usually review team which evaluates the implemented systems and suggests changes, if required. It also leads to integrated and standardized system development.

5.11 PROJECT TEAM CONSTITUTION :

For undertaking a study and design of a commercial information processing system, a project team is constituted. The members of this team are drawn from various functional areas and professional backgrounds. This team is usually of 7-11 member size. Each member is assigned specific responsibility with scheduled deadlines for each job. The involvement and representation of the user departments and affected parties is ensured while constituting such project teams. Normally organizations face a dilemma about choosing a project leader. The choice is between the user group or the systems group. Depending upon the availability, experience and type of project. The leader is chosen. It is in the interest of the proposed

system that all the members of the project team should have sufficient time at their disposal and take keen interest in the progress of the project.

5.12 EFFORT DISTRIBUTION IN SYSTEM DEVELOPMENT LIFE CYCLE (SDLC) :

The distribution of the organizational efforts over various phases of the system development life cycle can be seen from Figure 5.2. It can be seen that over the life cycle. Almost half the efforts are devoted to maintenance after implementation and half the efforts in the system development itself are devoted to the testing and debugging activities. This once again underlines the need for a thorough testing and debugging of the information system before it is implemented.

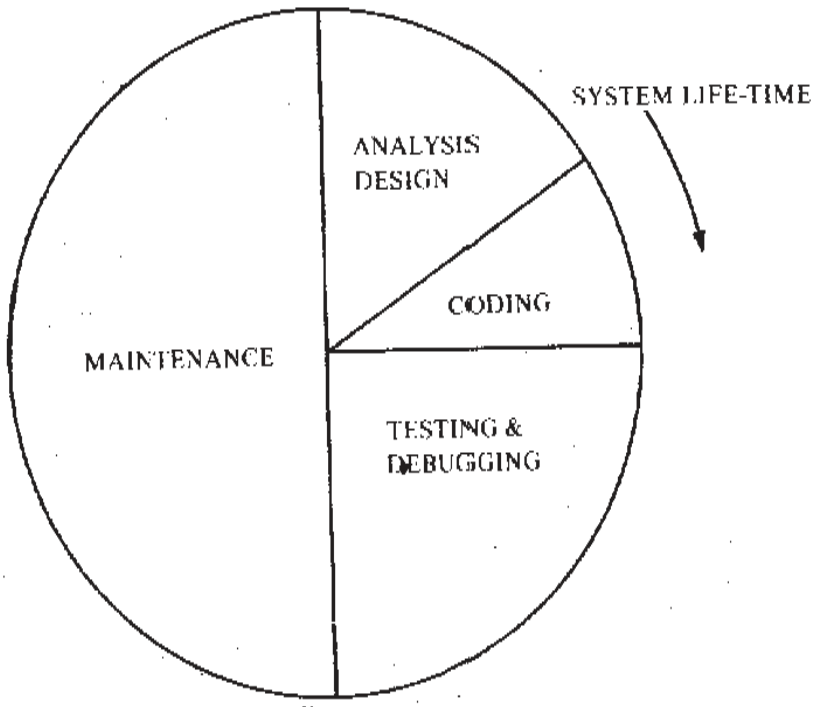

Figure 5.2 : Distribution of Effort

5.13 CONCLUSION :

Every system either developed as an improvement over the existing system or developed for the first time has to undergo various identifiable stages. The unit has discussed these stages as problem definition, feasibility study, system analysis, system design, system development, implementation and maintenance. The birth of a system takes place when the conceptual model is developed by way of expressing a need. This need is converted into a logic for fulfilling of this need. It ultimately gets converted into data files, programs and documentation at the stage of physical model. The total development cycle needs more than one full - time individual. Generally a project team consists of member from user group as well as systems group.

5.14 KEYWORDS :

System Development Life Cycle, System Analysis, System Implementation and System Analysis

5.14 SELF ASSESSMENT QUESTIONS :

1. What are the various outputs of each stage of the system development life cycle?
2. What are the various stages of a system development life cycle and how are the efforts distributed over these phases?
3. What are the various stages system analysis tools and why do we need more than one tool at a time?
4. What do you understand by conceptual, logical and physical models of a system?
5. Discuss the various steps involved in programming?

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LESSON - 6

BANKING, ELECTRONIC FUND MANAGEMENT

OBJECTIVES :

After studying this unit, you should be able to:

- The meaning of E-Banking
- Distinguish between the commonly used tools for Electronic Fund Transfer
- Discuss the need for technology in banking; and
- Understand and appreciate the various technologies led developments in the banking industry.

STRUCTURE :

6.1 INTRODUCTION :

Electronic banking is a form of banking in which funds are transferred through an exchange of electronic signals rather than through an exchange of cash, checks, or other types of paper documents. It is also known as electronic funds transfer (EFT) and basically uses electronic means to transfer funds directly from one account to another. Internet banking is a financial institution with no physical branches; everything is completed online. There is no ability to cash a check, deposit cash and or coinage and such. Online banking is the ability to access account information, make transfers, set up automatic payments and such via the Internet. Internet banking typically is an electronic payment system, that allows the bank account holder

to execute the monetary transaction, such as bill payments, fund transfer, stop payment, balance enquiries, etc. anytime and anywhere using the bank's website. Online banking is part and parcel of the core banking system handled by the bank.

6.2 CONCEPT OF E-BANKING :

Privatization and globalization of banks led to huge competition among established and the new banks. The banks increased the number of services offered to include insurance, pension funds, mutual funds, money market accounts, loans and credit plus securities. They were encouraged to explore other financial instruments while at the same time offering more convenience to customers to do any-time banking.

This need led to the origin of the concept of E banking which primarily means banking anytime, anywhere. Digitization has ushered a new era for financial services. It has contributed to the banks entering a period of unprecedented disruptions, in part because financial services innovations have contributed to a completely new way in which customers can bank through the increased mass adoption of mobile technology to the digitization of cash. The concept of E banking has redefined a banking model that had been unchanged for decades resulting in established banks being forced to increase their pace of digital adoption as well as drastically reduce their overheads through cost cutting measures like cutting the number of bank branches in which they operate. In order to stay competitive in today's marketplace, banks and other financial institutions have expanded the range of services that they offer. These services can be divided into four main categories:

i. Savings
ii. Payment services
iii. Borrowings
iv. Other financial services

6.3 IMPORTANCE OF E-BANKING :

E-banking is a service provided by banks that enables a customer to conduct banking transactions, such as checking accounts, applying for loans or paying bills over the internet using a personal computer, mobile telephone or handheld computer. It includes a range of services like Electronic Funds Transfer (EFT), Automated Teller Machine (ATM), Electronic Data Interchange (EDI), Credit Cards and Electronic or Digital Cash. E-banking has certain advantages over the traditional banking system, as stated below:

i. It provides 24 hours, 365 days a year services to the customers of the bank.
ii. It lowers the transaction cost.
iii. It inculcates a sense of financial discipline and promotes transparency. Customers can make the transactions from office, home or while travelling via cellular phones.

E-Banking through electronic systems continues to expand. While most traditional financial institutions offer online banking services, Web-only banks have also become strong competitors. For example, E*Trade Bank operates online while also providing customers with access to ATMs. These "e-banks" and "e-branches" provide nearly every needed financial service like:

Obtain cash, check account balance, Transfer funds, Direct Deposits, Preauthorized payments of bills, cards, rents etc. Unquestionably, many more of these types of financial innovations will be created over the coming years to try to win customers by switching their accounts.

6.4 TECHNOLOGY USED IN BANKING :

Over the past decade financial service innovations have contributed to a completely new way in which customers can bank, threatening the status quo of traditional retail banks, and redefining a banking model which has been in place for generations. These new technological advancements have facilitated the rapid emergence of digital banking firms and Fin Tech companies like Paytm, PhonePe, Mobi Kwik, PayU, ET Money, Policy Bazaar leading to established banks being forced to swiftly increase their pace of digital adoption to stay relevant and stop mass client attrition to these agile financial start-ups.

With cash being overtaken by card payments for the first time and enhancement in technology now at the forefront, digital banking is gaining importance among financial customers to properly manage their finances. Almost all banks have introduced Core Banking Solutions for their day-to-day operations. As such, banks are using the technology for Back end operations such as Analytics, Data storage and retrieval, Customer Relationship management (CRM), advances processing, report generation and decision making process.

Banking online and through electronic systems continues to expand. While most traditional financial institutions offer online banking services, Web-only banks have also become strong competitors.

6.5 EFT (ELECTRONIC FUND TRANSFER) :

Electronic funds transfer (EFT) is an electronic method for transferring funds from one account to another either within a financial institution or across multiple institutions, by using computer-based systems, without the direct intervention of bank staff. Examples of EFT include receiving cash out of an ATM and then placing a stock buy order by using the telephone. Electronic payments are becoming more popular these days as they allow users to transfer funds by various online modes and eliminate any sort of geographical barriers. For transferring money, banks provide multiple options based on various factors and needs of the customers, few of them are

National Electronic Funds Transfer (NEFT), Real Time Gross Settlement (RTGS), Immediate Payment Service (IMPS), etc. Based on the value or speed of the transfer, service availability, and other factors, each mode of transfer has different kinds of features and flexibility as well as their own advantages and disadvantages.

Moreover, many banks have their own digital wallets to facilitate additional methods of fund transfers online. Out of various modes for online fund transfer digital wallets, UPI, etc. NEFT, RTGS, and IMPS are typically the most popular. It is the originator who is considered responsible for ensuring the correctness of the account details used for a transfer of funds. Distinguish the online fund transfer methods on various parameters:

i. **Fund Value:** The fund value is essential in determining which of the transfer methods are available for you. Depending on the value of the fund, the originator can choose a particular method.

ii. **Timings (service availability):** There are certain methods of fund transfer that allows 24/7 online transfers while other have specified timings. The latter will allow a remitter to initiate a fund transfer any time of the day but the funds will settle only during the availability of the service. There are certain types of fund transfer methods that are not available during the weekend and public holidays while others operate round the clock throughout the year.

iii. **Fund Settlement Speed:** After considering the fund value, most often an individual will look into the settlement speed factor. Each of the fund transfer methods come with different speed of fund settlement. Fund settlement speed indicates the amount of time consumed and the speed at which the funds are settled to the beneficiary's account once it's been initiated. In most cases, people largely choose one transfer method over other due to the speed factor; however, a faster settlement speed is bound to attract additional charges.

iv. **Charges:** In accordance with the Reserve Bank of India (RBI), banks decide the transaction charges for each of the fund transfer methods. The charges are based on the total value of the fund, settlement speed, and other features/flexibility offered by the bank. Moreover, the government levies an applicable service charge for each fund transfer transaction. Particular bank's website can be referred to obtain the latest list of transaction fees and other charges.

v. **Transaction Limits:** All banking and financial institutions specify transaction limits on most types of banking and financial products. RBI regulates the transaction limits and all other factors of fund transfer through the Board for Regulation and Supervision of Payment and Settlement Systems (BPSS). BPSS is a subcommittee of the Central Board of the RBI and designated for being the highest authority for making policies pertaining to the payment systems in India. Moreover, BPSS is also responsible for supervising all the payment and settlement systems. All the payment and settlement systems in India are regulated under the Payment and Settlement Systems Act, 2007 (PSS Act).

6.5.1 NEFT (National Electronic Fund Transfer) :

National Electronic Funds Transfer or NEFT is the most commonly used online payment option to transfer money from one bank account to another. Usually, salary transfers by companies are done using NEFT. The funds are transferred on a deferred settlement basis, which implies that the money is transferred in batches. There is no maximum limit but this depends from one bank to another. For instance, the retail banking limit set by SBI is Rs.10 lakhs. Based on the amount being transferred the bank can charge an amount from Rs 2.50 to Rs 25. The money can be transferred only during the bank working days. The transactions cannot be completed over the weekends and on bank holidays. It will be completed on the next working day. Thus, instant transactions can't be made using NEFT. Various requirements for conducting an NEFT transfer are:

i. Recipient's name
ii. Recipient's bank name
iii. Recipients' account number
iv. IFSC code of the beneficiary bank

6.5.2 RTGS (Real Time Gross Settlement) :

Money can be transferred from one bank to another on a real-time basis using Real Time Gross Settlement or RTGS method. There is no maximum transfer limit, but the minimum is Rs. 2 lakhs. The transactions are processed throughout the RTGS business hours. Usually, the amount is remitted within 30-minutes. To be able to transfer money through RTGS, it is required for the sender and the receiver bank branch to be RTGS enabled. It costs a little more than NEFT. But still, it will not cost you more than Rs. 30 for transactions up to Rs. 5 lakhs. The fee varies from one bank to another. Various requirements for conducting a RTGS are:

i. Amount to be sent
ii. Account number of the remitter or sender
iii. Name of the recipient or beneficiary
iv. Account number of the beneficiary
v. Beneficiary's bank and branch name
vi. IFSC code of the receiving branch
vii. Sender to receiver information, if any

6.5.3 Immediate Payment Service (IMPS) :

An Immediate Payment Service (IMPS) sends instant payments. The money is transferred instantaneously through mobile phones using this interbank electronic fund transfer service. You can make the transactions 24x7x365 across banks including all weekends and bank holidays. The money can be transferred using phones, ATMs, Mobile Money Identifier (MMID) and internet banking. The idea is simple to allow users to make payments with the mobile number of the beneficiary. Various requirements for conducting IMPS are:

i. MMID of the Recipient
ii. Seven Digit MMID Number
iii. MMID of the receiver
iv. Name of the beneficiary
v. Beneficiary's mobile number
vi. Account Number of the recipient
vii. IFSC Codes of the beneficiary bank

6.5.4 Unified Payments Interface (UPI) :

Unified Payments Interface is an instant real-time payment system developed by National Payments Corporation of India facilitating inter-bank transactions. The interface is regulated by the Reserve Bank of India and works by instantly transferring funds between two bank accounts on a mobile platform.

Unified Payments Interface is a real time payment system that allows sending or requesting money from one bank account to another. Any UPI client app may be used and multiple bank accounts may be linked to single app. Money can be sent or requested with the following methods:

i. Virtual Payment Address (VPA) or UPI ID: Send or request money from/to bank account mapped using VPA.
ii. Sending or requesting money from/to the bank account mapped using mobile number.
iii. Sending money to the bank account Account number and IFSC
iv. Sending money to the bank account mapped using Aadhar number.
v. QR code : Send money by QR code which has enclosed VPA, Account number and IFSC or Mobile number

Fig 6.1: Examples of UPI Apps

6.5.5 Difference between NEFT, RTGS & IMPS :

Irrespective of which system is being used, NEFT, RTGS, or IMPS, they function as robust fund transfer methods which allow individuals and businesses to transfer money online from anytime and anywhere in the world. Online transfer methods are subject to availability based on the customer's eligibility and level of access granted by the bank. Additionally, the limits on fund value, timings, settlement speed, and other factors are a part of the online fund transfer method. Currently, NEFT, RTGS, and IMPS are the most popular methods of fund transfer in India, few of the notable differences between these methods are listed below:

Table 6.1: Key Differences between NEFT, RTGS and IMPS

Basis	**NEFT**	**IMPS**	**RTGS**
Speed of settlement	Half hourly	Real-Time	Real-Time
Maximum transfer value	No Limit	INR 200,000	No Limit
Minimum transfer value	No Limit	No Limit	INR 200,000

Charges	No Charges	Charges decided as per the bank For each transaction	No Charges
Timing	24*7, 365 Days	24*7, 365 Days	7 am IST- 5 pm IST (On all working days for banks in India)

Currently, Indians have the access to choose multiple fund transfer methods. The access to latest technology and an increasing demand for online-based service has left no stone unturned. From banking and financial institutions to governing bodies, and private businesses, the immense utilization of latest technology has helped almost everyone to bridge the gap between their customers, partners, vendors, etc.

6.6 VIRTUAL CURRENCY :

Virtual currency, or virtual money, is a type of unregulated digital currency, which is issued and usually controlled by its developers and used and accepted among the members of a specific virtual community. The term came into existence around 2012, when the European Central Bank (ECB) defined virtual currency to classify types of "digital money in an unregulated environment, issued and controlled by its developers and used as a payment method among members of a specific virtual community," according to Bitcoin News Virtual currency can be defined as "an electronic representation of monetary value that may be issued, managed, and controlled by private issuers, developers, or the founding organization".

Examples of virtual currencies are frequent flyer programs by various airlines, Microsoft Points, Nintendo Points, Facebook Credits and Amazon Coin etc. RBI has imposed a ban on the sale or purchase of crypto-currency by stating that financial institutions can no longer deal with entities that trade in virtual currencies such as Bitcoin.

The Reserve Bank of India had imposed a ban on crypto currency trading in April 2018 that barred banks and other financial institutions from facilitating "any service in relation to virtual currencies." Various features of a virtual currency are explained as below:

i. Virtual currency is a type of unregulated digital currency that is only available in electronic form.
ii. It is stored and transacted only through designated software, mobile or computer applications, or through dedicated digital wallets, and the transactions occur over the internet through secure, dedicated networks.
iii. Virtual currency is considered to be a subset of the digital currency group, which also includes crypto currencies, which exist within the Block chain network.
iv. It is not controlled by a centralized banking authority.

v. Virtual currency is different than digital currency since digital currency is simply currency issued by a bank in digital form.

vi. Virtual currency is unregulated without a legal tender and therefore experiences dramatic price movements since the only real force behind trading is consumer sentiment.

vii. Unlike regular money, virtual currency relies on a system of trust and may not be issued by a central bank or other banking regulatory authority. They derive their value based on the underlying mechanism, like mining in cases of crypto currencies, or the backing by the underlying asset.

Difference between Digital, Virtual, and Crypto Currencies :

Digital currency is the overall superset that includes virtual currency, which in turn includes crypto currencies. Compared to virtual currency, a digital currency covers a larger group that represents monetary assets in digital form. Digital currency can be regulated or unregulated. In the former case, it can be denominated to a sovereign currency that is, a country's central bank can issue a digital form of its fiat currency notes. On the other hand, a virtual currency often remains unregulated and hence constitutes a type of digital currency. Crypto currencies like Bitcoin and Ethereum are considered to be a part of the virtual currency group. A crypto currency uses cryptography technology that keeps the transactions secure and authentic, and also helps to manage and control the creation of new currency units.

6.7 AUTOMATED CLEARING HOUSE :

Automated Clearing House (ACH) is a computer-based electronic network that coordinates electronic payments and automated money transfers i.e processes transactions, usually domestic low value payments, between participating financial institutions. An ACH payment occurs when money moves from one bank to another bank. This money moves electronically, through the Automated Clearing House Network. In India National Automated Clearing House, or NACH, introduced by National Payments Corporation of India, is a centralized clearing service that aims at providing interbank high volume, low value transactions that are repetitive and periodic in nature.. When employers pay wages through direct deposit or consumers pay bills electronically out of checking accounts, the ACH network is often responsible for those payments. These computerized payments have benefits for both merchants and consumers as explained below:

i. **Lower costs:** ACH payments use fewer resources than traditional paper checks. There's no need for paper, ink, fuel to transport checks, time and labor to handle and deposit checks, and so on.

ii. **Record keeping Convenience:** Electronic transactions make it easy to keep track of income and expenses. With every transaction, banks create an electronic record. Accounting and personal financial management tools can also access that transaction history.

iii. **Convenience:** ACH is more convenient and easier to use as compared to the other methods of payment.

iv. Customer's Preference: ACH is preferred because of security, reduced human error and increase time savings, Faster processing

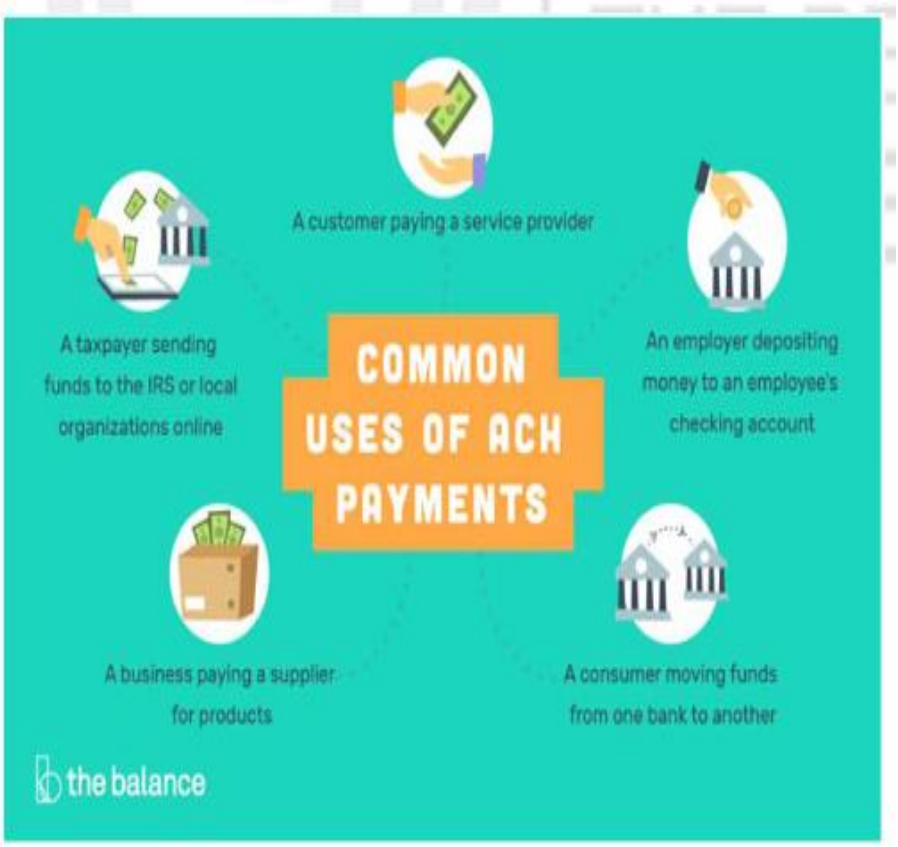

Fig 6.2: Common uses of ACH Payments

To complete payments, the organization requesting a payment (whether they want to send funds or receive funds) needs to get bank account information from the other party involved. For example, an employer needs the following details from employees to set up direct deposit:

i. The name of the bank or credit union receiving funds
ii. The type of account at that bank (checking or savings)
iii. The bank's ABA routing number
iv. The recipient's account number

With that information, payments can be created and routed to the correct account. Billers need those same details to make pre-authorized withdrawals from customer accounts. An originator starts a direct deposit or direct payment transaction using the ACH Network. Originators can be individuals, organizations, or government bodies, and ACH transactions can be either debit or credit. The originator's bank, also known as the originating depository financial institution (ODFI), takes the ACH transaction and batches it together with other ACH transactions to be sent out at regular times throughout the day.

An ACH operator, either the Federal Reserve or a clearing house, receives the batch of ACH transactions from the ODFI with the originator's transaction included. The ACH operator sorts the batch and makes transactions available to the bank or financial institution of the intended recipient, also known as the receiving depository financial institution (RDFI). The recipient's bank account receives the transaction, thus reconciling both accounts and ending the process. ACH payments are often electronic from start to finish. But sometimes merchants convert paper checks to electronic payments, and the funds move through the ACH system. The ACH Network essentially acts as a financial hub and helps people and organizations move money from one bank account to another. ACH transactions consist of direct deposits and direct payments, including B2B transactions, government transactions, and consumer transaction.

6.8 AUTOMATED LEDGER POSTING :

Learning to identify anomalies in large-scale accounting data is one of the ancient challenges in financial statement audits or forensic investigations. Nowadays, the majority of applied techniques refer to handcrafted rules derived from known scenarios.

Fig 6.3: Automated Ledger Posting

The financial accounting term posting to the ledger refers to the process of analyzing the credits and debits appearing in journal entries, and recording those transaction amounts in the proper accounts found in the company's general ledger. The process of transferring the entries from journal to respective ledger accounts has been automated coining the term automated ledger posting. The balancing of ledgers is carried out automatically to find out differences at the end of the year. There are certain ways by which the ledger posting is automatically governed.

Artificial intelligence can help accountants to be more productive and efficient. Robotic process automation (RPA) allows machines or AI workers to complete repetitive, time-consuming tasks in business processes such as document analysis and handling that are plentiful in accounting.

Algorithms and Volume of Data :

Two factors impact how well an AI platform is designed for accounting are:

i. Algorithms and the sophistication of its technology

ii. The amount of data used for testing the technology

For an AI platform to perform exceptionally well, it has to have processed tens of millions of transactions to have a high level of certainty and prediction rate. Very few platforms reach that level since they either need to have a lot of clients or access to massive datasets.

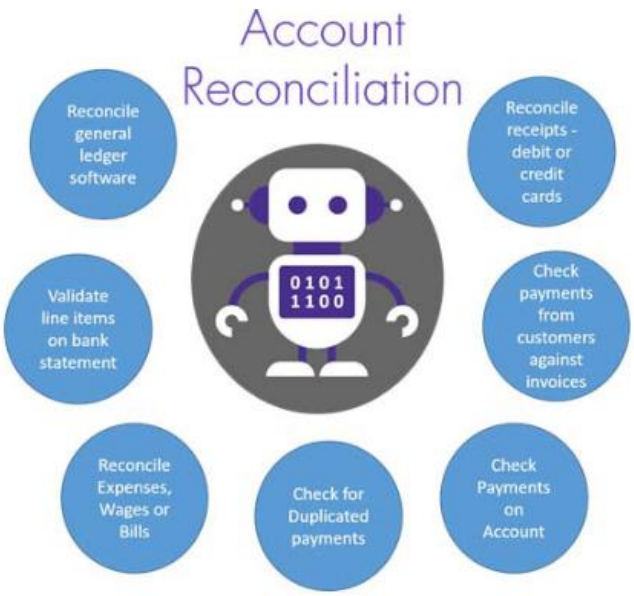

Fig 6.4: Account Reconciliation

AI can prevent these problems because well-trained AI knows everything needed to know a client (even tracing past trends, if applicable). AI can cut down on data retrieval fatigue and related human input errors by as much as 90%.

6.9 DISTRIBUTED LEDGER TECHNOLOGY :

Since ancient times, ledgers have been at the heart of economic transactions, with the purpose of recording contracts, payments, buy-sell deals, or moving assets or property. The journey which began with recording on clay tablets or papyrus made a big leap with the invention of paper. Over the last couple of decades, computers have provided the process of record-keeping and ledger maintenance with great convenience and speed. Today, with innovation, the information stored on computers is moving towards much higher forms, which is cryptographically secure, fast, and decentralized. Companies can take advantage of this technology in many forms, one way being through distributed ledgers.

Thus a Distributed ledger technology (DLT) is a digital system for recording the transaction of assets in which the transactions details are recorded in multiple places at the same time. Unlike traditional databases, distributed ledgers have no central data store or administration functionality.

Advantages of Distributed Ledgers:

i. While centralized ledgers are prone to cyber-attack, distributed ledgers are inherently harder to attack because all of the distributed copies need to be attacked simultaneously for an attack to be successful. Furthermore, these records are resistant to malicious changes by a single party. By being difficult to manipulate and attack, distributed ledgers allow extensive transparency.

ii. Distributed ledgers also reduce operational inefficiencies, speed up the amount of time a transaction takes to complete, are automated, and therefore function 24/7, all of which reduce overall costs for the entities that use them.

iii. Distributed ledgers also provide an easy flow of information, which makes an audit trail easy to follow to accountants when they conduct reviews of financial statements. This helps to remove the possibility of fraud occurring on the financial books of a company. The reduction in the use of paper is also a benefit to the environment.

6.10 CONCLUSION :

Electronic banking is a form of banking in which funds are transferred through an exchange of electronic signals rather than through an exchange of cash, checks, or other types of paper documents. It is also known as electronic funds transfer (EFT) and basically uses electronic means to transfer funds directly from one account to another. E-Banking has certain advantages over the traditional banking system, as it provides 24 hours, 365 days a year services to the customers of the bank; lowers the transaction cost; inculcates a sense of financial discipline and promotes transparency; customers can make the transactions from office, home or while travelling via cellular phones.

The financial accounting term posting to the ledger refers to the process of analyzing the credits and debits appearing in journal entries, and recording those transaction amounts in the proper accounts found in the company's general ledger. Distributed ledger technology (DLT) is a digital system for recording the transaction of assets in which the transactions details are recorded in multiple places at the same time. Unlike traditional databases, distributed ledgers have no central data store or administration functionality.

6.11 KEY WORDS :

- **Electronic Banking:** E-banking is a form of banking in which funds are transferred through an exchange of electronic signals rather than through an exchange of cash, checks, or other types of paper documents.
- **IFSC (Indian Financial System Code):** IFSC is a unique eleven-digit number which is a combination of alphabets and numerals given to a bank for a specific branch.
- **NEFT (National Electronic Funds Transfer):** NEFT enables an individual electronically transfer funds from any bank branch to any individual having an account with any other bank branch in the country participating in the Scheme.
- **RTGS (Real Time Gross Settlement):** RTGS is an electronic form of funds transfers where the transmission takes place on a real time basis. In India, transfer of funds with RTGS is done for high value transactions, the minimum amount being Rs. 2 lakh. The beneficiary account receives the funds transferred, on a real time basis.

- **IMPS (Immediate Payment Service):** IMPS is an instant payment inters- bank electronic funds transfer system in India. IMPS offer an inter-bank electronic fund transfer service through mobile phones.
- **Virtual Currency:** Virtual currency is termed as an electronic representation of monetary value that may be issued, managed, and controlled by private issuers, developers, or the founding organization.
- **Automated Clearing House:** An automated clearing house is a computer- based electronic network to move money between banks without using paper checks, wire transfers, credit card networks, or cash.
- **Distributed Ledger Technology:** Distributed ledger technology is a ledger of any transactions or contracts maintained in decentralized form across different locations and people, eliminating the need for a central authority to keep a check against manipulation.

6.12 SELF ASSESSMENT QUESTIONS:

1. What all reasons were responsible for the technological innovation in the banking industry?
2. What are the factors for considering before initiating an online fund transfer?
3. What is the difference between NEFT, RTGS and IMPS?
4. What is a virtual currency? and why do you think crypto currency was banned by RBI?
5. What are the features of a virtual currency?
6. What is the difference between ACH and EFT?
7. What are the benefits of ACH payments?

6.13 REFERENCES :

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LESSON - 7

ENABLING TECHNOLOGIES OF MODERN BANKING WITH ELECTRONIC COMMERCE AND BANKING

OBJECTIVES :

After reading this lesson, you will be able to understand:

- The concept of Technology in modern banking
- Enumerate various technologies used in Modern banking
- The concepts of E-commerce and E-banking
- Importance of CRM in Banking Sector
- Analyse the various integrated communication Networks for banks

STRUCTURE :

7.1 INTRODUCTION:

Distinctive technological solutions and an ability to rapidly adapt gives companies a competitive advantage. They are now developing and employing new technologies to move aggressively and strategically to disrupt rather than be disrupted. Greater emphasis is being laid on leveraging sophisticated technology to improve productivity and reach.

Embracing futuristic technologies has gained significant momentum across the banking and financial sector as well. Streamlining services for the customers along with system upgrades in terms of tech deployments are rapidly gaining acceptance. The banking industry in India is geared up for a transformational space with the implementation of advanced technologies

such as applications of Artificial Intelligence (AI), Machine Learning (ML), Block Chain and Robotics.

Technology and innovation in banking is a way to meet new and existing requirements via the application of digital solutions in an existing or articulated market. Nowadays, innovative technology is considered as one of the most important tools that can affect the economic and banking sector. It is only a matter of time that digital progress eventually destroys old ideals that are still used to develop and deliver services and will be replaced by new and operations-centric practices. Thus, in the highly competitive banking environment, specifically, internal banking operation, the adoption of new tech and innovation has never

7.2 TYPES OF TECHNOLOGIES USED IN BANKING :

i. **Robotic Process Automation:** The volume of unstructured data that the banks have to process is growing exponentially with the rise of the digital economy. These are not just banking transaction data, but also other behavioral data that could allow banks to improve and innovate the customer experience. With a combination of various technologies that enable cognitive and robotic process automation bankers can now understand customer action and make a judgment at a higher speed, scale, and quality. Additionally, smart virtual assistants today are handling transactions, providing important information, and helping customers. Robotic Process Automation is improving the user experience by allowing bots to handle repetitive tasks without human intervention. It also reduces errors and enables bank staff members to handle more intricate queries and provide better customer service.

ii. **Data Analytics:** Today, success is achieved by driving intelligent customer engagement based on a data-driven understanding of the business. Technology and digitization have transformed the BFSI sector by enabling them with real-time actionable insights to make informed decisions, creating competitive advantages and elevating consumer experience. This also allows banks to share potential products, upsells, cross-sells, and strategic planning with customers. With AI-backed models, the ability to transform the banking experiences of customers is truly exponential.

iii. **API Platforms:** Today, through API platforms, banks are working with Fintechs to build banking stacks that allow them to be a platform on which customers and third-party service providers can connect to deliver flexible and personalized experiences to the end-user. API Banking Platform is designed to work through APIs that sit between the banks' backend execution and front-end experiences provided by either the bank itself or third-party partners. This allows the banks to adopt completely new business models and use cases such as enabling salary advances and experiment with new technologies like blockchain at low cost. APIs also help banks to future-proof their systems.

iv. **Cyber Security:** Banking industry deals with sensitive & personal information, which has made it an attractive target for cybercriminals. With the deployment of technology in the BFSI sector, cyber risk is also evolving. They are gradually implementing advanced analytic, real-time monitoring and biometrics and behavioral analysis software to detect threats and stop them from disrupting the systems. They are also utilizing anti-hacking tools which provide network-level security which looks for unusual behaviors and potential cyber attacks.

v. **Cloud Computing:** Another technological advancement that is revolutionizing the banking industry is cloud computing. Cloud is a crucial tool of the service delivery model and enables banks to penetrate new business opportunities and access new

delivery channels. By leveraging cloud-based services, banks can decrease data storage costs by saving on capital and operating expenditure, while ensuring customer data is protected. Cloud computing also promotes safe online payments, digital money transfers, wallets payments, etc.

vi. **Artificial Intelligence (AI) and Machine Learning (ML):** Banks increasingly leverage AI and ML technologies to enhance operational efficiency, detect fraud, and improve customer experiences. AI-powered chat bots and virtual assistants are being used to provide personalized assistance and support. At the same time, ML algorithms analyze large datasets to uncover valuable insights for risk assessment and customer segmentation.

vii. **Block Chain Technology:** Block chain has emerged as a disruptive force in the banking industry, transforming areas such as cross-border payments, trade finance, and identity verification. Its decentralized and secure nature has the potential to streamline processes, reduce costs, and increase transparency in transactions.

viii. **Internet of Things (IoT):** IoT technologies enable the interconnection of physical devices and objects, allowing them to collect and exchange data. IoT can be leveraged in the banking industry for various applications, such as remote asset monitoring, real-time fraud detection, and personalized customer experiences. For example, banks can use IoT devices to monitor ATMs, track inventory levels, and provide personalized offers based on customers' locations and preferences.

ix. **Dev Ops and Automation:** Dev Ops practices combine software development and IT operations to enable continuous integration, continuous delivery, and faster application deployment. By adopting Dev Ops methodologies, banks can reduce time-to-market for new services, enhance collaboration between development and operations teams, and improve their applications' overall quality and stability. Automation tools further accelerate the development and deployment processes, enabling banks to achieve higher operational efficiency.

x. **The Future of Advanced Technologies in Banking :** Banking leaders must approach the future with a challenger mindset, looking beyond today, building a plan for technologies they must consider going forward. Leaders must commit to technologies that could drive competitive differentiation and efficiency in the next two to 10 years while doubling down on technologies that will be the most important to banking in the near term. Often, there is no proven path to adoption or certain return on investment. As opposed to technologies where there are already established use cases, emerging technologies are more disruptive with mainstream adoption occurring in as little as two years or as long as a decade or more.

7.3 E-COMMERCE :

E-commerce (electronic commerce) is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. These business transactions occur either as business-to-business (B2B), business-to-consumer (B2C), consumer-to-consumer or consumer-to-business. The terms e-commerce and e-business are often used interchangeably. The term e-tail is also sometimes used in reference to the transactional processes that make up online retail shopping.

In the last two decades, widespread use of e-commerce platforms such as Amazon and eBay has contributed to substantial growth in online retail. In 2011, e-commerce accounted for 5% of total retail sales, according to the U.S. Census Bureau. By 2020, with the start of the COVID-19 pandemic, it had risen to over 16% of retail sales.

i.History of E-Commerce :

Most of us have shopped online for something at some point, which means we've taken part in e-commerce. So, it goes without saying that e-commerce is everywhere. But very few people may know that e-commerce has a history that goes back to before the internet began. E-Commerce actually goes back to the 1960s when companies used an electronic system called the Electronic Data Interchange to facilitate the transfer of documents. It wasn't until 1994 that the very first transaction. took place.

The industry has gone through so many changes since then, resulting in a great deal of evolution. Traditional brick-and-mortar retailers were forced to embrace new technology in order to stay afloat as companies like Alibaba, Amazon, eBay, and Etsy became household names. These companies created a virtual marketplace for goods and services that consumers can easily access. New technology continues to make it easier for people to do their online shopping. People can connect with businesses through Smartphone and other devices and by downloading apps to make purchases. The introduction of free shipping, which reduces costs for consumers, has also helped increase the popularity of the e-commerce industry.

ii. Difference between E-Commerce and E-Business :

E-commerce involves the purchase and sale of goods and services online and is actually just one part of e-business. An e-business involves the entire process of running a company online. Put simply, it's all of the activity that takes place with an online business.

iii. Working Methodology of E-Commerce :

E-commerce is powered by the internet. Customers access an online store to browse through and place orders for products or services via their own devices. As the order is placed, the customer's web browser will communicate back and forth with the server hosting the e-commerce website. Data pertaining to the order will be relayed to a central computer known as the order manager. It will then be forwarded to databases that manage inventory levels; a merchant system that manages payment information, using applications such as PayPal; and a bank computer. Finally, it will circle back to the order manager. This is to make sure that store inventory and customer funds are sufficient for the order to be processed.

After the order is validated, the order manager will notify the store's web server. It will display a message notifying the customer that their order has been successfully processed. The order manager will then send order data to the warehouse or fulfilment department, letting it know the product or service can be dispatched to the customer. At this point tangible or digital products may be shipped to a customer, or access to a service may be granted.

Platforms that host e-commerce transactions include online marketplaces that sellers sign up for, such as Amazon; software as a service SAAS tools that allow customers to "rent" online store infrastructures; or open source tools that companies manage using their in-house developers.

Figure 7.1: Six Types of E-Commerce

7.4 E-COMMERCE BUSINESS MODELS :

i. **Business-to-Business (B2B):** This model refers to the electronic exchange of products, services or information between businesses rather than between businesses and consumers. Examples include online directories and product and supply exchange websites that let businesses search for products, services and information and initiate transactions through e-procurement interfaces. A Forrester report published in 2018 predicted that by 2023, B2B e-commerce will reach $1.8 trillion dollars and account for 17% of U.S. B2B sales.

ii. **Business-to-Consumer (B2C):** This model is the retail part of E-Commerce on the internet. It is when businesses sell products, services or information directly to consumers. The term was popular during the dot-com boom of the late 1990s, when online retailers and sellers of goods were a novelty. Today, there are innumerable virtual stores and malls on the internet selling all types of consumer goods. Amazon is the most recognized example of these sites. It dominates the B2C market.

iii. **Consumer-to-Consumer (C2C):** E-Commerce in which consumers trade products, services and information with each other are online. These transactions are generally conducted through a third party that provides an online platform on which the transactions are carried out. Online auctions and classified advertisements are two examples of C2C platforms. EBay and Craigslist are two well-known examples of these platforms. Because eBay is a business, this form of e-commerce could also be called C2B2C -- consumer-to-business-to-consumer. Platforms like Facebook marketplace and Depop -- a fashion reselling platform -- also enable C2C transactions.

iv. **Consumer-to-Business (C2B):** It is a type of e-commerce in which consumers make their products and services available online for companies to bid on and purchase. This is the opposite of the traditional commerce model of B2C. A popular example of a C2B platform is a market that sells royalty-free photographs, images, media and design elements, such as iStock.

v. **Business-to-Administration (B2A):** This model refers to transactions conducted online between companies and public administration or government bodies. Many branches of

government are dependent on various types of e-services or products. These products and services often pertain to legal documents, registers, social security, fiscal data and employment. Businesses can supply these electronically. B2A services have grown considerably in recent years as investments have been made in e-government capabilities.

vi. **Consumer-to-Administration (C2A):** This model refers to transactions conducted online between consumers and public administration or government bodies. The government rarely buys products or services from individuals, but individuals frequently use electronic means in the following areas:

a) **Social Security:** Distributing information and making payments.
b) **Taxes:** Filing tax returns and making payments.
c) **Health:** Making appointments, providing test results and information about health conditions, and making health services payments.
d) **Mobile E-commerce:** (M-Commerce) refers to online sales transactions using mobile devices, such as smart phones and tablets. It includes mobile shopping, banking and payments. Mobile chat bots facilitate M-Commerce, letting consumers' complete transactions via voice or text conversations.

7.5 ADVANTAGES OF E-COMMERCE :

Advantages of e-commerce include its around-the-clock availability, the speed of access, the wide availability of goods and services, easy accessibility and international reach.

i. Easy Availability: Aside from outages and scheduled maintenance, e-commerce sites are available 24/7, enabling visitors to browse and shop at any time. Brick-and-mortar businesses tend to open for a fixed number of hours and may even close entirely on certain days.

ii. Speed of Access: While shoppers in a physical store can be slowed by crowds, e-commerce sites run quickly, which is determined by compute and band width considerations on both the consumer device and the e-commerce site. Product and shopping cart pages load in a few seconds or less. An e-commerce transaction can comprise a few clicks and take less than five minutes.

iii. Wide Availability: Amazon's first slogan was "Earth's Biggest Bookstore." It could make this claim because it was an e-commerce site and not a physical store that had to stock each book on its shelves. E-commerce enables brands to make a wide array of products available, which are then shipped from a warehouse or various warehouses after a purchase is made. Customers will likely have more success finding what they want.

iv. Easy Accessibility. Customers shopping a physical store may have difficulty locating a particular product. Website visitors can browse product category pages in real time and use the site's search feature to find the product immediately.

v. International Reach. Brick-and-mortar businesses sell to customers who physically visit their stores. With e-commerce, businesses can sell to anyone who can access the web. E-commerce has the potential to extend a business's customer base.

vi. Lower Cost. Pure play e-commerce businesses avoid the costs of running physical stores, such as rent, inventory and cashiers. They may incur shipping and warehouse costs, however.

vii. Personalization and Product Recommendations. E-commerce sites can track a visitor's browse, search and purchase history. They can use this data to present personalized product recommendations and obtain insights about target markets.

Examples include the sections of Amazon product pages labeled "Frequently bought together" and "Customers who viewed this item also viewed."

7.6 E-COMMERCE APPLICATIONS :

Many retail e-commerce apps use online marketing techniques to get customers to use the platform. These include email, online catalogs and shopping carts, Electronic Data Interchange (EDI), file transfer protocol, web services and mobile applications.

These approaches are used in B2C and B2B activities, as well as other types of outreach. They include emailing targeted ads and e-newsletters to subscribers and sending SMS texts to mobile devices. Sending unsolicited emails and texts is generally considered spam. More companies now try to entice consumers online, using tools such as digital coupons, social media marketing and targeted advertisements.

Another area of focus for e-commerce companies is security. Developers and admins should consider consumer data privacy and security, data governance-related regulatory compliance mandates, personally identifiable information privacy rules and information protection protocols when developing e-commerce systems and applications. Some security features are added during the design of an application, while others must be continually updated to address evolving threats and new vulnerabilities.

7.7 ISSUES AND CHALLENGES IN E-COMMERCE :

i. Cyber & Data Security

When it comes to eCommerce, one of the biggest challenges faced is security breaches. There is a lot of information/data that is involved while dealing with eCommerce and a technical issue with data can cause severe damage to the retailer's daily operations as well as brand image.

Solution: Be vigilant and always back up your data. Post that, you can install security plugins onto your website to prevent it from getting hacked. There are several plugins out there, pick one that works best for your e Commerce website.

ii. Online Identity Verification

When a shopper visits an e Commerce site, how would the retailer know if the person is who they say they are? Is the shopper entering accurate information? Is the shopper genuinely interested in the eCommerce products?

If you do not have the accurate details or information, how do you proceed? Well, it does become tricky. The solution would be to invest in *online identity verification.*

Solution: There are different ways to incorporate online identity verification. Some examples include biometrics, AI, single sign on, one time password, two-factor authentication and so on.

iii. Attracting the Perfect Customer

Shoppers have a myriad of options to choose from these days. If they are looking to buy a handbag, they do some thorough research before finalizing on one. If shoppers have several options, how do you make sure they pick you? How do you go about finding that perfect customer that wants your product, at your rate and to the places you can ship?

Solution: Partner with companies that help you target your customers. Digital marketing is preferred over traditional marketing because they can target your ideal customer. While this might not happen overnight, with A/B testing, fine tuning and analysis – your products could be showing up to potential customers on different social media platforms.

iv. Customer Experience

Customer experience or user experience is key to a successful eCommerce website. Shoppers expect a similar if not same experience as one they would get in a brick and mortar store. The flow of the website, the segmentation of the website and the retail personalization of products based on the shopper's preferences are imperative.

Solution: There are several ways to improve the user experience. The most important would be to have a clean and simple website so that shoppers can navigate through easily. The next point would be to have clear CTAs (call to action) so that the shopper knows exactly what to do. Here is a post that shows you 10 ways to improve user experience.

v. Customer Loyalty

Here are two facts that show the importance of customer loyalty:(a) It can cost up to 5 times more to acquire a new customer than retaining an existing one and (b) the success rate of selling to a current customer is 60-70% compared to only 5-20% success rate of selling to a new customer. The above two facts are testament to how important customer retention or loyalty is. Once a customer makes a purchase or utilizes a service from a retailer, they have to make sure that they keep this customer for life.

vi. Competition & Competitor Analysis

Have you heard of a Jam Experiment? Well it has quite a controversial conclusion, which is – the less you offer customers the more likely they are to actually purchase something. A lot of people these days are fatigued by all the options that are out there. A simple search (personalized search) for something like headphones will give you thousands of options – how does one make a choice?

vii. Price & Shipping

We have all heard of customers that prefer to purchase products from places that have free shipping. eCommerce giants like Amazon provide such attractive shipping deals that customers seldom want to look at other places. How does one bring down costs for shipping?

viii. Product Return & Refund Policies

According to ComScore, more than 60% of online shoppers say that they look at a retailer's return policy before making a purchase. When an eCommerce site says "no returns or refunds" it makes a shopper nervous and less likely to trust the retailer. When shopping online, customers want the flexibility of making a mistake that doesn't cost them.

ix. Choosing the Right Technology/Partners

Choosing the right technology or partner will make or break your business. A retailer's growth might be stunted because their technology is limiting them or because they have hired the wrong agency to help them manage their projects.

There are a lot of aspects that need to be in place for a successful retail business, but a good technology foundation is crucial.

x. Customer Support

With the scale of eCommerce increasing rapidly and with the rising number of users facing everyday issues with eCommerce services, Customer support has been augmented with chatbots which enable faster processing and response to tickets.

However, many customers find themselves feeling uncomfortable or dissatisfied with automated responses from chatbots. Solution: The solution to this eCommerce challenges is fairly simple – eCommerce companies should utilize a combination of technology and human assistance to deal with customer support by tagging specific issues that require human assistance and distinguishing the queries that can be handled by a chatbot.

xi. Cross-border eCommerce

A lot of E-Commerce sites tend to stagnate due to the lack of interaction with customers outside their geographical and linguistic range. Users that do not speak the primary language used on the site tend to look for other retailers that can offer them a better user experience. Moreover, the differences in pricing, tax rates, etc., deter users from purchasing across borders.

xii. Marketing Budgets

With digital marketing becoming the norm for most eCommerce businesses, more companies are flocking towards their digital and social media ad spends. With the demand for clicks and virtual advertising space increasing, so does the price. This can become very expensive for small and medium-sized retailers and in fact, this is one of the biggest eCommerce challenges that they face.

xiii. Going Omni Channel

Selling your products through multiple channels enables you to increase your overall revenue and Average Order Value(AOV). A customer that shops on multiple channels is likely to spend three-times more than the average customer. However, if not done right, some channels might lead to losses if they don't attract the right customers and the required volume of customers.

xiv. Data Privacy

Customers today are aware of the importance of their data and the need for data privacy. Device manufacturers like Apple are going the extra mile to ensure that their users' data are kept safe from third-parties. However, user data can also enable platforms to provide them a better user-experience.

xv. Logistics

Companies across the world are affected by supply chain issues every year, and considering it is a layered process, issues and errors occur at multiple steps during the process, which leads to added expenses and delays.

xvi. Customer Expectations

Modern consumers these days are increasingly informed and aware with the advent of new technology and exposure to multiple brands and services. The modern consumer has high expectations for the kind of products and services they pay for and are constantly on the lookout for better experiences.

7.8 INTRODUCTION TO E-BANKING :

E-banking is an arrangement between a bank or a financial institution and its customers that enables encrypted transactions over the internet. Short for electronic banking, E-banking has various types that cater to customers' different requirements, which can be resolved online.

E-banking is also helpful for non-financial transactions such as changing your ATM PIN, getting a mini statement, updating your personal details, balance inquiry or printing an account statement. Essentially, it refers to any transaction that doesn't involve any movement of funds to or from your account.

Electronic banking has many names like web-based banking, e-banking, virtual banking, or web banking, and online banking. It is just the utilisation of telecommunications networks and electronic networks for conveying different financial services and products. Through e-banking, a client can acquire his record and manage numerous exchanges utilising his cell phone or personal computer.

7.9 CLASSIFICATION OF E-BANKING :

Banks offer different kinds of services through electronic financial stages and they are classified into three types as under:

Type 1:
This is the essential degree of administrations or services that banks offer through their sites. Through this assistance, the bank offers data, information regarding its services and products to clients. Further, a few banks might respond to an inquiry through email as well.

Type 2:
In this category, banks permit their clients to submit directions or applications for various administrations, check their record balance, and so on. Be that as it may, banks don't allow their clients to do any fund-based exchanges with respect to their records or accounts.

Type 3:
In the third category, banks permit their clients to work or operate their records or accounts for bill payments, purchase and redeem securities and fund transfers, and so on. Most conventional banks offer e-banking administrations as an extra technique for offering support. Further, many new banks convey banking administrations principally through the other electronic conveyance channels or web. Likewise, a few banks are 'internet only' banks with no actual branch anyplace in the country. In this way, banking sites are of these types:

i. **Transactional Websites:** These sites permit clients to go through with exchanges on the bank's site. Further, these exchanges can go from a plain retail account balance request to huge business-to-business liquid assets transfers. The accompanying table records some normal wholesale and retail e-banking administrations presented by financial institutions and by banks.
ii. **Informational Websites:** These sites offer general data regarding the bank and its services and products to the clients.
iii. **Wholesale services by banks:** Include Account management, Cash management, small business loan applications, Approvals or advances, Commercial wire transfer, Business-to-business payments, Employee benefit, and Pension administration.
iv. **Retail services by banks:** Include Account management, Bill payment, new account opening, Consumer wire transfers, Investment and brokerage services, Loan application and approval, and Account Aggregation.

7.10 SERVICES UNDER E-BANKING :

The following are the services under E-Banking:

i. **Mobile Banking:**
Mobile banking (otherwise called M-banking) is a name utilised for performing account exchanges or transactions, bill payments, credit applications, balance checks,

and other financial exchanges through a mobile phone like a Personal Digital Assistant (PDA) or cell phone.

ii. **Electronic Clearing System (ECS):**
The Electronic Clearing System is a creative provision for occupied individuals. With this provision, an individual's credit card bill is consequently charged from the same individual's savings bank account, so one doesn't have to stress over missed or late payments.

iii. **Smart Cards:**
A smart card is a card that stores data on a microchip or memory chip or a microprocessor in lieu of the magnetic stripe found on debit cards and credit cards. Smart cards are not utilised for transferring or moving monetary data alone, but also they can be utilised for an assortment of identification grounds. Exchanges made with smart cards are scrambled or encrypted to shield the exchange of data from one party to another. Each encoded exchange can't be hacked and doesn't transmit any extra data past what's required for finishing the single exchange or transaction.

iv. **Electronic Data Interchange (EDI):**
Electronic Data Interchange is a digital mode of fund transfer across businesses.
EDI is a standard electronic format that tends to replace company paperwork like purchase orders and invoices hence reducing manual processing errors. In this way, it helps reduce transaction costs across a supply chain.

v. **ATMs:**
Do you have to withdraw or deposit cash urgently? Automatic Teller Machines (ATM) allow you to do so seamlessly in just seconds. ATMs were the first form of digital banking that was introduced. Enter your card/account details, enter the amount to be withdrawn, enter your ATM PIN and there you go!

vi. **Electronic Fund Transfer (EFT):**
Electronic Fund Transfer is a digital way of transferring funds.
While you transact online, there are a number of modes of payment you can opt for. National Electronics Fund Transfer (NEFT), Immediate Payment Service (IMPS) and Real-Time Gross Settlement (RTGS).

vii. **Electronic Fund Transfers (ETFs):**
Electronic fund transfer (EFT) is the electronic exchange of cash starting with an individual account in the bank to another individual account of the same bank, or within or with other financial institutions or with multiple institutions, by means of personal computers based frameworks, without the immediate intercession of bank staff.

viii. **Telephone Banking:**
Telephone banking is an assistance given by a bank or other monetary foundation or other financial institutions that empower clients to perform via telephone a scope of monetary exchanges which don't include cash or financial instruments, without the need to visit an ATM or a bank branch.

ix. **Internet Banking:**
Web-based banking is an assistance presented by banks that permits account holders to get their record information by means of the web or the internet. Web-based banking or Internet banking is otherwise called "Web banking" or "Online banking." Internet banking through customary banks empowers clients to play out every standard exchange, for example, bill payments, balance requests, stop-payment

requests, and balance inquiries. Some banks even proposition online credit card and loan applications. Account data can be acquired day or night, and should be possible from any place.

x. **Home Banking:**
Home banking is the most common way of concluding the monetary exchange from one's own home as opposed to using a bank's branch. It incorporates making account requests, moving cash, covering bills, applying for credits, and directing deposits.

7.11 SIGNIFICANCE OF E-BANKING :

The significance of banking is defined as under:

i. Importance to clients:

a) **Lower cost per exchange:** Since the client doesn't need to visit the branch for each exchange, it saves him both time and cash.
b) **No topographical hindrances:** In conventional financial frameworks, geological distances could hamper specific financial exchanges. Nonetheless, with e-banking, geological obstructions are diminished.
c) **Convenience:** A client can get to his record or bank account and execute from any place at any time.

ii. Importance to Businesses:

a) **Better Efficiency:** Electronic banking further develops usefulness. It permits the computerisation of ordinary, regularly scheduled payments and provides further banking activities to upgrade the efficiency of the business.
b) **Lower Costs:** Usually, costs in financial relationships and connections depend on the assets used. Assuming that a specific business needs more help with deposits, wire transfers, and so on, then, at that point, the bank charges its higher expenses. With internet banking, these costs are limited.
c) **Lesser Errors:** Electronic financial diminishes mistakes in normal financial exchanges. Awful penmanship, mixed-up data or information, and so on can cause mistakes that can be exorbitant. Likewise, a simple audit of the record or account activity, movement upgrades the precision of monetary exchanges.
d) **Diminished Misrepresentation:** Electronic banking gives an advanced impression to all representatives who reserve the privilege to alter banking exercises. In this manner, the business has better perceivability into its exchanges, making it hard for any fraudsters from committing crimes.
e) **Account Reviews:** Business proprietors and assigned staff individuals can get to the records rapidly utilising a web-based financial interface. This permits them to audit the record action and, furthermore, guarantee the smooth working of the account.

iii. Importance to Banks:

a) **Lesser Exchange Costs:** Electronic exchanges are the least expensive methods of exchange.
b) **A Decreased Edge for Human Blunder:** Since the data is handed-off electronically, there is no space for human mistakes or errors.
c) **Lesser Desk Work:** Advanced records decrease desk work, paperwork, and make the cycle simpler to deal with. Likewise, it is ecological.
d) **Decreased Fixed Expenses:** A lesser requirement for branches which converts into a lower fixed expense.

e) **More Steadfast Clients:** Since e-banking administrations or services are convenient to the clients, banks experience higher reliability from their client.

7.12 BENEFITS OF E-BANKING:

Customers	Businesses	Banks
No hassle of bank visits saves customers a lot of time and energy.	Lower transaction charges in comparison to bank transfers.	Electronic exchanges are the least expensive form of exchanges
Customers also face no geological obstacles. E-banking makes any kind of financial services and transactions very convenient	Manual processing errors will reduce since the financial operations of businesses are digital and automated.	E-banking allows lesser manual/desk work and even reduces the risk of human error since all financial operations are digital.
Customers find all financial services at their fingertips and can transact from anywhere and at any time 24x7x365	The efficiency of a business increases since most banking operations are digitals, hence saving a lot of time.	Since e-banking provides more convenience to customers, banks experience higher reliability from clients.

Table 7.2 Benefits of E-Banking

7.13 DEFERENCE BETWEEN E-BANKING VS E-COMMERCE :

E-Banking and e Commerce refer to electronic mode of doing business. This is the age of computers and internet and it is making its presence felt in all walks of life. Banking and trading have not remained aloof and have embraced advancements gleefully to make both banking and buying and selling easier, fast and more convenient for people. The difference between e banking and e commerce is self evident and is clear from the phrases. However, there are overlapping as e banking is often involved in many cases of e commerce.

i. **E-Banking:** E banking or online banking is nothing but allowing a customer to use internet to access his account anytime he wishes sitting in the comfort of his home or office or anywhere else. E banking, which started slowly has today become a need and also allows banks to cut down on expenditure involved with extra staff. Customers are happy as they are not required to go to the bank physically for various reasons and can conduct financial transactions even in the middle of night when the banks are closed. This has led to a revolution of sorts and has in fact given a boost to trade and commerce.
ii. **E-Commerce:** E commerce is the name given to trading activities that are conducted using the power of internet. E commerce is simply online transactions. Buying and selling of goods and services using money through internet. E commerce can be between businesses to businesses when it is called B2B or business to consumer when it is called B2C.

The biggest attraction of e banking and e commerce lies in the fact that they are fast, convenient, and money saving. Imagine going physically to your bank for trivial reasons but having to take your car and spending money and time in driving, parking and having to face traffic on road. All this time and money is saved when a customer avails e banking. Similarly, if there is a product that is not available in your city or area and you find it on a website and really need it, you can avail the facility of e commerce to pay for the product using online banking and getting it which otherwise would take a lot of time and money to reach to your doorstep if you use traditional means of paying.

7.14 CONCLUSION :

In the same way that technology has impacted other industries, it has also had a major impact on the banking sector. People's daily interactions and business practices are being transformed by the widespread adoption of digital technology. When it comes to digitisation and technology utilisation in the banking industry, both the epidemic and technological advancements have had a role in the process. According to the Reserve Bank of India's annual report for 2020-21, India's total digital transaction volume was around 4,371 crores in 2020-21, whereas it was 3,412 crores in 2019-20. Technology and digitalisation in banking have created a wide range of innovative and speedier solutions for clients' banking-related challenges.

7.15 KEYWORDS :

E-Commerce, E-Banking, Business-to-Business (B2B), Business-to-Consumer (B2C), Consumer-to-Consumer (C2C), Consumer-to-Business (C2B), Business-to-Administration (B2A) and Consumer-to-Administration (C2A).

7.16 SUGGESTED QUESTIONS :

1. Explain the types of technologies used in banking?
2. What is E-Commerce and explain types of E-Commerce?
3. What are the issues and challenges in E-Commerce?
4. What is E-Banking? and explain the services under E-Banking?
5. What are the benefits of E-Banking?

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LESSON - 8

CUSTOMER RELATIONSHIP MANAGEMENT IN BANKING

OBJECTIVES :

After reading this lesson, you will be able to understand:

- The basic concepts of CRM practices in banking industry
- Challenges of CRM in banking industry
- Benefits of CRM in banking industry
- The technological issues in CRM in banking industry

STRUCTURE :

8.1 INTRODUCTION :

The capital market line (CML) represents portfolios that optimally combine risk and return. It is a theoretical concept that represents all the portfolios that optimally combine the risk-free rate of return and the market portfolio of risky assets. Customer Relationship Management (CRM) is a process in which a business or other organization administers its interactions with customers, typically using data analysis to study large amounts of information. CRM (customer relationship management) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the customer lifecycle. The goal is to improve customer service relationships and assist with customer retention and drive sales growth

8.2 (CRM) – A CONCEPTUAL FRAMEWORK :

Customer relationship management (CRM) is a necessity in any customer-focused industry. For banks, it's an especially useful tool for meeting sales and marketing goals and exceeding customer expectations. CRM software is a tailored solution that helps banks implement customer-centric strategies. Customer relationship management (CRM) is a

technology for managing all your company's relationships and interactions with customers and potential customers. The goal is simple: Improve business relationships. A CRM system helps companies stay connected to customers, streamline processes, and improve profitability.

CRM is the strategy for building, managing and strengthening loyal and long-lasting customer relationships. CRM is a customer centric approach based on customer insight. Its ultimate objective is toward 'Personalised' handling of customers as distinct entities through the identification and understanding of their differentiated needs, preferences and behaviours.

According to Philip Kotler, CRM is the process of carefully managing detailed information about individual customers and all customer 'touch points' to maximise customer loyalty.
It can also be described as a business strategy comprised of process, organisational and technical change to better manage business around customer behaviours.

8.3 TYPES OF CRM :

Broadly, three types of CRM are adopted by banks:

i. **Operation CRM** – In this, CRM software packages are used to track and efficiently organize inbound and outbound interactions with customers including the management of marketing campaigns and call centers. Operational CRM supports frontline processes in sales, marketing and customer service, automating communications and interactions with the customers. They record contact history and store valuable customer information to ensure a consistent picture of customer's relationship with the bank that can be retrieved by staff as per requirement.

The major benefits of operational CRM to banks are:

(a) Sales Force Automation
(b) Customer Service and Support
(c) Enterprise Marketing Automation

ii. **Analytical CRM –** It is about analysing customer information to better address marketing and customer service objectives and deliver the right message to the right customer at the right time through the right channel. It involves the use of data analysis to extract knowledge for optimising customer relationships.

The major benefits of Analytical CRM to banks are:

(a) Customer Retention
(b) Fraud Detection
(c) Optimising marketing efforts as per customer life time value
(d) Credit Risk Analysis
(e) Segmentation and targeting
(f) Development of customised new products matching the specific preferences and priorities of customers.

iii. **Collaborative CRM** – These involve systems facilitating customers to perform services on their own through a variety of communication and interactive channels. It brings

people process and data together and enables channelling of data and information appropriately to bank staff for proactive decision making and enhanced informed customer service and support activities. It provides a means of information sharing to all concerned in timely manner and includes customer as a creator of service.

The major benefits of collaborative CRM to banks are:

(a) Providing efficient customer communication across a variety of channels
(b) Online services to reduce customer service costs
(c) Providing access to customer data while interacting with customers.

8.4 CRM IN THE BANKING INDUSTRY:

In the banking industry, one of the biggest business challenges is understanding customers' demands and meeting clients' expectations. Banks should not only focus on providing valuable services to the customers, but also focusing on maintaining a long and good relationship with their clients.

CRM in the banking sector allows banking organizations to build a customer-focused business framework to understand the customer's needs and demands and, more importantly, meet them with your banking and financial services. Just like any organization's success, high customer satisfaction and retention are critical for a bank's success in today's competitive market scenario. According to a study by Reichheld and Sasser, banking businesses can observe an improvement in the profit margins by up to 35%, just from the 5% growth in customer retention rate.

Unlike personal banking, it's more difficult for business bankers to offer current account services or business lending. You require more in-depth knowledge of the client's business, niche, market situation, and tailor-made solutions to offer good financial advice and onboard a business client. This is why CRM has become more crucial than ever before in the highly competitive banking industry, where you need a customer-centric approach to manage customers, understand their expectations and offer personalized solutions and win more clients and retain them.

Customer relationship management (CRM) is a necessity in any customer-focused industry. For banks, it's an especially useful tool for meeting sales and marketing goals and exceeding customer expectations.

CRM software is a tailored solution that helps banks implements customer-centric strategies.
Less than one system, bank tellers and employees can:

i. Store customer data such as contact information, products used, and interactions.
ii. Schedule appointments, send personalized emails, and respond to social media posts.
iii. Update customer profiles in real time with notes or new information.
iv. Visualize, nurture, and manage leads in their sales pipeline.
v. Create reports that analyze customer behavior, marketing campaign performance, and more.

8.5 CHALLENGES OF CRM IN THE BANKING INDUSTRY :

Just like any other business, banks face several challenges when looking to adopt CRM software.

i. **Data Security :**
The banking industry is very sensitive to data security and aims to deliver an extra level of control over access to their records. Besides their clients' personal information and account records, the entire banking system should be well protected against cyber-attacks and malicious software. Modern CRM platform providers are well aware of these concerns and provide excellent security measures, from role-based access permission to encrypted transactions and data backups, to ensure high level of information security.

ii. **Integration with the Existing Tech Stack :**
Pretty much every financial and banking organization has a legacy IT infrastructure and tech stack that might be complicated to interfere with. Most of the outdated software wasn't built to work together with the modern CRM systems. It means that any bank can face the problem of integrating new solutions with the existing ones without any data loss and system failures. The good news is CRM specialists such as OMI can help you seamlessly integrate a CRM system of your choice into your company's infrastructure and make sure the new solution works perfectly.

So when does the banking industry need to consider CRM adoption? The answer is pretty simple – ASAP, because lack of data visibility provided by CRM can cost your organization loses in clients and profits. Moreover, lack of customer-related information doesn't allow you to thoroughly analyze your customers' behaviour and provide them with the quality of services they seek.

8.6 STEPS IN THE CRM PROCESS :

The process steps are also a collaborative effort among a Bank's sales, marketing, and support departments. Below are the said CRM steps, how teams work together in every stage, and how a CRM system helps you achieve each step.

i. Generate Brand Awareness :

The first step in the CRM business process is to make potential customers aware of your products and services through different marketing channels like social media and advertisements. The marketing team begins this task by researching your target audience's demographics, purchasing behaviour, interests, and preferences.
As part of the CRM development process, the team creates customer personas to segment the audience into groups. Then, you can launch marketing campaigns tailored to your target audience's interests. Knowing your customer demographics and creating their persona helps you create effective marketing messages that resonate with your customer base.

ii. Acquire Leads :

After introducing bank's brand to potential customers, the second step is generating leads. The sales or marketing team (or both) engages with your target audience via available communication channels.

For example, the marketing team could use the sign-up form on your website to encourage visitors to subscribe to newsletters. The sales team can use your CRM's live chat function to respond to visitors and request their contact information. CRM platforms like Zoho CRM have lead generation and enrichment tools to help you pull important information like addresses and employment history from your site visitors. This makes it easier to personalize prospect outreach.

iii. Convert Leads into Customers :

Once you have captured the attention and interest of your prospects, the next step is to convert them into paying customers. To do this, you can combine content marketing and marketing automation. The CRM analyzes and captures contacts and leads' interaction with these activities. Then, the sales team gauges lead interest and builds further trust with them until they decide to make a purchase.

Lead conversion varies based on the offering of a business. For example, a lead conversion tactic for a retail business might involve sending a series of promotional marketing emails to encourage potential customers to buy. Meanwhile, a lead for a high-value service, such as real estate, will include more complex business and CRM procedures. These could cover sending and revising proposals, contract and cost negotiations, and multiple follow-up conversations before a purchasing decision is made.

iv. Nurture Leads :

Nurturing leads is crucial in building customer loyalty, wherein customers keep coming back to you and making repeat purchases. One of the most effective ways to nurture customers is through email marketing, where you continuously share relevant content based on their preferences. This is where email marketing list segmentation plays an essential role because you shouldn't utilize a one-size-fits-all approach since your customers have diverse preferences.

Therefore, build various email marketing distribution channels based on factors such as past purchase history, demographics, and pages visited on your site. HubSpot CRM offers free email marketing tools for building personalized marketing emails using its drag-and-drop email editor. You can also choose from dozens of free email templates on its marketplace. Our HubSpot review provides more insight into the platform's nurturing tools.

v. Provide Quality Customer Support :

The customer relationship management process does not end when a customer makes a purchase. Your business must retain customers to grow—and this is where your support team comes in. Excellent customer service keeps clients coming back for your products or services. Ensure you deliver superior service, preferably via various communication channels (live chat, email, and phone) whenever your customers need it.

Leverage your CRM's help desk and service system to understand your customer's user experience after they make a purchase. Getting honest feedback from them is important to understand the changes you need to make to improve their experience.

For example, with Fresh sales, you can integrate live chat software like Fresh chat for centralized management of customer service needs. This integration allows your team to immediately respond to customer complaints from within the CRM as soon as they crop up.

vi. Drive Up sells & Cross-sells :

Once you've built and established your customer database, the goal is to introduce repeat buyers to your other products or services. To do this, you use up selling and cross-selling strategies. Up selling is a sales strategy used to convince existing customers to buy additional products or upgrades related to their original purchase. One example of this is offering warranties in addition to a gadget and letting customers know another product offers more features than the one they chose.

Meanwhile, cross-selling is a sales strategy for obtaining more value from a deal or sales transaction. It involves suggesting additional products or services complementing an existing purchase so you can generate more revenue from one deal from customers already in the buying mindset. For instance, cross-selling works when a product is paired with a service, such as purchasing a laptop sleeve after buying an actual laptop.

Use a customer relationship management platform to organize bank's customer list according to transaction history and send custom email templates about relevant products for each group. You can also set reminders for regular check-in calls with repeat customers. This is your chance to ask them for feedback about your product or service and how they think you can improve their experience.

8.7 BENEFITS OF CRM IN THE BANKING SECTOR :

Both customers and banking organizations can benefit from using CRM. The first ones get more personalized high-quality services, while the second ones get better control of their operations and can deliver this type of service. Here are the main benefits the banking sector can gain from using CRM systems:

Fig 8.1: Benefits of CRM in Banking Industry

i. Get and Qualify More Leads :

CRM system helps you to reach out to your leads as quickly as possible to either help them with their challenges or understand that your service is not what they are looking for. As a result, the lead qualification process is sped up and your sales department can focus on converting leads into actual sales.

i. Build Strong Relationships with Clients :
Launch marketing campaigns, streamline communication, and provide a personalized approach to increase your customers' satisfaction rates and make them get what they need and when they need it. Your clients will appreciate your care and attention.

ii. Improve Staff's Productivity :
CRMs help to streamline processes across various departments, as well as to eliminate repetitive tasks and let your staff focus more on clients and improve their performance.

iii. Get Valuable Insights :
The system analyzes data on your customers' behaviour such as chosen types of credit and debit cards, number of transactions, type of transactions, etc. This data can be later used by your sales and marketing departments to improve your services.

iv. Drive New Business Opportunities :
Every industry needs to keep up with the constantly changing economy and market demands. Analyzed customers' data can be used to introduce new solutions to fulfil your clients' needs. As a result, your business credibility, loyalty, and awareness increase letting potential customers know that they can trust your organization.

v. Use insights to Improve Sales and Marketing Efforts :
The data in your CRM can be compiled into reports so you can gain a much deeper understanding of your customers. From there, you can identify trends, successful campaigns, and areas for improvement that will help you anticipate customer needs and tailor your future marketing efforts. You can also use the data in your customer profiles to pinpoint areas for cross-selling and up selling. For example, if a customer makes a deposit inside the bank, the teller can have a full view of their profile and notify the customer of new products they may be interested in or qualify for, such as a platinum credit card.

vi. Make Bank's Staff More Productive :
With all customer information available under one CRM system, there's no need for employees to search through emails or check multiple platforms for the answer to a quick question. Repetitive administrative tasks are eliminated so employees spend less time scrounging through data and more time fostering client relationships. According to Nucleus Research, sales representatives saw a productivity increase of 26.4 percent when social networking and mobile capabilities were utilized in their CRM. Users can also access a CRM from any device, such as a laptop, desktop, or smart phone, meaning there's no limitation to where and when data can be viewed.

8.8 TEN BEST CRM TECHNOLOGIES FOR BANKING :

i. Monday Sales CRM:
Recently voted a G2 top sales product for 2023, Monday sales CRM is *the* CRM software your banking team needs to close deals faster. Gain visibility into the entire sales process from lead to close and easily communicate with your team all in one place. Plus, with a host of different board views, individuals can visualize data and activities in a way that suits them best.

ii. Sales force Sales Cloud:

Sales Cloud is Sales force's fully customizable CRM module for sales, marketing, and support, catering for both B2B and B2C sales markets. In this module, you will find Leads, Accounts, Contacts, Contracts, Opportunities, Products, and Campaigns, to name a few. This module will take you from the start of your sales process to the end of it, to help you grow your bottom line.

iii. Sugar CRM:

Sugar CRM is a software platform that holds customer experience as its number one priority. The platform uses artificial intelligence and historical data from each and every customer to provide your reps with actionable insights for managing their customer relationships.

iv. Creatio:

Previously known as Bpm'online, Creatio is a low-code platform for both CRM and business process management (BPM). BPM is an operations management discipline that involves modelling, analyzing, improving, optimizing, and automating business processes.

v. Microsoft Dynamics 365:

A powerful CRM for financial institutions, Microsoft Dynamics 365 is also one of the most widely used CRMs. That's because Microsoft Dynamics 365 is actually a suite of products, going one step further than traditional CRMs and incorporating a number of ERP (enterprise resource planning) products with powerful analytics.

vi. Vymo:

Vymo is a sales engagement platform for financial institutions. It aims to be a mobile-first CRM which helps businesses to close more sales. You can use Vymo in a couple of ways. You can either use it as a standalone lead management solution or integrate it into Sales force.

vii. 360 view:

Similar to Vymo, 360view is also a CRM platform specifically for banks and credit unions. As the name suggests, its main benefit is to provide a 360-degree view of relationships, products, services, and more. You can track unlimited relationship types, such as vendors, customers, and employees. It also can track loans past due and provides robust reporting.

viii. Hub Spot:

At the heart of HubSpot is a CRM platform that allows you to keep track of leads and customers at different stages in their journey. Through the CRM you can manage contacts, sales, pipeline, digital marketing, and lead nurture – and create a single customer view – which is one of HubSpot's greatest strengths.

ix. Nextiva:

Nextiva's key selling point is how it allows you to measure, analyze, and customize the customer journey in real time. You can take a closer look at how every touch point impacts the customer experience score, and gain insights to improve the sales process and customer service.

x. Oracle NetSuite:
Oracle NetSuite is a cloud-based solution that delivers a real-time, 360-degree view of your customers. NetSuite provides a seamless flow of information across the entire customer lifecycle – from lead all the way through to opportunity, sales order, fulfilment, and support.

8.9 TECHNOLOGICAL ISSUES IN CRM :

Some of the technological issues in CRM are as mentioned:

- **Misconception about Role of Technology:** Most officers perceive technology as a limited to record of information and transaction. The use of technology in further sophisticated information processing and dissemination is not done.

- **Lack of Integration:** There are multiple channels and multiple technologies in use simultaneously in customer interface, service and sales. The integration of this complex system of technologies is a challenge.

- **Empowerment to Frontline Staff:** Frontline staffs have customer profile and data. Most of them have no motivation to further process these and make full utilization of these to provide better services and proactive selling effort. They are neither trained to use customer analytics nor to customize the Banks offering.

- **Under Utilization:** the single integrated view of customer ,past transactions preferred mode of business are known, but no mechanism is in place to utilize this with aid of software like lead management and activity management for higher effectiveness in sales and service.

- **CRM Process Issues:** As CRM is an organization wide strategy the entire processes need to be aligned appropriately. Some important process issues are:

- **Change in Culture:** The CRM implementation demands a change in organizational culture in terms of vision, mission, philosophy, and shared values. This encompasses a fundamental change in the organizational practices and employee behavior.
- **Breaking the Silos:** CRM cannot succeed in Silo structure of departments. It demands integration and collaboration of all departments on a continuous basis. So, Breaking of silos prevalent in traditional organization structure is a challenge.
- **Change in Structure and Systems:** CRM success lies in ownership of CRM by all departments with Marketing in the strategic role of combining efforts in all these towards better customer service. This basic structural change from product centric organization to customer centric organization faces impediments in terms of role conflicts, ambiguity, resistance and attitudinal impediments.
- **Demand for more Pro-Activeness and Flexibility:** The former strict hierarchical and rigid structure has to be transformed to flexible, responsive and proactive structure. This demands top management support, proper training and efficient follow up systems. In addition to behavioral issues the full utilization of CRM benefits cannot be attained unless this is enabled.

8.10 HOW CRM HELPS THE BANKS :

A CRM solution can help banks digitize their services and improve the overall customer experience, streamline processes, increase efficiency, improve cross-selling and up selling, and enhance customer engagement.

The following are some of the ways how CRM can help banks:

CRM Increases Customer Retention: It enables banks to keep a track of their customers and know what they want. It helps in identifying the customers who are no longer satisfied with the bank and have left for other banks. Banks can then take the necessary steps to retain them.

- **It Helps in Driving Revenue Growth By Increasing Customer Retention and Cross-Sell Opportunities:** It induces customers to grow their business with the bank as well as increase their expenses on banking products and services. Also, it helps in increasing revenues by adding new products that the customers might need from the bank.
- **It Gives Better Insights Into Customer Behaviour and Preferences:** It helps in understanding the behavior of every customer, thereby making it easier for banks to give personalized service to their customers. They can then serve them better by providing packages according to their requirements and needs.
- **It Improves Customer Experience:** CRM improves the overall experience of customers by giving them quality service that they would love to experience again and again. Customers get what they want from banks when the bank understands them well enough through CRM. It makes communication easier between the bank staff and their clients, which ultimately improves the customer experience.
- **It Enables Banks To Enhance Revenue Generation Opportunities:** It helps banks in improving revenue generation opportunities by identifying new services that are required by new or existing customers, thereby generating more revenue for banks. Also, it enables banks to explore new business opportunities with existing as well as potential customers, thereby generating more revenue for banks. Since it enables banks to identify new services that are required by new or existing customers, it helps in generating more revenue for banks.

8.11 CONCLUSION :

Banks have been using CRM to improve their customer service and enhance customer satisfaction. It helps banks in understanding their customers better, thereby making it easier to give them the best of services. Users can also access a CRM from any device, such as a laptop, desktop, or smart phone, meaning there's no limitation to where and when data can be viewed. Pretty much every financial and banking organization has a legacy IT infrastructure and tech stack that might be complicated to interfere with. Most of the outdated software wasn't built to work together with the modern CRM systems.

8.12 KEYWORDS :

Customers Relationship Management (CRM), Drive Upsells and Cross-sells,
Productivity, business opportunity and technology

8.13 SUGGESTED QUESTIONS :

1. What is Customer Relationship Management (CRM) and explain its uses?
2. Explain how CRM is used in banking industry?
3. Explain Ten Best CRM Technologies for Banking?
4. Explain some of the Technological Issues in CRM in Banking Industry?

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LESSON - 9

INTEGRATED COMMUNICATION NETWORK FOR BANKS

OBJECTIVES :

After reading this lesson, you will be able to understand:

- The integrated communication network for banks.
- The various types of communication networks used in banking industry
- Describe abut Network Convergence
- The advantages and disadvantages of integrated network in banking
- Various integrated networks like WAP,VPN and Multimedia Systems in banking

STRUCTURE :

9.1 INTEGRATED COMMUNICATION NETWORK FOR BANKS SECURITY AND CONTROL SYSTEMS :

Banks are exposed to many risks in their activities relating to management of funds on line banking services. Credit card and other e- banking products/services are also facing risks which are associated with the use of IT tools, channels, platforms. Banks should have a good and effective control system to handle IT related issues and risks.
Control system can be classified as:

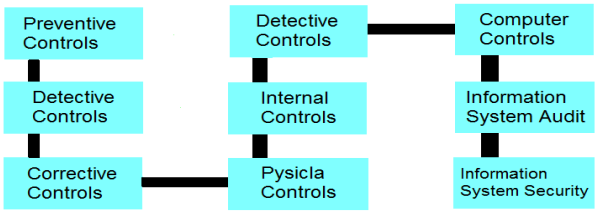

Fig: 1 **Network for Banks Security and Control Systems**

Types of Integrated Networks for banks :

The following are the integrated networks for banks:

- **Preventive Controls:** This type of control stops errors or irregularities. Good design/ screen lay out reduces or stops the errors at the time of coding data or entering data from source document.
- **Detective Controls:** Identification of errors or irregularities happens after they occur. For example: An input validation program identifies data input errors.
- **Corrective Controls:** These types of controls remove or reduce the effects of errors and irregularities after they have been identified. If any data is corrupted during transmission the communication software (with inbuilt control) may request for retransmission of information/data.
- **Physical Controls:** In computerized environment, the control of access is very important in view of the confidential and sensitive information/data which are being processed/stored at the data processing centre. Access Control assist the organization and users in restricting entry to authorized persons only to the computer room and also allowing access to computer media, computer components, data, documentation etc. Unauthorized persons should not be allowed to undertake repairs/ maintenance of computer hardware. Access to the computer system should be protected through pass word protection mechanism. Access to the computer system can be allowed by means of PIN, biometric methodology. Access control should be very strict and only authorized users, officers should be allowed inside the data centre, computer room and all others should be allowed to enter the data centre and computer rooms after recording in the access log.
- **Output controls:** Hard copies of all important reports generated should be preserved properly as per the bank's record maintenance policy. As part of disaster management, the computer room, data centres need to be checked for proper functioning of fire extinguishers, smoke detectors and other devices. Backup tapes and other data should be stored in off sites. Regular checks should be carried out to ensure that such back up CDs and other tools/data can be used in case of an emergency/contingency.
- **Internal Controls:** To ensure that the accounting data and other sensitive customer information are accurate and reliable and also to protect assets of the bank, a system of internal controls is built in the computerized systems. An effective and efficient internal control would assist the bank management to run the bank's operations in a better controlled environment. Accounting Controls may be in the form of (a) dual controls and authorizations (b) validation checks on data (c) other controls on access to the software applications. Some other controls include validation of each transaction against limits and balances, stop payments, post dated and stale dated cheques, etc.
- **Operational Controls:** Operational controls are embedded in software whereas access controls can be enforced by the system software and an application software at different levels. The operational controls are usually provided in the application software to ensure data integrity and processing. To ensure operational controls, some tools like audit trail, checksum and data encryption are used. Audit trail maintains a record of processes that update the data and information. Checksum is a number calculated on the basis of certain key information in the system. Checksum is generated to ensure data integrity stored in a computer file.

9.2 MODELS OF INTEGRATED COMMUNICATION NETWORKS FOR BANKS :

The following integrated communication network are used by banks…

Network convergence: combines support for multimedia, telephone, and data on a single network. Network convergence primarily serves large, complex organizations where mobile and Internet connections are regulated behind the same firewalls or sign-on credentials. With network convergence, registered users access their Internet, Ethernet, Wi-Fi, and mobile connections through a single network that supports everything from email, VoIP, and web browsing to text messaging.

Convergence in networking occurs when one network provider delivers networking services for voice, data, and video in a single network offering, instead of providing a separate network for each of these services. This allows a business to use one network from one provider for all communication and cloud-based services. It also allows businesses to balance bandwidth needs more easily among the services that use the network.

Types of Network Convergence :

One type of network convergence involves the convergence of communication services and systems, including Wi-Fi, Ethernet, mobile, and VoIP. This makes it possible for a company to use a single converged network from one telecommunications provider for all of these types of communications and services. And it means businesses that used to offer these services separately now have the opportunity to offer many more networking-based services over the same network.

Benefits of Network Convergence :

- **Consistent performance on the same network:** Network convergence allows all network services—voice, data, video—to be delivered over the same network with consistentperformance.

- **Universal security:** Network convergence also allows large corporate, government, and university IT departments to apply firewall rules, automated anti-virus and malware scanning, and other security measures, universally across all data connections.

Converged Network Challenges :

- **Many services across many devices:** Running all of a company's communications and cloud-based services over a converged network requires that IT teams carefully manage the dynamic bandwidth requirements of different services across many types of devices.
- **If a cybercriminal breaches security, greater risk:** If a cybercriminal is able to penetrate the security measures for a converged network, all parts of the network may potentially be vulnerable, not just one siloed area.
- **Constraint due to competing standards:** Legislation regulating different spectrum bandwidths or frequencies for specific technologies has historically constrained converged network solutions. Currently, there are competing standards for networking that organizations must adhere to. Fiber connections, broadband, DSL, Wi-Fi, Ethernet, WAN/SAN, vWAN/vSAN, SD-WAN, and mobile can all have different requirements for video, text, data, and voice transmissions.

9.3 WIRELESS APPLICATION PROTOCOL :

WAP stands for Wireless Application Protocol. It is a protocol designed for micro-browsers and it enables access to the internet in mobile devices. It uses the markup language WML (Wireless Markup Language and not HTML), WML is defined as an XML 1.0 application. It enables the creation of web applications for mobile devices. In 1998, WAP Forum was founded by Ericson, Motorola, Nokia and Unwired Planet whose aim was to standardize the various wireless technologies via protocols. WAP protocol resulted from the joint efforts of the various members of WAP Forum.

WAP Model :

The user opens the mini-browser in a mobile device. He selects a website that he wants to view. The mobile device sends the URL encoded request via network to a WAP gateway using WAP protocol.

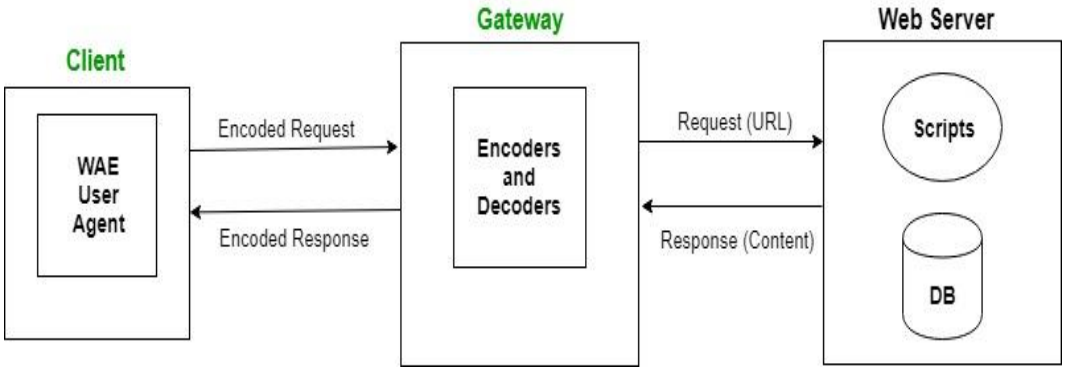

Fig: 2 WAP Model

The WAP gateway translates this WAP request into a conventional HTTP URL request and sends it over the internet. The request reaches to a specified web server and it processes the request just as it would have processed any other request and sends the response back to the mobile device through WAP gateway in WML file which can be seen in the micro-browser.

WAP Protocol stacks:

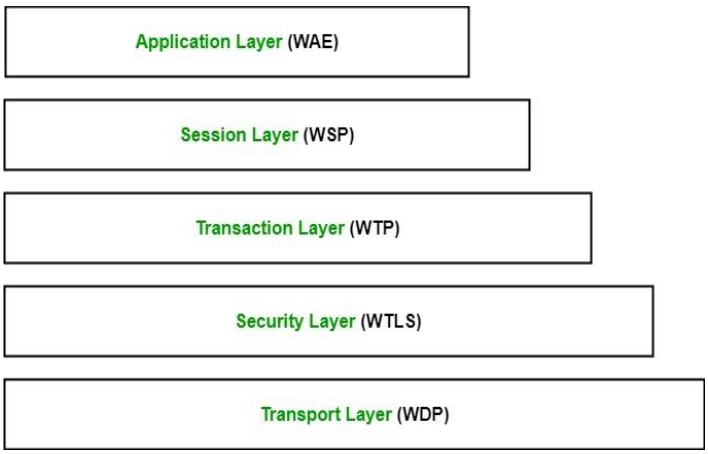

Fig: 3 WAP Protocol stacks:

1. **Application Layer:** This layer contains the Wireless Application Environment (WAE). It contains mobile device specifications and content development programming languages like WML.
2. **Session Layer:** This layer contains Wireless Session Protocol (WSP). It provides fast connection suspension and reconnection.
3. **Transaction Layer:** This layer contains Wireless Transaction Protocol (WTP). It runs on top of UDP (User Datagram Protocol) and is a part of TCP/IP and offers transaction support.
4. **Security Layer:** This layer contains Wireless Transport Layer Security (WTLS). It offers data integrity, privacy and authentication.
5. **Transport Layer:** This layer contains Wireless Datagram Protocol. It presents consistent data format to higher layers of WAP protocol stack.

Advantages of WAP?

The following advantages for wireless network operators, content producers, and end users were put out by WAP when it was first introduced in 1999:

- Operators of wireless networks and mobile phones: WAP was created with the intention of enhancing already-existing wireless data services, such as voicemail, and facilitating the creation of new mobile applications. Without making any further infrastructure adjustments or phone modifications, these applications might be created.
- Content Provider: For third-party application developers, WAP opened up a market for extra applications and mobile phone features. It was suggested that developers use the WML programming language to write applications for mobile devices.
- End users: Access to online services like banking, entertainment, messaging, and other information on mobile devices should be simple and safe for users of mobile phones. WAP could also permit access.

Advantages of Wireless Application Protocol :

The benefits of Wireless Application Protocol, or WAP, are listed below:

- WAP is a rapidly evolving technology.
- Wireless Application Protocol is an open source that is totally free of cost.
- WAP can be used over multiple platforms.
- Neither it nor network standards are affected.
- Higher controlling possibilities are offered.
- It follows a model that is similar to the Internet.
- You can send and receive real-time data with WAP.
- WAP is supported by the majority of current mobile phones and devices.

Disadvantages of Wireless Application Protocol :

The following is a list of various Wireless Application Protocol, or WAP, drawbacks:

- WAP connection speed is slow and number of connections is less.
- At some places it is very difficult to access the Internet, and also at some places it is totally impossible.
- Less secure.
- WAP provides a small User interface (UI).

9.4 VIRTUAL PRIVATE NETWORK :

A virtual private network, or VPN, is an encrypted connection over the Internet from a device to a network. The encrypted connection helps ensure that sensitive data is safely transmitted. It prevents unauthorized people from eavesdropping on the traffic and allows the user to conduct work remotely. VPN technology is widely used in corporate environments.

VPN Working Methodology :

A VPN hides your IP address by letting the network redirect it through a specially configured remote server run by a VPN host. This means that if you surf online with a VPN, the VPN server becomes the source of your data. This means you're Internet Service Provider (ISP) and other third parties cannot see which websites you visit or what data you send and receive online. A VPN works like a filter that turns all your data into "gibberish". Even if someone were to get their hands on your data, it would be useless.

What are the benefits of a VPN connection?

A VPN connection disguises your data traffic online and protects it from external access. Unencrypted data can be viewed by anyone who has network access and wants to see it. With a VPN, hackers and cyber criminals can't decipher this data.

- **Secure encryption:** To read the data, you need an *encryption key* . Without one, it would take millions of years for a computer to decipher the code in the event of a brute force attack. With the help of a VPN, your online activities are hidden even on public networks.
- **Disguising your whereabouts**: VPN servers essentially act as your proxies on the internet. Because the demographic location data comes from a server in another country, your actual location cannot be determined. In addition, most VPN services do not store logs of your activities. Some providers, on the other hand, record your behaviour, but do not pass this information on to third parties. This means that any potential record of your user behaviour remains permanently hidden.
- **Access to regional content:** Regional web content is not always accessible from everywhere. Services and websites often contain content that can only be accessed from certain parts of the world. Standard connections use local servers in the country to determine your location. This means that you cannot access content at home while travelling, and you cannot access international content from home. With VPN location spoofing**,** you can switch to a server to another country and effectively "change" your location.
- **Secure data transfer:** If you work remotely, you may need to access important files on your company's network. For security reasons, this kind of information requires a secure connection. To gain access to the network, a VPN connection is often required. VPN services connect to private servers and use encryption methods to reduce the risk of data leakage.

Functions of a good VPN :

Banks should rely on your VPN to perform one or more tasks. The VPN itself should also be protected against compromise. These are the features you should expect from a comprehensive VPN solution:

- **Encryption of your IP address:** The primary job of a VPN is to hide your IP address from your ISP and other third parties. This allows you to send and receive information online without the risk of anyone but you and the VPN provider seeing it.
- **Encryption of protocols:** A VPN should also prevent you from leaving traces, for example, in the form of your internet history, search history and cookies. The encryption of cookies is especially important because it prevents third parties from gaining access to confidential information such as personal data, financial information and other content on websites.
- **Kill switch:** If your VPN connection is suddenly interrupted, your secure connection will also be interrupted. A good VPN can detect this sudden downtime and terminate preselected programs, reducing the likelihood that data is compromised.
- **Two-factor authentication:** By using a variety of authentication methods, a strong VPN checks everyone who tries to log in. For example, you might be prompted to enter a password, after which a code is sent to your mobile device. This makes it difficult for uninvited third parties to access your secure connection.

Working of Virtual Private Network service work in banking :

Whenever you use the internet through an Internet Service Provider (ISP) or at another site, your computer is given an address on that provider's network. While you can reach your bank from the Internet, you will normally be denied access to services that are restricted to bank network addresses because your computer is using an address from an external network.

But, if you are on the internet, you can still connect to the Bank's VPN service, in two ways. From a web browser or with a software VPN client. A VPN need not have explicit security features, such as authentication or content encryption. Virtual Private Network setup, can be used to separate traffic of different user communities over an underlying network with strong security features. Seek secured private connectivity across public IP networks!

- Extends geographical connectivity
- Improves productivity
- Improves security
- Reduce transit time and transportation costs for remote users
- Reduce operational costs versus traditional WAN
- Simplify network topology
- Provides global networking opportunities
- Provides broadband networking compatibility
- Provides faster ROI than traditional WAN

Site to site Virtual Private Network in banking :

Such Site to site VPN allows you to have a secured connection between locations across the open internet. With the help if site to site VPN your bank can save a great deal of money, as you can use cheaper means always - on connections such as domestic broadband rather than expensive leased lines between sites.

Remote access VPN also known as Virtual Private Dial up(VPDN) is used by banks who have staff regularly working in locations outside the office. You can connect into the office

network over dial up phone/isdn lines or over broadband from anywhere. Virtual Private Network banking uses advanced encryption and tunneling to permit computers to establish secure, end-to-end, private network connections over insecure networks, such as the Internet or wireless networks. VPN services can impact your overall computing and network performance. VPNs exist to protect traffic on public data

9.5 MULTIMEDIA SYSTEMS :

A multimedia system is responsible for developing a multimedia application. A multimedia application is a bundle of different kinds of data. A multimedia computer system is one that can create, integrate, store, retrieve delete two or more types of media materials in digital form, such as audio, image, video, and text information.

Major characteristics or features of a Multimedia System:

Very High Processing Power: To deal with large amount of data, very high processing power is used.

- **File System:** File system must be efficient to meet the requirements of continuous media. These media files requires very high-disk bandwidth rates. Disks usually have low transfer rates and high latency rates. To satisfy the requirements for multimedia data, disk schedulers must reduce the latency time to ensure high bandwidth.
- **File formats that support multimedia:** Multimedia data consists of a variety of media formats or file representation including, JPEG, MPEG, AVI, MID, WAV, DOC, GIF, PNG, etc. AVI files can contain both audio and video data in a file container that allows synchronous audio-with-video playback. Like the DVD video format, AVI files support multiple streaming audio and video. Because of restrictions on the conversion from one format to the other, the use of the data in a specific format has been limited as well.
- **Input/ Output:** In multimedia applications, the input and output should be continuous and fast. Real-time recording as well as playback of data are common in most of the multimedia applications which need efficient I/O.
- **Operating System:** The operating system must provide a fast response time for interactive applications. High throughput for batch applications, and real-time scheduling,
- **Storage and Memory:** Multimedia systems require storage for large capacity objects such as video, audio, animation and images. Depending on the compression scheme and reliability video and audio require large amount of memory.
- **Network Support:** It includes internet, intranet, LAN, WAN, ATM, Mobile telephony and others. In recent years, there has been a tremendous growth of multimedia applications on the internet like streaming video, IP telephony, interactive games, teleconferencing, virtual world, distance learning and so on. These multimedia networking applications are referred as continuous-media applications and require high communication latency. Communication Latency is the time it takes for a data packet to be received by the remote computer.
- **Software Tools:** For the development of multimedia applications, the various software tools like programming languages, graphics software's, multimedia editing software's scripting languages: authoring tools, design software's etc are required.

In addition to these the device drivers are required for interfacing the multimedia peripherals.

Types of Multimedia Systems :

Multimedia can be defined as any application that combines text with graphics, animation, audio, video, and/or virtual reality. A computer system is a combination of equipment (hardware), processes and programs (software), and people organized to perform a function. Combining these definitions, a business multimedia system includes equipment, programs, and people organized for the purposes of communication, data storage and retrieval systems (multimedia databases and electronic filing systems), information security, and Internet use (Web pages and electronic-business applications).

Within organizations, multimedia systems are used in all forms of information systems from transaction processing systems to executive decision support systems. These systems also can be found across industries such as accounting, banking, communications, education, entertainment, insurance, manufacturing, medical, retailing, and real estate. Anywhere there is a need for combining text, pictures, sounds, and animation, multimedia systems are found.

Multimedia systems are used for security to keep intruders out of a system and for the protection of stored documents. Scanning devices are available to scan potential user's eyes (retina imaging) or thumb prints to gain access to a computer or site. Other systems can scan a person's signature or capture voice pattern recognition for the same purposes. Stored text, pictures, original document images, sound files, and video files can be protected through encryption methods, read/write protection, password management, and copyright protection that keep intruders from copying or accessing sensitive files.

Analog Systems :
Analog multimedia systems use books, documents, films, photographs, records, tapes, videotapes, and many other forms of media to store text, sounds, and pictures. As technology improves, converting from one medium to another and combining different media formats becomes difficult and cumbersome.

Analog systems are being replaced with systems that digitize the original documents and store them on digital media; nevertheless, analog systems still remain vital for legal, historical, and research purposes. Many new companies have come into existence for the sole purpose of converting analog media into digital formats.

Computer-Based Multimedia :

Technological advances have changed the hardware and software used for developing multimedia from the traditional analog equipment to computer-based or digital multimedia systems. Computers use 0s and 1s to store and process sounds, still graphics (pictures), and motion video. Text scanning, digital imaging (using digital cameras and scanners), sound cards, and analog video-capturing devices sample, compress, and convert analog media into a series of 0s and 1s (digital) signals for processing by a computer. Once analog media are converted to a digital format, a computer can be used to manipulate the various media. With the development of digital-video cameras and digital-still cameras, media are already in a form that the computer can process, making it easier to merge text, graphics, video, sounds, and animation into an application.

Multimedia hierarchy is a term that reflects how much computing power is needed to process information. Multimedia systems have different levels of components that handle tasks ranging in difficulty from simple text processing to complex digital-motion video. As more powerful computers are developed, more applications can be used by businesses.

Text Processing :

Text is the first and simplest level in the multimedia hierarchy. Traditionally, text has been keyed directly into the computer. Scanners equipped with optical character recognition software allow text to be scanned into a computer from printed documents or from Universal Product Codes on products, using wand or handheld scanners.

More complex text input involves voice pattern recognition systems that convert voice to text. These applications find their way into legal, health-care, and other industries and businesses that process vast amounts of text. Text-to-voice systems reverse this process and allow text to be read to the user.

Sound Processing :

Sound in multimedia applications enables a user to describe products, give instructions, enhance a presentation, or provide cues for some action by the viewer. Hardware for capturing and processing sounds includes a card attached to the main motherboard of the computer system.

Sound cards capture analog audio signals from microphones, music compact disks, musical instrument digital interface (MIDI; such as electronic-piano keyboards) devices, and other sound sources through a line-in jack on the card. Computer users can plug in record turntables, cassette tape players, or any other analog device from an audio-out jack on those devices and record sounds. Sound cards also have output jacks for speakers, or the audio-out can be plugged into other sound recording devices. The card contains two computer chips called the AD (analog to digital) and DA (digital to analog) chips. These chips convert sound waves to digits and digits to sound waves.

Still-Image Processing :

Various specialized forms of multimedia include image processing systems designed specifically for handling business forms, images, graphics, or pictures. An example may be found in banking systems that use computer-output microform devices to store images of checks and place several check images on the customer's bank statement or display them on an Internet banking page, rather than returning the cancelled checks. Insurance companies use imaging systems to scan insurance applications, claim forms, and pictures of damages to customers' property. The imaging systems provide immediate access to all information stored in a computer for processing of a claim. In transaction-processing systems, companies can digitize customer signatures on sales slips and store the original sales documents for proof of purchase using point-of-sale devices. Other "turnaround documents" may be generated by a computer and scanned into a computer to verify a purchase at a merchandise pickup point.

Scanners and digital cameras can also be used in image processing to capture pictures for printed publications, Internet Web sites, and electronic presentations. A scanner or digital camera can digitize a picture by converting dark and light areas of a graphic to dots or pixels using a charge-coupled device. File sizes can be reduced by saving graphics using compression/decompression (codec) systems such as JPEG (Joint Photographic Experts

Group) compression methods. Single images can also be "captured" with a video-capture board from videotape, from a video camera, or directly from broadcast television. In both cases, a file is then saved in computer format for future use.

Photographic editing software lets users add special effects and edit photos or images. Draw and paint computer programs generate graphics and tables for multimedia applications. These programs allow users to draw objects, fill them with colours, and add text and special effects. The user-made images are saved in files and are then incorporated into a multimedia application.

Full-Motion Video Processing :

In the early twenty-first century, broadcast television and videotapes record moving pictures by using 30 still pictures or frames for every second of motion. Broadcasts and videotapes use a standard developed in the 1950s in the United States, the National Television Standards Committee broadcast standard. Other countries use 25 frames per second and have different image-aspect ratios (ratio of height to width). At the start of the twenty-first century, the high-definition and digital television broadcasting being introduced will change the standards; pictures will have better quality because of an increase in the number of pixels and a change in the aspect ratio of the picture.

More expensive tuner and capture cards on computers allow for "full-motion" capture by saving all of the frames and sound. Because these files become very large (640 × 480 pixels per frame times 30 frames per second—over 9 million characters for 1 second), several methods have been developed for compressing motion video files. Video is compressed to save it as a smaller file and is decompressed during playback. Several codec systems use hardware including computer chips and software such as MPEG (Motion Picture Experts Group). Since video files are large, they are usually brief recordings or clips from video. The clips are used in business presentations, on Web pages, as product descriptions, or as other media bytes to emphasize an important point in a short time. Advances in storage capacity and speed of newer storage media will eventually allow for smoother and longer clips. Video streaming from Web sites stores large video clips on the host Web site and allows the video to "stream" in smaller segments to the Internet user.

Animation and Virtual Reality :

The most sophisticated forms of multimedia are animation and virtual reality. These systems combine still graphics, video, sound, and animation to form virtual-reality outcomes. Industries using this technology include entertainment, education and training, legal, architecture and construction, government, and transportation. Animated (anime) movies and computer games have become popular and require all of the multimedia formats for development.

Working with virtual reality requires powerful computers and software to collect, edit, and produce the product or title or presentation. Some examples include computer games, computer-assisted design, home improvement software that allows users to design and display a proposed project in 3-D, flight simulators, and simulation of a crash for accident investigation.

9.6 CONCLUSION :

The communication system of a modern bank implies the use of forms of the current and potential clients' information and stimulation, which present the banking institution, its products/ services so that they cause favorable changes in their consumption mentality and habits; on the other side, also the establishment of an effective communication with its own employees, shareholders, with other banks and financial institutions should be taken into account. Communication is the most visible, sometimes disturbingly visible element of marketing mixing, but its value is limited in the event that it is not used intelligently, in complete correlation with the other components – product/service, price and distribution. By communication, the marketing specialists inform the current and potential clients on the benefits that a product/service brings, about the price and other costs, about the channels through which a service is delivered and where and when it is valid.

9.7 KEYWORDS :

Communication network, network convergence, Virtual Private Network and wireless application protocol Multimedia.

9.8 SELF ASSESSMENT QUESTIONS :

1. Discuss various technologies supporting convergence?
2. Discuss various applications of convergence?
3. Explain WAP architecture?
4. Explain WAP architecture?
5. Explain the role of VPN in financial sector?

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LESSON - 10

COMPUTER SECURITY AND DISASTER MANAGEMENT SYSTEM

OBJECTIVES:

After reading this lesson, you will be able to understand:

- The Computer Security and Disaster Management
- Various Computer Security Areas and Types
- The Disaster Management/Disaster Recovery Plan
- The System Audit and Computer Crime
- To Discuss The Types of Cyber Crimes And Main Offences of Computer Misuse Act

STRUCTURE :

10.1 INTRODUCTION :

Computer security refers to protecting and securing computers and their related data, networks, software, hardware from unauthorized access, misuse, theft, information loss, and other security issues. The Internet has made our lives easier and has provided us with lots of advantages but it has also put our system's security at risk of being infected by a virus, of being hacked, information theft, damage to the system, and much more.

Technology is growing day by day and the entire world is in its grasp. We cannot imagine even a day without electronic devices around us. With the use of this growing

technology, invaders, hackers and thieves are trying to harm our computer's security for monetary gains, recognition purposes, ransom demands, bullying others, invading into other businesses, organizations, etc. In order to protect our system from all these risks, computer security is important.

Computer security can be defined as controls that are put in place to provide confidentiality, integrity, and availability for all components of computer systems. Let's elaborate the definition.

The CIA Triad :
Computer security is mainly concerned with three main areas:

Fig:1 The CIA Triad

i. Confidentiality is ensuring that information is available only to the intended audience
ii. Integrity is protecting information from being modified by unauthorized parties
iii. Availability is protecting information from being modified by unauthorized parties

10.2 COMPUTER SECURITY THREATS :

Computer security threats are possible dangers that can possibly hamper the normal functioning of your computer. In the present age, cyber threats are constantly increasing as the world is going digital. The most harmful types of computer security are:

Viruses :

Fig:2 Viruses

A computer virus is a malicious program which is loaded into the user's computer without user's knowledge. It replicates itself and infects the files and programs on the user's PC. The ultimate goal of a virus is to ensure that the victim's computer will never be able to operate properly or even at all.

Computer Worm :

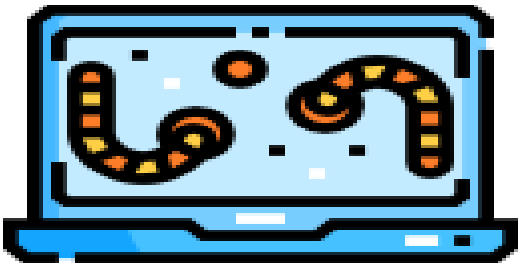

Fig:3 Computer Worm

A computer worm is a software program that can copy itself from one computer to another, without human interaction. The potential risk here is that it will use up your computer hard disk space because a worm can replicate in greate volume and with great speed.

Phishing :

Fig: 4 Phishing

Disguising as a trustworthy person or business, phishers attempt to steal sensitive financial or personal information through fraudulent email or instant messages. Phishing in unfortunately very easy to execute. You are deluded into thinking it's the legitimate mail and you may enter your personal information.

Botnet :

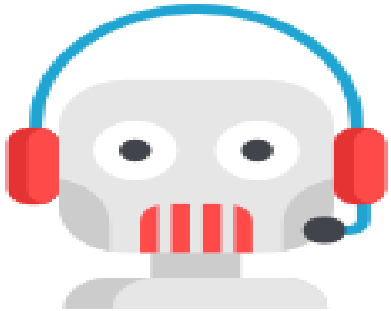

Fig: 5 Botnet

A botnet is a group of computers connected to the internet that have been compromised by a hacker using a computer virus. An individual computer is called 'zombie computer'. The

result of this threat is the victim's computer, which is the bot will be used for malicious activities and for a larger scale attack like DDoS.

A rootkit is a computer program designed to provide continued privileged access to a computer while actively hiding its presence. Once a rootkit has been installed, the controller of the rootkit will be able to remotely execute files and change system configurations on the host machine.

Keylogger :

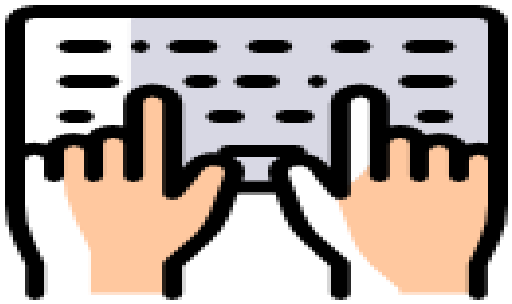

Fig:6 Keylogger

Also known as a keystroke logger, key loggers can track the real-time activity of a user on his computer. It keeps a record of all the keystrokes made by user keyboard. Key logger is also a very powerful threat to steal people's login credential such as username and password.

These are perhaps the most common security threats that you'll come across. Apart from these, there are others like spyware, wabbits, scareware, bluesnarfing and many more. Fortunately, there are ways to protect computer against these attacks.

10.3 TYPES OF COMPUTER SECURITY :

Computer security can be classified into four types :

- **Cyber Security:** Cyber security means securing our computers, electronic devices, networks, programs, systems from cyber attacks. Cyber attacks are those attacks that happen when our system is connected to the Internet.
- **Information Security:** Information security means protecting our system's information from theft, illegal use and piracy from unauthorized use. Information security has mainly three objectives: confidentiality, integrity, and availability of information.
- **Application Security:** Application security means securing our applications and data so that they don't get hacked and also the databases of the applications remain safe and private to the owner itself so that user's data remains confidential.
- **Network Security:** Network security means securing a network and protecting the user's information about who is connected through that network. Over the network hackers steal, the packets of data through sniffing and spoofing attacks, man in the middle attack, war driving, etc, and misuse the data for their benefits.

10.4 IMPORTANCE OF COMPUTER SECURITY :

Cybercrime is incredibly common — according to the Cyber security & Infrastructure Security Agency (CISA), 1 in 3 homes in the United States has a computer infected with malware and 600,000 Face book accounts are hacked every single day. Many of these breaches could have been avoided with proper security practices.

Computer security protects individuals and organizations against cyber threats and the loss of important data. Becoming the target of a cybercriminal can be incredibly damaging and disruptive to daily activities, whether personal or professional. So, why is computer security so important? Because understanding the basics of computer security can help you avoid headaches and keep your data safe from others. Having your identity stolen or your accounts compromised can involve hours lost with account recovery — as well as significant financial losses.

Computer security is also an important component of computer infrastructure in an enterprise setting. Cyber security specialists are becoming increasingly important for organizations across the globe to protect their business infrastructure from outside threats. Becoming an expert in computer security can lead to a lucrative, exciting career.

10.5 TYPES OF CYBER ATTACK :

Finance businesses handle and manage large amounts of financial data, making them prime targets for cybercriminals. According to the Financial Stability Board, a serious cyber incident could destabilize financial systems, impacting critical infrastructure and the economy.

- **Denial of Service Attack or DOS:** A denial of service attack is a kind of cyber attack in which the attackers disrupt the services of the particular network by sending infinite requests and temporary or permanently making the network or machine resources unavailable to the intended audience.
- **Backdoor:** In a backdoor attack, malware, Trojan horse or virus gets installed in our system and start affecting it's security along with the main file. Consider an example: suppose you are installing free software from a certain website on the Internet. Now, unknowingly, along with this software, a malicious file also gets installed, and as soon as you execute the installed software that file's malware gets affected and starts affecting your computer security. This is known as a backdoor.
- **Eaves dropping:** Eavesdropping refers to secretly listening to someone's talk without their permission or knowledge. Attackers try to steal, manipulate, modify, hack information or systems by passively listening to network communication, knowing passwords etc. A physical example would be, suppose if you are talking to another person of your organization and if a third person listens to your private talks then he/ she is said to eavesdrop on your conversation. Similarly, your conversation on the internet maybe eavesdropped by attackers listening to your private conversation by connecting to your network if it is insecure.
- **Phishing:** Phishing is pronounced as "fishing" and working functioning is also similar. While fishing, we catch fish by luring them with bait. Similarly, in phishing, a user is tricked by the attacker who gains the trust of the user or acts as if he is a genuine person and then steals the information by ditching. Not only attackers but some certain websites that seem to be genuine, but actually they are fraud sites. These sites trick the users and they end up giving their personal information such as

login details or bank details or card number etc. Phishing is of many types: Voice phishing, text phishing etc.

- **Spoofing:** Spoofing is the act of masquerading as a valid entity through falsification of data(such as an IP address or username), in order to gain access to information or resources that one is otherwise unauthorized to obtain. Spoofing is of several types- email spoofing, IP address spoofing, MAC spoofing, biometric spoofing etc.
- **Malware:** Malware is made up of two terms: Malicious + Software = Malware. Malware intrudes into the system and is designed to damage our computers. Different types of malware are adware, spyware, ransom ware, Trojan horse, etc.
- **Social engineering:** Social engineering attack involves manipulating users psychologically and extracting confidential or sensitive data from them by gaining their trust. The attacker generally exploits the trust of people or users by relying on their cognitive basis.
- **Polymorphic Attacks:** Poly means "many" and morph means "form", polymorphic attacks are those in which attacker adopts multiple forms and changes them so that they are not recognized easily. These kinds of attacks are difficult to detect due to their changing forms.

10.6 STEPS TO ENSURE COMPUTER SECURITY :

In order to protect our system from the above-mentioned attacks, users should take certain steps to ensure system security:

- Always keep your Operating System up to date. Keeping it up to date reduces the risk of their getting attacked by malware, viruses, etc.
- Always use a secure network connection. One should always connect to a secure network. Public Wi-Fi's and unsecured networks should be avoided as they are at risk of being attacked by the attacker.
- Always install an Antivirus and keep it up to date. An antivirus is software that scans your PC against viruses and isolates the infected file from other system files so that they don't get affected. Also, we should try to go for paid anti-viruses as they are more secure.
- Enable firewall. A firewall is a system designed to prevent unauthorized access to/from a computer or even to a private network of computers. A firewall can be either in hardware, software or a combination of both.
- Use strong passwords. Always make strong passwords and different passwords for all social media accounts so that they cannot be key logged, brute forced or detected easily using dictionary attacks. A strong password is one that has 16 characters which are a combination of upper case and lower case alphabets, numbers and special characters. Also, keep changing your passwords regularly.
- Don't trust someone easily. You never know someone's intention, so don't trust someone easily and end up giving your personal information to them. You don't know how they are going to use your information.
- Keep your personal information hidden. Don't post all your personal information on social media. You never know who is spying on you. As in the real world, we try to avoid talking to strangers and sharing anything with them. Similarly, social media also have people whom you don't know and if you share all your information on it you may end up troubling yourself.

- Don't download attachments that come along with e-mails unless and until you know that e-mail is from a genuine source. Mostly, these attachments contain malware which, upon execution infect or harms your system.
- Don't purchase things online from anywhere. Make sure whenever you are shopping online you are doing so from a well-known website. There are multiple fraud websites that may steal your card information as soon as you checkout and you may get bankrupt by them.
- Learn about computer security and ethics. You should be well aware of the safe computing and ethics of the computing world. Gaining appropriate knowledge is always helpful in reducing cyber-crime.
- If you are attacked, immediately inform the cyber cell so that they may take appropriate action and also protect others from getting attacked by the same person. Don't hesitate to complain just because you think people may make your fun.
- Don't use pirated content. Often, people try to download pirated movies, videos or web series in order to get them for free. These pirated content are at major risk of being infected with viruses, worms, or malware, and when you download them you end up compromising your system security.

10.7 DISASTER MANAGEMENT/ DISASTER RECOVERY PLAN :

Disaster recovery (DR) is an organization's ability to restore access and functionality to IT infrastructure after a disaster event, whether natural or caused by human action (or error). DR is considered a subset of business continuity, explicitly focusing on ensuring that the IT systems that support critical business functions are operational as soon as possible after a disruptive event occurs.

Today, disaster recovery planning is crucial for any business, especially those operating either partially or entirely in the cloud. Disasters that interrupt service and cause data loss can happen anytime without warning—your network could have an outage, a critical bug could get released, or your business might have to weather a natural disaster. Organizations with robust and well-tested disaster recovery strategies can minimize the impact of disruptions, achieve faster recovery times, and resume core operations rapidly when things go awry.

10.8 MEANING OF IT DISASTER RECOVERY :

IT disaster recovery is a portfolio of policies, tools, and processes used to recover or continue operations of critical IT infrastructure, software, and systems after a natural or human-made disaster.
The first and foremost aspect of a disaster recovery plan is cloud. The cloud is considered the best solution for both business continuity and disaster recovery. The cloud eliminates the need to run a separate disaster recovery data centre (or recovery site).

Also referred to as DRP, a disaster recovery plan is a step-wise process you follow to resume the normal state of business operations and processes after an organizational disaster has occurred. In the context of cyber security, the disaster can be of multiple types, such as breach, theft or loss of data, data hijacking, loss of sensitive data, virus attack, cybercrime, cyber attack, etc. So, the primary objective of a cyber security disaster recovery plan is to protect the organizational data and assets after a security mishap has happened. You can also understand it as a stealthy approach to collect and preserve evidence, and root causes analysis of the security incident.

10.9 TYPES OF DISASTERS CAN INCLUDE :

- Natural disasters (for example, earthquakes, floods, tornados, hurricanes, or wildfires)
- Pandemics and epidemics
- Cyber attacks (for example, malware, Dodos, and ransom ware attacks)
- Other intentional, human-caused threats such as terrorist or biochemical attacks
- Technological hazards (for example, power outages, pipeline explosions, and transportation accidents)
- Machine and hardware failure

10.10 IMPORTANCE OF DISASTER RECOVERY :

Technology plays an increasingly important role in every aspect of business, with applications and services enabling companies to be more agile, available, and connected. This trend has contributed to the widespread adoption of cloud computing by organizations to drive growth, innovation, and exceptional customer experience.

However, the migration to cloud environments—public, private, hybrid, or multicloud—and the rise of remote workforces are introducing more infrastructure complexity and potential risks. Disaster recovery for cloud-based systems is critical to an overall business continuity strategy. A system breakdown or unplanned downtime can have serious consequences for enterprises that rely heavily on cloud-based resources, applications, documents, and data storage to keep things running smoothly.

In addition, data privacy laws and standards stipulate that most organizations are now required to have a disaster recovery strategy. Failure to follow DR plans can result in compliance violations and steep regulatory fines.

Every business needs to be able to recover quickly from any event that stops day-to-day operations, no matter what industry or size. Without a disaster recovery plan, a company can suffer data loss, reduced productivity, out-of-budget expenses, and reputational damage that can lead to lost customers and revenue.

10.11 OBJECTIVES OF DISASTER RECOVERY PLAN :

Before we proceed to discuss the goals of a cyber security recovery plan, it is important to understand that disaster recovery is disjoint from business continuity. While business continuity also becomes important and requires proper remediation after a cyber security disaster, disaster recovery purely focuses on the IT and management aspects of the disaster. So, the goals of a cyber security disaster recovery plan are built keeping the effects and recurrence of such disasters in mind, and comprise: Managing, monitoring, protecting, and tracking the IT inventory, such as hardware, applications, data, processes, connectivity, etc.

- **Maintain Business Continuity:** Full recovery from a cyber security incident can be time-consuming, and the interruption in operations incurs significant costs for the business. A cyber security disaster recovery plan should include strategies for maintaining operations throughout the incident and recovery process.
- **Protect Sensitive Data:** A breach of sensitive customer or corporate data can dramatically exacerbate the cost and impact of a security incident. Ensuring that data

is secure throughout the incident is essential to protecting the business and its customers.

- **Minimize Impacts and Losses:** Cyber security incidents can carry costs in the millions, and, if left unmanaged, can drive companies out of business. Disaster recovery plans should include strategies for minimizing costs and losses by maintaining operations, protecting critical assets, and containing the incident.
- **Communicate with Stakeholders:** Cyber security incidents require communication with stakeholders both inside and outside the organization, such as the incident response team, leadership, regulators, and customers. Defining clear lines of communication is essential to effective incident management and meeting legal and regulatory deadlines.
- **Restore Normal Operations:** The end goal of any disaster recovery plan is a return to business as usual. Cyber security disaster recovery plans should describe the process of moving from business continuity to full recovery.
- **Review and Improve:** Throughout the disaster recovery process, team members should document their activities and record information about the incident and how it was managed. These logs and metrics can be used retrospectively to improve incident prevention and streamline recovery procedures in the future.
- Updating and refining IT strategies for protection against future disasters updating and refining disaster recovery strategies.
- Updating organizational disaster and risk register.
- Disaster recovery and contingency planning.
- Testing the system for any remnant effects or loopholes

10.12 CREATING CYBER SECURITY DISASTER RECOVERY PLAN :

Any organization can be the victim of a cyber attack, and these attacks are growing more sophisticated and damaging. A successful ransom ware attack can cause permanent data loss and degrade a company's ability to do business for days or weeks. A successful data breach carries the risks of reputational damage, regulatory penalties, and the loss of competitive advantage as well as the costs of recovery.

Responding quickly and correctly is essential to minimizing the cost and impact of a cyber security incident. By having a cyber security disaster recovery plan in place, an organization has taken steps to prepare to maintain operations during the incident and restore business as usual as quickly as possible.

A cyber security disaster recovery plan should be targeted at maintaining business continuity and restoring normal operations in the wake of a cyber security incident. Some key steps toward the development of a cyber security disaster recovery plan include:

- **Choose a Plan Owner:** Finding out during a security incident that the plan doesn't exist, is out of date, or is lost is not ideal for business continuity. A cyber security disaster recovery plan should be owned by the person who will lead the recovery process and who will be accessible when needed.
- **Identify Critical Assets:** Business continuity is about ensuring that the assets that are needed to maintain operations are online and available. Identifying critical assets is essential to developing plans to protect and restore them.
- **Determine Risks:** Different critical assets may face different risks, ranging from ran some ware attacks to power outages. Identifying and documenting these risks enables a business to develop plans for addressing and minimizing them.

- **Develop Strategies:** A disaster recovery strategy should include plans for backing up critical assets, protecting them against risks, responding to an incident, and communicating with key stakeholders. With a clear understanding of what needs protecting and what can go wrong, a team can develop strategies for managing these risks.
- **Practice and Test:** Practice makes perfect. Running through the disaster recovery with all key stakeholders and participants before an incident occurs can help to ensure that everyone knows what they are supposed to do and to identify and correct any gaps or errors in the plan.

10.13 CHECK POINT METHOD OF SUPPORTING DISASTER RECOVERY PLANNING :

Cyber security incident management includes both minimizing the probability that an incident occurs and restoring operations in the wake of a disruption. Check Point's free Security Check up is a great starting place for incident prevention because it can help identify the security vulnerabilities in your organization's system that are most likely to result in a cyber attack.

10.14 DISASTER RECOVERY WORKING METHOD :

Disaster recovery relies on having a solid plan to get critical applications and infrastructure up and running after an outage—ideally within minutes. An effective DR plan addresses three different elements for recovery:

- **Preventive:** Ensuring your systems are as secure and reliable as possible, using tools and techniques to prevent a disaster from occurring in the first place. This may include backing up critical data or continuously monitoring environments for configuration errors and compliance violations.
- **Detective:** For rapid recovery, you'll need to know when a response is necessary. These measures focus on detecting or discovering unwanted events as they happen in real time.
- **Corrective:** These measures are aimed at planning for potential DR scenarios, ensuring backup operations to reduce impact, and putting recovery procedures into action to restore data and systems quickly when the time comes.

Typically, disaster recovery involves securely replicating and backing up critical data and workloads to a secondary location or multiple locations—disaster recovery sites. A disaster recovery site can be used to recover data from the most recent backup or a previous point in time. Organizations can also switch to using a DR site if the primary location and its systems fail due to an unforeseen event until the primary one is restored.

Types of Disaster Recovery :

The types of disaster recovery you'll need will depend on your IT infrastructure, the type of backup and recovery you use, and the assets you need to protect.

Here are some of the most common technologies and techniques used in disaster recovery:

- **Backups**: With backups, you back up data to an offsite system or ship an external drive to an offsite location. However, backups do not include any IT infrastructure, so they are not considered a full disaster recovery solution.
- **Backup as a Service (BaaS):** Similar to remote data backups, BaaS solutions provide regular data backups offered by a third-party provider.
- **Disaster Recovery As A Service (DRaaS):** Many cloud providers offer DRaaS, along with cloud service models like IaaS and PaaS. A DRaaS service model allows you to back up your data and IT infrastructure and host them on a third-party provider's cloud infrastructure. During a crisis, the provider will implement and orchestrate your DR plan to help recover access and functionality with minimal interruption to operations.
- **Point-in-Time Snapshots:** Also known as point-in-time copies, snapshots replicate data, files, or even an entire database at a specific point in time. Snapshots can be used to restore data as long as the copy is stored in a location unaffected by the event. However, some data loss can occur depending on when the snapshot was made.
- **Virtual DR:** Virtual DR solutions allow you to back up operations and data or even create a complete replica of your IT infrastructure and run it on offsite virtual machines (VMs). In the event of a disaster, you can reload your backup and resume operation quickly. This solution requires frequent data and workload transfers to be effective.
- **Disaster Recovery Sites:** These are locations that organizations can temporarily use after a disaster event, which contain backups of data, systems, and other technology infrastructure.

10.15 ELEMENTS OF AN EFFECTIVE DISASTER RECOVERY PLAN :

- **Disaster Recovery Team**: This assigned group of specialists will be responsible for creating, implementing and managing the disaster recovery plan. This plan should define each team member's role and responsibilities. In the event of a disaster, the recovery team should know how to communicate with each other, employees, vendors, and customers.
- **Risk Evaluation**: Assess potential hazards that put your organization at risk. Depending on the type of event, strategize what measures and resources will be needed to resume business.
- **Business-Critical Asset Identification**: A good disaster recovery plan includes documentation of which systems, applications, data, and other resources are most critical for business continuity, as well as the necessary steps to recover data.
- **Backups**: Determine what needs backup (or to be relocated), who should perform backups, and how backups will be implemented. Include a recovery point objective (RPO) that states the frequency of backups and a recovery time objective (RTO) that defines the maximum amount of downtime allowable after a disaster. These metrics create limits to guide the choice of IT strategy, processes and procedures that make up an organization's disaster recovery plan. The amount of downtime an organization can handle and how frequently the organization backs up its data will inform the disaster recovery strategy.
- **Testing and Optimization**: The recovery team should continually test and update its strategy to address ever-evolving threats and business needs. By continually ensuring that a company is ready to face the worst-case scenarios in disaster situations, it can successfully navigate such challenges. In planning how to respond to a cyber attack, for example, it's important that organizations continually test and optimize their

security and data protection strategies and have protective measures in place to detect potential security breaches.

Types of Disaster Recovery :

Businesses can choose from a variety of disaster recovery methods, or combine several:

- **Back-up:** This is the simplest type of disaster recovery and entails storing data off site or on a removable drive. However, just backing up data provides only minimal business continuity help, as the IT infrastructure itself is not backed up.
- **Cold Site:** In this type of disaster recovery, an organization sets up a basic infrastructure in a second, rarely used facility that provides a place for employees to work after a natural disaster or fire. It can help with business continuity because business operations can continue, but it does not provide a way to protect or recover important data, so a cold site must be combined with other methods of disaster recovery.
- **Hot Site:** A hot site maintains up-to-date copies of data at all times. Hot sites are time-consuming to set up and more expensive than cold sites, but they dramatically reduce down time.
- **Disaster Recovery as a Service (DRaaS):** In the event of a disaster or ransom ware attack, a DRaaS provider moves an organization's computer processing to its own cloud infrastructure, allowing a business to continue operations seamlessly from the vendor's location, even if an organization's servers are down. DRaaS plans are available through either subscription or pay-per-use models. There are pros and cons to choosing a local DRaaS provider: latency will be lower after transferring to DRaaS servers that are closer to an organization's location, but in the event of a widespread natural disaster, a DRaaS that is nearby may be affected by the same disaster.
- **Back Up as a Service:** Similar to backing up data at a remote location, with Back Up as a Service, a third party provider backs up an organization's data, but not its IT infrastructure.
- **Datacenter Disaster Recovery:** The physical elements of a data center can protect data and contribute to faster disaster recovery in certain types of disasters. For instance, fire suppression tools will help data and computer equipment survive a fire. A backup power source will help businesses sail through power outages without grinding operations to a halt. Of course, none of these physical disaster recovery tools will help in the event of a cyber attack.
- **Virtualization:** Organizations can back up certain operations and data or even a working replica of an organization's entire computing environment on off-site virtual machines that are unaffected by physical disasters. Using virtualization as part of a disaster recovery plan also allows businesses to automate some disaster recovery processes, bringing everything back online faster. For virtualization to be an effective disaster recovery tool, frequent transfer of data and workloads is essential, as is good communication within the IT team about how many virtual machines are operating within an organization.
- **Point-in-Time Copies:** Point-in-time copies, also known as point-in-time snapshots, make a copy of the entire database at a given time. Data can be restored from this back-up, but only if the copy is stored off site or on a virtual machine that is unaffected by the disaster.

- **Instant Recovery:** Instant recovery is similar to point-in-time copies, except that instead of copying a database, instant recovery takes a snapshot of an entire virtual machine.

Benefits of Disaster Recovery Software :

No organization can afford to ignore disaster recovery. The two most important benefits of having a disaster plan in place, including effective DR software, are:

- **Cost Savings:** Planning for potential disruptive events can save businesses hundreds of thousands of dollars and even mean the difference between a company surviving a natural disaster or folding.
- **Faster Recovery:** Depending on the disaster recovery strategy and the types of disaster recovery tools used, businesses can get up and running much faster after a disaster, or even continue operations as if nothing had happened.

Key Features of a Disaster Recovery Program Know Your Threats.

Learn about the history of your business, the industry and the region, and map out the threats you are most likely to face. These should include natural disasters, geopolitical events like wars or civil unrest, failure to critical equipment like servers, Internet connections or software, and cyber attacks that are most likely to affect your type of business.

Ensure your disaster recovery plan is effective against all, or at least the most likely or most significant threats. If necessary, develop separate DR plans or separate sections within your DR plan for specific types of disasters.

i. Know Your Assets.
ii. Define Your RTO and RPO.
iii. Set Up Disaster Recovery Sites.

Know Your Assets :
It's important to be comprehensive. Get your team together and make a big list of all the assets that are important for the day-to-day operations of your business. In the IT sphere this includes network equipment, servers, workstations, software, cloud services, mobile devices, and more. Once you have your list organize it into:

i. Critical assets your business cannot operate without – for example, an email server Important assets that can seriously hamper some activities – for example, a projector used for presentations
ii. Other assets that will not have a major effect on the business – for example, a recreational system used by employees on their lunch break

Define RTO and RPO :

Define your Recovery Time Objective (RTO) for critical assets. What period of downtime can you sustain? For example, a high traffic e-Commerce site sustains major financial damage for every minute of downtime. An accounting firm may be able to sustain a day or two of downtime and resume normal operations, provided there is no data loss. Build a

process and obtain technological means that can help you bring operations back online within the RTO.

The term recovery point objective (RPO) refers to the maximum age of files the organization must recover from backup storage to resume normal operations after a disaster occurs. Organizations use RPO to determine the minimum frequency of backups. For example, a four-hour RPO requires backing up at least every four hours.

Set up Disaster Recovery Sites :

A cornerstone of almost every disaster recovery plan is having a way to replicate data between multiple disaster recovery sites. While many businesses schedule periodic data backups, for disaster recovery purposes, the preferred approach is to continuously replicate data to another system. Data may be replicated to:

On-Site Cold Storage A backup device within your data centre.	**On-Site Warm Backup** A redundant operational unit in your data centre, for example, a secondary server.
Off-Site Cold Storage A backup device in a remote data centre, or cloud storage with high latency, involving a delay or extra cost to retrieve data.	**Off-Site Warm Backup** A redundant operational unit in a remote data centre, or cloud storage with low latency, enabling immediate data access.

Table 14.1: Data Recovery Methods

Local storage is less resilient to disaster but gives you a shorter RTO. It also allows you to replicate or backup data more frequently, improving your Recovery Point Objective (RPO) – meaning you can restore your data from almost every point in time.

Just like business systems can fail in a disaster, so can backups. There are many horror stories of organizations that had a backup system in place, but discovered too late that backups were not actually working properly. A configuration problem, software error or equipment failure can render your backups useless, and you may never know it unless you test them.

An inseparable part of any disaster recovery plan is to test that data is being replicated correctly to the target location. It's just as important to test that it's possible to restore data back to your production site. These tests must be conducted once, when you set up your disaster recovery apparatus, and repeated periodically to ensure the setup is still working.

10.16 CONCLUSION:

Computer Security is the process of detecting and preventing any unauthorized use of your laptop/computer. It involves the process of safeguarding against trespassers from using your personal or office based computer resources with malicious intent or for their own gains, or even for gaining any access to them accidentally. Disaster recovery is generally a planning process and it produces a document which ensures businesses to solve critical events that affect their activities. Such events can be a natural disaster (earthquakes, flood, etc.), cyber–attack or hardware failure like servers or routers.

10.17 KEYWORDS :

Computer security, Disaster recovery plan, Cyber attack, Disaster recovery Management.

10.18 SELF ASSESSMENT QUESTIONS :

1. What is needed for an effective disaster recovery plan?
2. Explain the methodology of disaster recovery plan?
3. What are the deliverables of each phase of disaster recovery plan?
4. What are the guidelines for business continuity plan?
5. What arc the standards for BCP prepared by DRII?

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LESSON - 11

SYSTEM AUDIT AND COMPUTER CRIME

OBJECTIVES :

After reading this lesson, you will be able to understand:

- The basic concepts of system audit and computer crimes
- The various types of system audit
- The standards of Information system audit
- The various computer crimes / cyber crimes
- The main offences of computer misuse act

STRUCTURE :

11.1INTRODUCTION:

Business processes for Indian banking have undergone a paradigm shift with the increasing dependence on Information Technology. The IT has moved from support function to process controller and is still moving forward forming the basis of business operations. Deployment of technology has not only enabled banks to perform efficiently but also offer flexibility in the services offered. Days of definite banking hours have gone, banking services are available 24x7 through ATM networks and Internet Banking. The productivity has been improved. The vision of Customer of Bank has come true and days are not far when the Bill Gates statement will come true.

However with the introduction of technology new risks and liabilities have been introduced into the system. The threats of virus, hackers, and frauds are realizing frequently. Non-availability of services due to failure of power supply and therefore computers is not unheard of. There are various reasons for these problems like; absence of Process re-engineering due to deployment of technology, non addressing control structure changes, lack of awareness and training, dependence on vendor and most importantly absence of proper Information systems Audit.

Traditionally the word audit has been associated with accounts. The dictionary meaning of the word Audit is: "Verification of records of financial transactions and inspecting them for being in accordance with organization's policies and procedures". However today it has broadened its meaning to include all the aspects of business processes

to mean the "Verification of processes that originates and puts through the business transactions". The word transaction has also has broad meaning as; "Any input into the process that changes the status of data or provides output". It could be a decision by management, deployment of technology, or providing services to the customer.

11.2 DIFFERENCE BETWEEN INFORMATION SYSTEMS AUDIT AND FINANCIAL AUDIT :

Automation of systems with the help of Information technology has its own rewards and penalties that have led the financial audit services to take cognizance of it and Information System Audit immerged as a tool to maximize the advantages and to provide a shell for avoidance of disadvantages. However Information System Audit differs from financial and other types of audit.

Primary difference is in approach. Financial audit is Post-mortem activity. It verifies the transactions put through the system during predefined period of time. e.g. During the previous audit till the date of current audit, or During previous financial year 1st April to 31st March. It focuses on the validity of transactions based on the predefined set of business rules for transaction processing. In other words it verifies the processes in past up to here. The information systems audit focuses on controls in the business process that has been applied through the technology and its impact on the transactions from now and in future.

Financial audit focuses on the 'amount transactions' whereas Information System audit focuses on the process of transaction. e.g. The financial audit will focus on the Balance in customer account to understand if the value arrived is accurate or not. The information system audit will focus on the process of computing balance as implemented by software and not the actual value. In short financial audit looks for Quantitative value and Information systems audit looks for Qualitative value.

- Financial audit can be conducted by ignoring the technology i.e. treating the technology as black box and verifying the input and output for known consistencies. (Also called as "Around the Computer Audit"). Information systems audit cannot be conducted without considering technology.
- Both the audits can be conducted using CAAT - Computer Assisted Audit Tools and Techniques, but these tools are different in either case. e.g ACL, IDEA, SOFTCAAT etc are examples of Financial Audit CAAT, whereas Output Analyzers, Firewall, Vulnerability assessment tools are CAAT for Information systems audit.

11.3 TYPES OF INFORMATION SYSTEMS AUDITS :

Information systems covers various processes associated with the receiving, storing, retrieving, processing, communicating and destroying the information assets of the business. It also covers various technologies converged for enabling deployment of Information processes. e.g. Networked ATMs, Wireless LAN, Interactive Website, Branchless banking (Any Where banking etc. The Technology systems that are designed and developed for carrying out the information of and for Banks needs to be deployed very carefully. Traditionally Banks have been subject to attack because "That is where the Money is". The misuse and abuse of banking technology has already been reported worldwide which has brought out various security issues in Technology deployment. Since technology is

indifferent in giving services, it the 'man behind machine' that needs to be controlled. The Information systems audits are focused on verification of controls.

Based on the technology deployment there could be various IS Audits. Some of them illustratedbelow;

Software Audit:
Audit of the software to be used for the business processes need to be audited before implementation in order to bring out the control weaknesses. Depending upon the acquisition processes there could be different audits viz.

i. Acquired Packaged Software
ii. Acquired developed software
iii. In-house developed software

Implementation Audit: The software needs to be implemented across the business locations for final use of the customers - directly or through employees. Banking application software needs setting of parameters before implementing the software, and also during the use due to changes in the environmental conditions like regulatory and/or statutory requirements etc.

Operations Audit: Use of information technology needs to be controlled for preventing misuse/frauds. Hence defining the secure procedures and auditing their compliance is essential. Depending upon the product there could be different operations audits, viz.

i. Branch operations audit
ii. ATM operations audit
iii. Network administration audits
iv. System access audits
v. EDI and remote login audits
vi. Software development process audit
vii. Software testing audits

- **Firewall and network audits:** Where Banks are using the networks that communicate with external entities for information receiving and transmission, a firewall needs to be implemented and audited for ensuring security of communications.
- **Internet banking and web server audits:** Internet banking allows the access to the Banks database over the Internet; hence it is essential to protect the access. Firewall can help in preventing unauthorized access; however prevention of misuse by the authorized person is necessary. Audit of Internet Banking focuses on secure procedures of identification, authentication and authorization of users and providing proper access to the data.
- **Business continuity management audits:** Business continuity planning and Disaster recovery procedures clubbed and constantly monitored by the business continuity management department. Since the Banks have more than one office located at geographically dispersed areas, the need for BCM is also different for each office/branch. However the audit of accepted process of Business continuity management is essential part of information system audit.
- **PKI Audits:** Use of Public key infrastructure is going to be common feature of Banking. Management of private keys issued to the authorized employees and secure storage of the same is essential.

- **Combination audits:** There could be combination of one or more audits illustrated above. e.g. EDI audit may consider development and deployment of software, or ATM operations audit may include the implementation audit also. This is an illustrative list and not the entire domain of IS Audit. Depending upon the need and use of IT, one can define scope for IS Audit.

The spread and diversification of use of information technology has really made it difficult to master the complete knowledge of technology. Hence it is essential that a proper skilled and knowledgeable person perform the IS Audit. Information Systems Audit and Control Association (ISACA) has defined the standards for IS Audits to be followed by auditors. These standards, described below in brief, provide the essence of the IS Audit process an auditor needs to follow.

Audit Charter :

i. Responsibility, Authority and Accountability:
The responsibility, authority and accountability of the information systems audit function are to be appropriately documented in an audit charter or engagement letter. It generally defines the scope of audit also.

ii. Independence:

a. Professional Independence: In all matters related to auditing, the information systems auditor is to be independent of the audited in attitude and appearance. i.e. Auditor should not undertake the assignment where he/she has any interest or have worked on the project earlier.

b. Organizational Relationship: The information systems audit function is to be sufficiently independent of the area being audited to permit objective completion of the audit. The audited management and Audit management should be functionally independent.

iii. Professional Ethics and Standards:

a. Code of Professional Ethics: The information systems auditor is to adhere to the Code of Professional Ethics of the Information Systems Audit and Control Association.

b. Due Professional Care: Due professional care and observance of applicable professional auditing standards are to be exercised in all aspects of the information systems auditor's work.

iv. Competence:

a. Skills and Knowledge: The information systems auditor is to be technically competent, having the skills and knowledge necessary to perform the auditor's work. This is true particularly for technology audits since one person cannot master entire gamut of latest technology.

b. Continuing Professional Education: The information systems auditor is to maintain technical competence through appropriate continuing professional education.

v. Planning:

a. Audit Planning: The information systems auditor is to plan the information systems audit work to address the audit objectives and to comply with applicable professional auditing standards.

vi. Performance of Audit Work:

a. Supervision: Information systems audit staff are to be appropriately supervised to provide assurance that audit objectives are accomplished and applicable professional auditing standards are met.

b. Evidence: During the course of the audit, the information systems auditor is to obtain sufficient, reliable, relevant and useful evidence to achieve the audit objectives effectively. The audit findings and conclusions are to be supported by appropriate analysis and interpretation of this evidence.

vii. Reporting:

a. Report Content and Form: The information systems auditor is to provide a report, in an appropriate form, to intended recipients upon the completion of audit work. The audit report is to state the scope, objectives, period of coverage and the nature and extent of the audit work performed. The report is to identify the organization, the intended recipients and any restrictions on circulation. The report is to state the findings, conclusions and recommendations and any reservations or qualifications that the auditor has with respect to the audit.

viii. Follow-Up Activities:

a. Follow-Up: The information systems auditor is to request and evaluate appropriate information on previous relevant findings, conclusions and recommendations to determine whether appropriate actions have been implemented in a timely manner.

Risk Based Audit :

Generally audit process provides the assurance to the management that the auditee is following the procedures defined by the management. However risk-based audit approach goes beyond just compliance scope and tries to evaluate the procedures and non-compliance as potential risk for the organization's information assets. This is more pro-active approach for I S Audit, since because of the nature of technology; procedures might be insufficient or may not consider complex risks.

The auditor analyses the technology and business processes using that technology and prepares a control matrix that points the impact of control on the risk mitigation. It helps in analyzing the management's perception about the risks and can point out possible risk perception discrepancies. A risk initially perceived as minor may actually lead to disaster. e.g. Risk due to virus might be low in case of independent LAN/server, but multiplies in many folds, moment any node is connected to the Internet. A most proactive approach for the management is to have a Risk management and monitoring program in place.

Outsourcing and Audit :

Deployment of Information Technology is not a main business domain for Banks, hence there is a tendency to outsource many functions to vendor who has capacity and expertise to handle such functions. However since Bank owns the assets handled by the technology provided by vendors, it is prudent to address the security issues before outsourcing. Apart from performance, secrecy and fidelity, continuity etc., auditability of the vendor's processes that are housing the Bank's assets, by the Bank appointed auditor should be the clause in the outsourcingagreement.

Also there should be predefined and agreed upon procedure for monitoring the performance. e.g. if the annual maintenance of Bank's hardware has been outsourced with 99% business hours uptime requirement, the Banks should devise a internal procedure to maintain the record of uptime or downtime of the system.

However everything covered by the technology cannot be outsourced. e.g. User Acceptance testing of the acquired developed software cannot be outsourced, since it is the internal business function and the requirements from the software are best known to the bank. Also it has been traditionally proven fact that the software development requirements are never fixed and final, hence the testing vendor will perform the testing only for the specifications provided to the development vendor. Another part that cannot be effectively outsourced is the development of Information Security Policy and procedures, since these needs to be developed taking into consideration the culture of the organization. e.g. Password sharing, if organization do not provide de-learning mechanism where password sharing has been common feature, making policy will be ineffective. Or if the systems administrator has not been given immunity from attending office late, he will share the password in order to avoid creating of record by opening sealed envelope containing his/her password.

Bank may decide to outsource the I S Audit function. In this case it is necessary to ensure that the I S Auditor will be following the standards defined above and have necessary expertise to carry out the audit. The best professionals comes at best cost, hence to define the requirements is the key to get best at competitive prices.

SelfAudits:
In order to supplement the audit function banks management may come up Self Audit or Control self assessment by the functional managers. This can be particularly useful in case of operational audits. Considering the geographical spread of bank's technology it may not be possible to follow the 'Workshop method' hence the questionnaire approach is generally used for Self-audits. The point to be noted in the questionnaire approach is that the defining questions should ensure that necessary knowledge is being provided to the functional manager.

Considering the expertise required, Bank may decide not to have internal audit function for the entire technology. Generally the internal auditors with minimum training requirements can handle Operational I S Audits, since these audits mainly focuses on compliance of predefined procedures and inherently has short audit cycle. The properly trained I S auditors should handle complex technological audits that have longer periodicity. The auditors for this can be deployed as and when required, since there may not be a full time workload available. Depending upon the size and spread, it is prudent to build the team of technical auditors starting with small team, to conduct the I S Audits.

Some Common Confusion :

Based on the RBI's guidelines Indian Banks have implemented IS audit function with help of Internal and external auditors. However there has been some confusion observed in some cases.

The scope of IS audit covers entire gamut of technology and thus proper scope cannot be defined. e.g. an advertisement requested quote for the scope covering Software audit as well as operations audit, but ignored the implementation and conversion audit. Software audit, Implementation audit, conversion audit and operations audit are different types requiring different scope. Conversion audit is mainly financial audit where as other audits are IS audits.

Operations audits are generally considered based upon the internal control questionnaire, which is improper mix of technology audit and financial audit. Actually operations audit can be of two types 1. Banking operations audit in computerized environment and 2. Technical operations audit of Bank/branch. Former is financial audit whereas later is I S Audit.

Operation audit questionnaire has questions covering technology (Does proper access controls provided?) and also banking (Does dormant accounts flagged properly? Or Interest being applied correctly?). Both these questions are irrelevant if Software audit and Implementation audit has been carried out properly. If not the scope need to cover these factors, but the management has not considered the person hour requirements for the same.

Auditor's background also adds to it. An auditor from Banking background tends to point out quantitative errors in technology audit, (e.g. quantum of interest is incorrect) whereas auditor from IT background fails to understand the significance of quantitative indicators in implementation audit. Also there is difference in risks perceived by these two auditors. Former may consider incorrect interest as high risk due to losses, where as later may perceive as low risk due to compensating controls of day book checking.

11.4 COMPUTER CRIME :

A computer crime, also called a cybercrime, refers to the use of a computer as an instrument to commit illegal acts. This includes committing fraud, trafficking in child pornography and intellectual property, stealing identities, and violating privacy. When you think about acts that are illegal to commit on the Internet, a good rule of thumb to remember is that if the act is illegal in real life, it is also illegal on the Internet. That is why existing laws in these areas form a basis through which federal and state authorities can pursue those who commit crimes on the Internet.

The web has certainly not been around as long as the laws of our nation have been, so it can be a bit confusing to understand what is considered a computer crime. Derek A. Adame, Attorney at Law is here to clear up any confusion surrounding the legal definitions of crimes. It is important to be aware of these laws so that you do not find yourself in any legal trouble. If you do find yourself in legal trouble, Derek A. Adame will be here to provide the aggressive defense you need.

Reasons for people committing cyber computer crimes :

In most cases, someone commits a computer crime to obtain goods or money. Greed and desperation are powerful motivators for some people to try stealing through computer crimes. Some people may also commit a computer crime because they are pressured or forced to do so by another person. Some people also commit computer crimes to prove they can do it. A person who can successfully execute a computer crime may be greatly satisfied. These types of people, sometimes called black hat hackers, like to create chaos and wreak havoc on other people and companies. Another reason computer crimes are sometimes committed is because they're bored. They want something to do and don't care if they commit a crime.

Examples of Computer Crimes :

Below are different types of computer crimes today. Clicking any of the links gives further information about each crime.

- **Child pornography** - Making, distributing, storing, or viewing child pornography.
- **Click fraud** - Fraudulent clicks on Internet advertisements.
- **Copyright violation** - Stealing or using another person's Copyrighted material without permission.
- **Cracking** - Breaking or deciphering codes designed to protect data.
- **Cyber terrorism** - Hacking, threats, and blackmailing towards a business or person.
- **Cyber bully or cyber stalking** - Harassing or stalking others online.
- **Cyber squatting** - Setting up a domain of another person or company with the sole intention of selling it to them later at a premium price.
- **Creating malware** - Writing, creating, or distributing malware (e.g., viruse sand spyware.)
- **Data diddling** - Computer fraud involves intentionally falsifying numbers in data entry.
- **Denial of Service attack** - Overloading a system with so many requests it cannot serve normal requests.
- **Data theft** - Stealing others' personal or confidential information.
- **Doxing** - Releasing another person's personal information without their permission.
- **Espionage** - Spying on a person or business.
- **Fake** - Products or services that are not real or counterfeit. For example, fake antivirus and fake technical support are examples of something fake.
- **Fraud** - Manipulating data, e.g., changing banking records to transfer money to an account or participating in credit card fraud.
- **Green graffiti** - Graffiti done through projectors or lasers to project an image or message onto a building.
- **Harvesting** - Collect account or account-related information on other people.
- **Human trafficking** - Participating in the illegal act of buying or selling other humans.
- **Identity theft** - Pretending to be someone you are not.
- **Illegal sales** - Buying or selling illicit goods online, including drugs, guns, and psychotropic substances.

- **Intellectual property theft** - Stealing practical or conceptual information developed by another person or company.
- **IPR violation** - An intellectual property rights violation is any infringement of another's Copyright, patent, or trademark.
- **Phishing** or **vishing** - Deceiving individuals to gain private or personal information about that person.
- **Pig butchering** - SMS (short message service) scam to get people to invest in a crypto currency scam.
- **Ransom ware** - Infecting a computer or network with ransom ware that holds data hostage until a ransom is paid.
- **Salami slicing** - Stealing tiny amounts of money from each transaction.
- **Scam** - Tricking people into believing something that is not true.
- **Extortion** - Extortion where a victim's private data of a sexual nature is acquired illegally by another person.
- **Slander** - Posting libel or slander against another person or company.
- **Software piracy** - Copying, distributing, or using software not purchased by the software user.
- **Spamming** - Distributed unsolicited e-mails to dozens or hundreds of different addresses.
- **Spoofing** - Deceiving a system into thinking you are someone you're not.
- **Swatting** - The act of calling in a false police report to someone else's home.
- **Theft** - Stealing or taking anything (e.g., hardware, software, or information) that doesn't belong to you.
- **Typo squatting** - Setting up a domain that is a misspelling of another domain.
- **Unauthorized access** - Gaining access to systems you have no permission to access.
- **Vandalism** - Damaging any hardware, software, website, or other objects.
- **Wiretapping** - Connecting a device to a phone line to listen to conversations.

11.5 TYPES OF COMPUTER CRIMES :

i. Internal Computer Crimes

If you plant a virus or other foreign item in a computer, this would be an internal computer crime. For example, if an employee of a finance company planted malicious software in the company computer due to anger over not getting a bonus. An act like this could cost the company millions of dollars, and they would certainly want to file a suit against the individual responsible.

ii. Telecommunications Crimes

A telecommunications crime is a general term used to refer to a person who commits an offense, particularly if the person had the intent to defraud or cause harm. The most common type of telecommunications crime is hacking. Illegal hacking refers to unauthorized computer access to gain data in a system without permission to access that data.

iii. Computer Manipulation Crimes

Computer manipulation crimes are crimes in which an individual manipulates computer files to cover up crimes they have committed, such as embezzlement. Embezzlement takes place when an individual uses funds for a different purpose than their original intention. They might create bills and receipts for activities that did not happen and then use that money for

paid personal expenses. This is such a common type of computer crime because it does not require a high level of expertise.

iv. Traditional Theft

When we talk about traditional theft, we are referring to the act of stealing computer hardware or software. An example of this would be software piracy, a crime in which criminals sell illegal copies of the software for their own profit. Software theft and piracy is a major concern in the software industry and is only growing to be more widespread as technology develops.

11.6 MAIN OFFENCES OF THE COMPUTER MISUSE ACT:

The Computer Misuse Act of 1990 was put into place to protect the personal data of organizations from unauthorized access and modification. It was drawn up after the failure to charge prominent hackers and was designed to prevent hackers from intentionally spreading malicious software. It has been updated several times to reflect changes in technology and cyber security. Today, failure to comply with the Computer Misuse Act can lead to fines and potential imprisonment.

i. Unauthorized access to Computer Material :

This offence occurs when the defendant causes a computer to perform a function with the intent to secure access. It excludes physical contact with a computer and the scrutiny of data without any interaction with the computer. In order to be considered this type of offence, the access to the program or data with the accused must be unauthorized access.

ii. Unauthorized Access with the Intent to Commit or Facilitate the Commission of Further Offences :

The next offence of the Computer Misuse Act is committing the unauthorized access offence above, but with an additional caveat. With this offence, the offender would have had the intent to commit or facilitate the commission of a more serious offence. Examples of this include obtaining unauthorized access with the intention of committing theft, such as by diverting funds that are in the course of an electronic funds transfer to the defendant's bank account or to a place where the defendant would gain unauthorized access to sensitive information held on a computer with a plan to blackmail the individual to whom that information was related.

iii. Unauthorized Acts with the Intent to Impair or with Recklessness as to Impairing the Operation of a Computer :

If you are in violation of this part of the offence, it means that there has been computer misuse in which the impact is to cause damage. For example, the misuse could cause damage to critical national infrastructure in a case so drastic that the court would determine ten years to be insufficient punishment. Critical national infrastructure could refer to an asset or system that is essential for the maintenance of vital societal functions, health, safety, security, economic or social well-being of individuals. This can include power plants, transport networks, or government networks, as well as the disruption or destruction that would have made a significant impact in a Member State due to the failure to maintain those functions.

11.7 HOW METHODS OF PROTECTION A SAINT CYBER CRIME :

Anyone using the internet should exercise some basic precautions. Here are 11 tips you can use to help protect yourself against the range of cybercrimes out there

i. **Use a full-service internet security suite** It's a good idea to consider trusted security software like Norton 360 with Life Lock Select**,** which provides all-in-one protection for your devices, online privacy, and identity, and helps protect your private and financial information when you go online.

ii. **Use strong passwords** Don't repeat your passwords on different sites, and change your passwords regularly. Make them complex. That means using a combination of at least 10 letters, numbers, and symbols. A **password** management application can help you to keep your passwords locked down.

iii. **Keep your software updated** This is especially important with your operating systems and internet security software. Cybercriminals frequently use known exploits, or flaws, in your software to gain access to your system. Patching those exploits and flaws can make it less likely that you'll become a cybercrime target.

iv. **Manage your social media settings** Keep your personal and private information locked down. **Social engineering** cybercriminals can often get your personal information with just a few data points, so the less you share publicly, the better. For instance, if you post your pet's name or reveal your mother's maiden name, you might expose the answers to two common security questions.

v. **Strengthen your home network** It's a good idea to start with a strong encryption password as well as a virtual private network. A VPN will encrypt all traffic leaving your devices until it arrives at its destination. If cybercriminals do manage to hack your communication line, they won't intercept anything but encrypted data. It's a good idea to use a VPN whenever you a public Wi-Fi network, whether it's in a library, café, hotel, or airport.

vi. **Talk to your children about the internet** You can teach your kids about acceptable use of the internet without shutting down communication channels. Make sure they know that they can come to you if they're experiencing any kind of online harassment, stalking, or bullying.

vii. **Keep up to date on major security breaches** If you do business with a merchant or have an account on a website that's been impacted by a security breach, find out what information the hackers accessed and change your password immediately.

viii. **Take measures to help protect yourself against identity theft** Identity theft occurs when someone wrongfully obtains your personal data in a way that involves fraud or deception, typically for economic gain. How? You might be tricked into giving personal information over the internet, for instance, or a thief might steal your mail to access account information. That's why it's important to guard your personal data. A VPN — short for virtual private network — can also help to protect the data you send and receive online, especially when accessing the internet on public Wi-Fi.

ix. **Know that identity theft can happen anywhere** It's smart to know how to protect your identity even when travelling. There are a lot of things you can do to help keep criminals from getting your private information on the road. These include keeping your travel plans off social media and being using a VPN when accessing the internet over your hotel's Wi-Fi network.

x. **Keep an eye on the kids** Just like you'll want to talk to your kids about the internet, you'll also want to help protect them against identity theft. Identity thieves often target children because their Social Security number and credit histories frequently represent a clean slate. You can help guard against identity theft by being careful when sharing your child's personal information. It's also smart to know what to look for that might suggest your child's identity has been compromised.

xi. Know what to do if you become a victim If you believe that you've become a victim of a cybercrime, you need to alert the local police and, in some cases, the FBI and is important even if the crime seems minor. Your report may assist authorities in their investigations or may help to thwart criminals from taking advantage of other people in the future. If you think cybercriminals have stolen your identity. These are among the steps you should consider.

11.8 CONCLUSION :

System audit involves the evaluation of an organization's practices, procedures, controls, and management systems. This is to determine their compliance with regulatory requirements and other policies set by the organization. Thus, allowing areas of nonconformance to be identified which will help in improving the company's operations and services. Alternatively known as cyber crime, e-crime, electronic crime, or hi-tech crime. Computer crime is an act performed by a knowledgeable computer user, sometimes called a "hacker," who illegally browses or steals a company's or individuals private information. Sometimes, this person or group of individuals may be malicious and destroy or otherwise corrupt the computer or data files.

11.9 KEYWORDS :

Computer audit, Audit software, Computer crime, Computer attack and System audit.

11.10 SELF ASSESSMENT QUESTIONS :

1. What is System Audit? How is it different from Computer Audit?
2. What are the various tasks associated with Audit Planning?
3. Explain the functioning of a generalized audit software package?
4. Name five audit software other than generalized audit software? Briefly discuss their utilities?
5. Discuss the various types of control security in a computerized environment?
6. What arc the various Network Security Services?

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LESSON - 12

SECURITY AND CONTROL ASPECTS OF EMERGING BANKING TECHNOLOGIES

After reading this lesson, you will be able to understand:

OBJECTIVES:

- The security and control aspects of banking technology
- The challenges in banking technology
- The importance of cyber security in banking industry
- The various tools and applications of cyber security in banking
- The cyber security framework for banks

STRUCTURE:

12.1 INTRODUCTION :

The present day banking business is, to a great extent, dependent on 'Electronic Banking'. The term 'Electronic Banking' means banking through internet where the physical presence of the consumers in the bank is not mandatory. Electronic banking, also known as electronic fund transfer (EFT), uses computer and electronic technology as a substitute for the negotiable instruments like cheques, drafts etc and other paper transactions. EFTs is initiated through devices like cards or codes that let one or those one authorizes, access one's account. Many financial institutions use ATM or debit cards and Personal Identification Numbers (PINs) for this purpose. Some use other types of debit cards such as those that require, at the most, one's signature or a scan. For example, some use radio frequency identification (RFID) or other forms of "contactless" technology that scan one's information without direct contact.

The federal Electronic Fund Transfer Act (EFT Act) covers some electronic consumer transactions. It includes both Debit and Credit Cards. For many consumers, electronic banking means 24-hour access to cash through an automated teller machine (ATM) or Direct Deposit of paychecks into checking or savings accounts. But electronic banking involves many different types of transactions. The world is changing at a staggering rate and technology is considered to be the key driver for these changes around us. An analysis of technology and its uses show that it has permeated in almost every aspect of our life. Many activities are handled electronically due to the acceptance of information technology at home as well as at workplace. Slowly but steadily, the Indian customer is moving towards the internet banking. The ATM and the Net transactions are becoming popular. But the customer is clear on one thing that he wants net-banking to be simple and the banking sector is matching its steps to the march of technology. E-banking or Online banking is a generic term for the delivery of banking services and products through the electronic channels such as the telephone, the internet, the cell phone etc.

12.2 EMERGING BANKING TECHNOLOGIES IN 2023 :

In the rapidly evolving digital landscape, technology has become a critical component for delivering effective services to customers in the banking industry. To stay competitive, banks must leverage the power of innovative technologies to enhance customer experiences, optimize operations, and drive growth. According to industry reports, global banking IT spending is projected to reach $761 billion by 2025 , underscoring the significance of technology investments in the Banking sector.

As technology plays a pivotal role in shaping the future of banking, IT analysts, managers, VP, and CIOs face unique challenges in identifying the right solutions to implement. The complexity of the technology landscape, the need to balance cost and effectiveness, integration hurdles, and the paramount importance of security and regulatory compliance present formidable obstacles. Integrating new technologies with existing systems is one of the top challenges in implementing digital transformation initiatives. Furthermore, the banking industry faces its own set of distinct technology challenges. Legacy systems, data management and analytics complexities, security concerns, compliance and regulatory requirements, and integration challenges are just a few examples.

12.3 CHALLENGES IN SELECTING RIGHT BANKING TECHNOLOGIES :

The banking industry faces unique technology challenges that impact its operations. Navigating the vast array of technology options can be overwhelming. IT analysts, managers, and CIOs must address challenges such as:

i. **Complexity:** The banking technology landscape is diverse and continuously evolving, making it difficult to choose the right solutions that align with the organization's goals.

ii. **Cost-Effectiveness:** Balancing cost and effectiveness is crucial. While cutting-edge technologies may offer enticing features, the cost of implementation and maintenance must be carefully evaluated.

iii. **Integration:** Banks often face challenges when implementing new technologies alongside legacy systems. Seamless integration is crucial to avoid disruption and ensure smooth operations.

In fact, A survey on the top 100 banks by Accenture found that 63 percent are either moving their core banking technology to the cloud or getting ready to do so.

iv. **Security:** Implementing technology solutions while ensuring data privacy and security can be challenging.

Cyber security threats pose a significant risk to the banking industry. Banks must employ robust security measures to protect sensitive customer data and financial transactions. According to the Sixth Annual Bank Survey by the Conference of State Bank Supervisors, 70% of those surveyed ranked cyber security as their top concern. In a survey conducted by Gartner, 66 percent of CIOs identified cyber security and privacy as their top investment priority for 2023 .

v. **Compliance and Regulations:** Banks operate in a highly regulated environment, requiring stringent security measures and compliance with regulations like GDPR and KYC. Banks must comply with numerous regulations and reporting requirements. Ensuring compliance with evolving regulatory standards requires adopting solutions tailored to meet these specific needs.

vi. **Legacy Systems:** Many banks still rely on legacy systems, making it difficult to adopt modern technologies seamlessly. Upgrading or replacing these systems is a complex undertaking that requires careful planning.

vii. **Data Management and Analytics:** Banks generate vast amounts of data. Effectively managing and leveraging this data for business insights is a challenge. Advanced analytics and data governance solutions are essential to extract actionable information. According to the Global Transaction Banking White Paper, 62% of Banks agree that Big Data solutions are critical to their success.

12.4 LATEST BANKING TECHNOLOGIES IN 2023 :

The banking industry is undergoing a significant transformation driven by advancements in technology. Digitalization, automation, and data-driven insights have become key focus areas for banks looking to enhance customer experiences, streamline operations, and gain a competitive edge. Here's an overview of the current state of technology in the banking industry.

i. Digital Banking:

The rise of digital banking has changed how customers interact with their banks. Mobile banking apps, online portals, and self-service options have become the norm, providing customers with convenience and real-time access to their accounts. According to a report by Economic Times, digital banking transactions are projected to reach $1 trillion by 2023.

ii. Hyper automation:

Hyper automation combines robotic process automation (RPA) with AI and ML capabilities to automate complex business processes end-to-end. Banks can leverage hyper-automation to automate repetitive and rule-based tasks, such as data entry, document processing, and customer on boarding. By automating these processes, banks can reduce errors, improve operational efficiency, and free up employees to focus on higher-value activities.

iii. Low-Code Development:

Low-code development platforms like Kissflow enable banks to build applications with minimal coding requirements, accelerating development and reducing reliance on traditional coding methods. These platforms provide visual interfaces, pre-built templates, and drag-and-drop functionalities, allowing both technical and non-technical stakeholders to participate in application development. Banks can leverage low-code development to quickly create custom applications, streamline internal processes, and deliver innovative customer experiences.

iv. Artificial Intelligence (AI) and Machine Learning (ML):

Banks increasingly leverage AI and ML technologies to enhance operational efficiency, detect fraud, and improve customer experiences. AI-powered chat bots and virtual assistants are being used to provide personalized assistance and support. At the same time, ML algorithms analyze large datasets to uncover valuable insights for risk assessment and customer segmentation.

v. Robotic Process Automation (RPA):

RPA has gained traction in the banking industry, automating repetitive manual tasks and improving operational efficiency. By deploying software robots, banks can streamline processes such as customer on boarding, data entry, and compliance checks, reducing errors and enhancing productivity.

vi. Cloud Computing:

Banks are embracing cloud computing to optimize infrastructure costs, improve scalability, and enable faster deployment of applications. Cloud-based solutions offer enhanced data security measures, agility, and the ability to integrate with other systems, enabling banks to innovate and launch new services quickly.

vii. Block chain Technology:

Block chain has emerged as a disruptive force in the banking industry, transforming areas such as cross-border payments, trade finance, and identity verification. Its decentralized and secure nature has the potential to streamline processes, reduce costs, and increase transparency in transactions.

viii. Data Analytics and Big Data:

Banks leverage data analytics and big data technologies to derive actionable insights from vast customer data. By harnessing data analytics, banks can better understand customer behaviour, personalize offerings, and make data-driven decisions to mitigate risks and optimize operations.

ix. Cyber security and Fraud Prevention:

With the increasing digitization of banking services, cyber security, and fraud prevention have become critical priorities. Banks are investing in advanced cyber security technologies, including threat intelligence, encryption, and biometric authentication, to safeguard customer data and protect against evolving threats.

x. Internet of Things (IoT):

IoT technologies enable the interconnection of physical devices and objects, allowing them to collect and exchange data. IoT can be leveraged in the banking industry for various applications, such as remote asset monitoring, real-time fraud detection, and personalized customer experiences. For example, banks can use IoT devices to monitor ATMs, track inventory levels, and provide personalized offers based on customers' locations and preferences.

xi. DevOps and Automation:

DevOps practices combine software development and IT operations to enable continuous integration, continuous delivery, and faster application deployment.
By adopting DevOps methodologies, banks can reduce time-to-market for new services, enhance collaboration between development and operations teams, and improve their applications' overall quality and stability. Automation tools further accelerate the development and deployment processes, enabling banks to achieve higher operational efficiency.

12.5 EMERGING HORIZONS: THE LATEST TRENDS IN BANKING TECHNOLOGY :

The banking industry is undergoing a significant transformation driven by technological advancements and evolving customer expectations. As banks strive to enhance security, improve operational efficiency, and deliver exceptional customer experiences, they are embracing a range of emerging technologies. In addition to the previously discussed trends, several other banking technology trends are reshaping the industry. These trends include biometric authentication, RegTech, open banking, payment processing, and the rise of compostable applications.

i. Biometric Authentication:
Biometric authentication technologies, such as fingerprint recognition, facial recognition, and voice recognition, are gaining popularity in the banking industry.
These technologies provide enhanced security and convenience by using unique biological characteristics for user identification and authentication. Biometric authentication can be used for secure access to banking applications, transaction verification, and identity verification during customer on boarding processes.

ii. RegTech:
RegTech, short for regulatory technology, refers to the use of technology to streamline regulatory compliance processes in the banking industry. Banks face numerous regulatory requirements, and RegTech solutions help automate compliance monitoring, reporting, and risk management. These technologies utilize AI, machine learning, and data analytics to ensure adherence to regulations, reduce compliance costs, and minimize the risk of regulatory violations.

iii. Open Banking:
Open banking initiatives aim to increase competition and innovation in the banking industry by allowing customers to securely share their financial data with authorized third-party providers.
Through open APIs (Application Programming Interfaces), banks can collaborate with fintech companies and other financial institutions to develop new products and services that meet customer needs. Open banking promotes data sharing, enables personalized financial solutions, and enhances the overall customer experience.

iv. Payment Processing:
With the rise of digital payments and customers' evolving needs, payment processing technologies are rapidly advancing. Banks are adopting faster and more secure payment methods like contactless payments, mobile wallets, and real-time payment systems. These technologies offer convenience, speed, and improved transaction security, enabling customers to make payments seamlessly across various channels and devices.

v. Compostable Applications:

Compostable applications refer to the modular and flexible approach to application development, where applications are built by composing pre-built components and services. This approach allows banks to rapidly develop and deploy applications by reusing existing functionalities and integrating them with external services. Compostable applications promote agility, scalability, and faster time-to-market, enabling banks to respond quickly to changing business needs and customer demands.

vi. Autonomic Systems:

By leveraging autonomic systems, banks can improve operational efficiency, reduce human error, and enhance customer experiences. These systems have the capability to self-diagnose and self-correct, optimizing processes and minimizing downtime, ultimately leading to cost savings and increased productivity.

vii. Privacy Enhancing Computation:

Privacy-enhancing computation (PEC) technologies enable banks to perform computations on sensitive data while preserving privacy. With the increasing emphasis on data privacy and protection, PEC techniques allow for secure data sharing and collaboration while ensuring confidentiality. Banks can confidently analyze and derive insights from customer data without compromising individual privacy by utilizing cryptographic protocols and techniques like secure multi-party computation, differential privacy, and homomorphism encryption.

viii. Generative AI:

With generative AI, banks can analyze vast amounts of data and generate intelligent and contextually relevant responses, recommendations, and financial insights. This technology has the potential to revolutionize customer interactions, product innovation, and risk management in the banking sector.

ix. Security Issues In E-Banking: (Florentine, 1999)Security breaches basically fall into three categories; (a)breaches with serious criminal intent (fraud, theft of commercially sensitive or financial information), (b) breaches by 'casual hackers' (defacement of web sites or 'denial of service' - causing web sites to crash), and flaws in,

(c) Systems design and/or set up leading to security breaches (genuine users seeing / being able to transact on other users' accounts). All of these threats have potentially serious financial, legal and reputational implications.

The purpose of computer networking is mainly the sharing of computing resources and data across the whole organization and the outside world. Computer Networks can be primarily divided into two categories based on speed of data transfers and geographical reach. A Local area network (LAN) connects many servers and workstations within a small geographical area, such as a floor or a building. Some of the common LAN technologies are 10 MB Ethernet, 100 MB Ethernet, 1GB Ethernet, Fibre Distributed Data Interface (FDDI) and Asynchronous Transfer Mode (ATM). The data transfer rates here are very high. They commonly use broadcast mode of data transfer. The Wide Area Network (WAN), on the other hand, is designed to carry data over great distances and is generally point-to-point. Connectivity in WAN set-up is provided by using dial-up modems on the Public Switched Telephone Network (PSTN) or leased lines, VSAT networks, an Integrated Services Digital Network (ISDN) or T1 lines, Frame Relay/X.25 (Permanent Virtual Circuits), Synchronous Optical Network 51(SONET), or by using Virtual Private Networks (VPN) which are

software-defined dedicated and customized services used to carry traffic over the Internet. The different topologies, technologies and data communication protocols have different implications on safety and security of services.

To standardize on communications between systems, the International Organization of Standards developed the OSI model (the Open System Interconnection Reference Model) in 1977. The OSI breaks up the communication process into 7 layers and describe the functions and interfaces of each layer.

- Application Layer: Network Management, File Transfer Protocol, Information validation, Application-level access security checking.
- Session Layer: establishing, managing and terminating connections (sessions) between applications.
- Transport Layer: Reliable transparent transfer of data between end points, end to end recovery & flow control.
- Network Layer: Routing, switching, traffic monitoring and congestion control, control of network connections, logical channels and data flow.
- Data Link Layer: Reliable transfer of data across physical link and control of flow of data from one machine to another.

12.6 BANKING APPLICATIONS SYSTEMS :

Banking Products Internet banking applications run on diversified platforms, operating systems and use different architectures. The product may support centralized (bank wide) operations or branch level automation. It may have a distributed, client server or three runs on the local machine and the server software, called the web server, runs on a possibly remote machine. Some of the popular browsers part tier architecture based on a file system or a DBMS package. Moreover, the product may run on computer systems of various types ranging from PCs, open (UNIX based) systems, to proprietary main frames. These products allow different levels of access to the customers and different range of facilities. The products accessible through Internet can be classified into three types based on the levels of access granted:

i. **Information only systems:** General-purpose information like interest rates, branch locations, product features, FAQs, loan and deposit calculators are provided on the bank's web (WWW) site. The sites also allow downloading of application forms. Interactivity is limited to a simple form of 'e-mail'. No identification or authentication of customers is done and there is no interaction between the bank's production system (where current data of accounts are kept and transactions are processed) and the customer.

ii. **Electronic Information Transfer System:** These systems provide customer specific information in the form of account balances, transaction details, statement of account etc. The information is still largely 'read only'. Identification and authentication of customer takes place using relatively simple techniques (like passwords). Information is fetched from the Bank's production system in either the batch mode or offline. Thus, the bank's main application system is not directly accessed.

iii. **Fully Transactional System:** These systems provide bi-directional transaction capabilities. The bank allows customers to submit transactions on its systems and these

directly update customer accounts. Therefore, security & control system need to be strongest here. 1.6 Application architecture A computer-based application may be built as a monolithic software, or may be structured to run on a client–server environment, or even have three or multi-tiered architecture.

12.7 CYBER SECURITY IN BANKING :

The arrangement of technologies, protocols, and methods referred to as "cyber security" is meant to guard against attacks, damage, malware, viruses, hacking, data theft, and unauthorized access to networks, devices, programs, and data. Protecting the user's assets is the primary goal of cyber security in banking. As more people become cashless, additional acts or transactions go online. People conduct transactions using digital payment methods like debit and credit cards, which must be protected by cyber security.

Current State of Cyber security in Banks :

Between June 2018 and March 2022, Indian banks reported 248 successful data breaches by hackers and criminals; the government notified Parliament on Aug 2, 2022. The Indian government has reported 11, 60,000 cyber-attacks in 2022. It is estimated to be three times more than in 2019. India has been the target of serious cyber attacks, such as the phishing attempt that nearly resulted in a $171 million fraudulent transaction in 2016 against the Union Bank of India. Another instance of a cyber attack involving online banking was Union Bank of India, resulting in a substantial loss. One of the officials fell for the phishing email and clicked on a dubious link, which allowed the malware to hack the system. The attackers entered the system using fake RBI IDs.
Banks have been mandated to strengthen their IT risk governance framework, which includes a mandate for their Chief Information Security Officer to play a proactive role in addition to the Board and the Board's IT committee playing a proactive role in ensuring compliance with the necessary standards.

12.8 IMPORTANCE OF CYBER SECURITY IN BANKING :

The banking industry has prioritized cyber security highly. Building credibility and trust is the cornerstone of banking, so it becomes much more essential. Here are five factors that demonstrate the significance of cyber security in the banking industry and why you should care:

- Everyone looks to be entirely cashless and using digital payment methods like debit and credit cards. In this case, ensuring that the required cyber security safeguards are in place to protect your privacy and data is critical.
- After data breaches, it could be difficult to trust financial institutions. That's a significant issue for banks. Data breaches caused by a shoddy cyber security solution may easily lead to their consumer base moving their business elsewhere.
- The majority of the time, when a bank's data is compromised, you lose time and money. Recovery from the same can be unpleasant and time-consuming. It would entail canceling cards, reviewing statements, and keeping a watchful lookout for issues.
- Inappropriate use of your private information might be very harmful. Your data is sensitive and could expose a lot of information that could be exploited against you, even if the cards are revoked and fraud is swiftly dealt with.

- Banks need to be more cautious than most other firms. That is the price for banks to retain the kind of valuable personal data they do. If the bank's information is not safeguarded against risks from cybercrime, it could be compromised.

12.9 TOP CYBER SECURITY THREATS FACED BY BANKS :

Cybercrimes have increased frequently over the past several years to the point where it is thought that they are one of the most significant hazards to the financial sector. Hackers have improved their technology and expertise, making it difficult for any banking sector to thwart the attack consistently. The following are some dangers to banks' cyber security:

i. Phishing Attacks

One of the most frequent problems with cyber security in the banking sector is phishing assaults. They can be used to enter a financial institution's network and conduct a more severe attack like APT, which can have a disastrous effect on those organizations (Advanced Persistent Threat). In an APT, a user who is not permitted can access the system and use it while going unnoticed for a long time. Significant financial, data and reputational losses may result from this. According to the survey, phishing assaults on financial institutions peaked in the first quarter of 2021.

ii. Trojans

The term "Trojan" is used to designate several dangerous tactics hackers use to cheat their way into secure data. Until it is installed on a computer, a Banker Trojan looks like trustworthy software. However, it is a malicious computer application created to access private data processed or kept by online banking systems. This kind of computer program has a backdoor that enables access to a computer from the outside.

iii. Around the globe, there were roughly 54,000 installation packages for mobile banking trojans in the first quarter of 2022. There has been an increase of more than 53%compared to last year's quarter. After declining for the first three quarters of 2021, the number of trojan packages targeting mobile banking increased in the fourth quarter.

iv. Ransom ware

A cyber threat known as ransom ware encrypts important data and prevents owners from accessing it until they pay a high cost or ransom. Since 90% of banking institutions have faced ransom ware in the past year, it poses a severe threat to them. In addition to posing a threat to financial cyber security, ransom ware also affects crypto currency. Due to their decentralized structure, crypto currencies allow fraudsters to break into trading systems and steal money.

v. Spoofing

Spoofing involves faking one's identity, and can be used for various attacks such as identity theft. Phishing is one such use of spoofing that attempts to steal somebody's personal information or credentials by having them volunteer that information from a nefarious source that looks legit.

12.10 APPLICATIONS OF CYBER SECURITY IN BANKING :

Cyber security threats are constantly evolving, and the banking sector must take action to protect it. Hackers adapt when new defences threaten more recent attacks by developing tools and strategies to compromise security. The financial cyber security system is only as strong as its weakest link. It is critical to have a selection of cyber security tools and approaches available to protect your data and systems.

i. Crucial cyber security tools:

The following tools are playing important role in providing security to the banks

ii. Network Security Surveillance

Network monitoring is known as continuously scanning a network for signs of dangerous or intrusive behaviour. It is frequently utilized with other security solutions like firewalls, antivirus software, and IDS (Intrusion Detection System). The software allows for either manual or automatic network security monitoring.

iii. Software Security

Application security safeguards applications that are essential to business operations. It has features like an application allowing listing and code signing and could help you synchronize your security policies with file-sharing permissions and multi-factor authentication. The use of AI in cyber security will inevitably improve software security.

iv. Risk Management

Financial cyber security includes risk management, data integrity, security awareness training, and risk analysis. Essential elements of risk management include risk evaluation and the prevention of harm from those risks. Data security also addresses the security of sensitive information.

v. Protecting Critical Systems

Wide-area network connections help avoid attacks on massive systems. It upholds the rigid safety standards set by the industry for users to follow when taking cyber security steps to protect their devices. It continuously monitors all programs and performs security checks on users, servers, and the network.

vi. Methods of making banking Institution Cyber Secure:

Security ratings are a great approach to indicate that you're concerned about the organization's cyber security. Still, you must also demonstrate that you're following industry and regulatory best practices for IT security and making long-term decisions based on that knowledge. A cyber security framework may be beneficial. You can go for Ethical Hacking training to enhance your knowledge further.

12.11 TOP CYBER SECURITY FRAMEWORK FOR BANKS :

A cyber security framework provides a common language and set of standards for security leaders across countries and industries to understand their security postures and those of their vendors. With a framework, it becomes easier to define the processes and procedures your organization must take to assess, monitor, and mitigate cyber security risk. Let us take a look at some common financial cyber security frameworks:

i. NIST Cyber security Framework

The former president's executive order, Improving Critical Infrastructure Cyber security, asked for increased cooperation between the public and private sectors for recognizing, analyzing, and managing cyber risk. In response, the NIST Cyber security

Framework was created. NIST has emerged as the gold standard for evaluating cyber security maturity, detecting security weaknesses, and adhering to cyber security legislation even when compliance is optional. To achieve NIST compliance, organizations can follow the guidelines outlined in the NIST Cyber security Framework and undergo rigorous assessments to ensure they meet the necessary standards.

ii. The Bank of England's CBEST Vulnerability Testing Framework :

CBEST vulnerability testing methodology was developed by the UK Financial Authorities in collaboration with CREST (the Council for Registered Ethical Security Testers) and Digital Shadows. It is an intelligence-led testing framework. CBEST's official debut took place on June 10, 2013. CBEST leverages intelligence from reputable commercial and government sources to find possible attackers for a specific financial institution. Then, it imitates these potential attackers' methods to see how successfully they can breach the institution's Defences. This enables a company to identify the weak points in its system and create and implement corrective action plans.

iii. Cyber security and Privacy Framework for Privately Held Information Systems (the CIPHER Framework)

Computer systems that organizations, both public and private, control and that hold personal data gathered from their clients are referred to as PHISs (Privately Held Information Systems). CIPHER framework addresses electronic systems, digital information kinds, and methods for data sharing, processing, and upkeep (not paper documents). The CIPHER methodological framework's primary goal is to suggest procedures and best practices for protecting privately held information systems online (PHIS). The following are the main features of CIPHER methodological framework:

- Technology independence (versatility) refers to the ability to be used by any organization functioning in any field, even as existing technologies deteriorate or are replaced by newer ones.
- PHIS owners, developers, and citizens are the three primary users who focus on this user-centric approach.
- Practicality - outlines possible precautions and controls to improve or verify whether the organization is safeguarding data from online dangers.
- It is simple to use and doesn't require specialized knowledge from businesses or individuals.

12.12 CHALLENGES IN IMPLEMENTING CYBER SECURITY IN BANKING :

Some contributing elements have presented a significant challenge to digital cyber security in banking. The following are some of these:

i. **Lack of Knowledge :** The general public's understanding of cyber security has been relatively low, and few businesses have significantly invested in raising that awareness.

ii. **Budgets that are Too Small and Poor Management :** Due to the low priority given to cyber security, it frequently receives short budgetary shrift. Cyber security continues to receive little attention from top management, and programs that assist it are accorded low priority. They might have underestimated how serious these risks are, which is why.

iii. **Identities and Access are poorly managed :** The core component of cyber security has always been identity and access management, especially now when hackers are in

control and might access a business network with just one compromised login. Although there has been a little progress in this area, much work still needs to be done.

iv. **Increase in Ransom ware :** Recent computer attacks have brought our attention to the growing threat of ransom ware. Cybercriminals are beginning to employ various techniques to avoid being identified by endpoint protection code that concentrates on executable files.

v. **Smart phones and Apps :** The majority of banking organizations now conduct business primarily through mobile devices. Every day the base grows, making it the best option for exploiters. Due to increased mobile phone transactions, mobile phones have become a desirable target for hackers.

vi. **Social Media :** Hackers have increased their exploitation as a result of social media adoption. Customers that are less knowledgeable expose their data to the public, which the attackers abuse.

12.13 CHALLENGES RELATING TO CYBER SECURITY IN DIGITAL BANKING :

i. Lack of Awareness among the people regarding the Cyber security has been quite low, and not many firms invest in training and improving the overall Cyber security awareness among the people.

ii. Inadequate Budgets and Lack of Management Cyber security is accorded low priority; therefore, they are most of the time neglected in the budgets. Top management focus also remains low on Cyber security, and support for such projects is given low priority. This may be because they misjudge the impact of these threats.

iii. Weak Identity and Access Management Identity and access management has been the fundamental element of Cyber security and especially in these times when the hackers have the upper hand; it may require only one hacked credential to enter into an enterprise network. There has been a slight improvement in this regard, but still, a lot of work remains to be done in this area.

iv. Rise of Ransom ware the recent events of malware attacks bring our focus to rising menace of ransom ware. Cybercriminals are starting to use methods that avoid them to be detected by endpoint protection code that focuses on executable files.

v. Mobile devices and Apps Most of the banking institutions have adopted mobile phones as a medium to conduct business. As the base increases each day, it also becomes the ideal choice for exploiters. Mobile phones have become an attractive target for hackers as we see a rise in mobile phone transactions.

vi. Social Media Adoption of social media has led to hackers to exploit even more. Less aware customers put out their data for anyone to see which is exploited by the attackers.

12.14 SOLUTIONS TO THE THREAT TO THE CYBER SECURITY IN DIGITAL BANKING :

There are certain approaches that can be followed to curb the threat to the Cyber security in digital banking.

- Integrated Security As BFSI is highly regulated, banks invest time, money, and effort in employing the best technology which may be sometimes difficult to manage together. Moving towards integrated security where all components work and communicate together is more beneficial.
- Machine Learning and big data analytics is an essential element in leveraging cyber resilience. A new generation of security analytics has come out which can store and assess a huge number of security data in real-time.

- Understand the importance of security The mindset where security is seen as a cost must make way for security as a plus. The risk of security threats and its impact must be analyzed then only the importance of security can be truly understood.
- Invest in Next-generation endpoint protection Banks and institutions must invest in technologies that can recognize and eliminate the practices and actions used in exploits.
- Protect information today the data is stored in different devices and in the cloud, so every system that holds the sensitive data must be protected with security.
- Consumer Awareness It is one of the important aspects where the consumer must be made aware of not disclosing their banking credentials to anyone. They must report to the Cyber security cell in case of any suspicious developments in their transactions or in their bank account as quickly as possible.
- Anti-virus and Anti-malware applications a firewall may increase protection, but it won't stop attack unless updated anti-virus and anti-malware applications are used. Updating to the latest application can deter potentially disastrous attacks on your system.

12.15 CONCLUSION :

Every organization is concerned about cyber security. It is crucial for banks to have the proper cyber security solutions and procedures in place, especially for institutions that store a lot of personal data and transaction lists. Banking cyber security is an issue that cannot be bargained with. Hackers are more likely to target the banking sector as digitalization advances.

12.16 KEYWORDS :

Security control, emerging technologies, Cryptography, Digital signature, Cyber Security, Biometric authentication, Internet of Things, Artificial Intelligence and Machine learning.

12.17 SELF ASSESSMENT QUESTIONS :

1. Explain the technology related risks for a bank?
2. Discuss the technology-related risk management control aspects in a bank.
3. Explain the verification process of a Digital Signature?
4. Why use Digital Signatures?
5. Discuss the types of Certification Authority systems'?
6. How to minimize the security risks in telecommuting?

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Dr. K. Sudheer Kumar

LESSON - 13

DATA WAREHOUSING AND DATA MINING

OBJECTIVES :

After reading this unit, you should be able to:

- Understand the concepts of data warehouse and data mining
- Dscribe the process of data warehouse
- Explain the structure and implementation of data warehousing solution
- Describe how to use a data warehouse
- Explain the process of integration of data mining with data warehouse solution.

STRUCTURE :

13.1 INTRODUCTION :

The financial institutions and the commercial banks are characterised by the 'calculated risk taking' as the core generic activity. The process is spawned by the wider term 'Risk Management'. It involves managing risks inherent in internal procedures as also arising out of external business environmental factors like competition, government regulations, technological changes etc. The solution of Data Warehousing and Data Mining provide tools to carry out risk management effectively.

In the present information age where almost everything is seen as technically possible provided there is commitment to the objective, and that sufficient resources are available. There is an increasing demand for hard information relating to the issues where traditionally qualitative information used to be available. This falls in the newly developing discipline of business intelligence, the two technologies Data Warehousing and Datamining are possible technical solutions for the issues relating to providing business information to a bank or financial institution.

The changes in the market place are making it unavoidable for all business organisations to become more aware of economic factors and strategic choices. It is more so in the case of Banking and Financial Services establishments. It is also becoming well established that in all business strategies the vital factor that supports correct decision-making lies in the provision and availability of adequate, appropriate and timely knowledge and information, Further, with growing competition all round in the financial sector every financial institution is

seeking to arrive at a situation whereby the only functions or processes that can be justified are those that "add value".

The growing need for information and knowledge has come about because of the extensive, rapid and continuing changes in the business environment. The present scenario is characterised by following perceptions:

i) Banks are facing competition from new competitors
ii) Banks have now to take notice of pressure groups and minority shareholders
iii) Banks have to operate within Government Managed Economies
iv) The world is more aware of the fact that by nature, most resources are finite
v) Customers tend to be much better informed and they have more choice
vi) Banks are competing against other banks who are using Knowledge and Information as a competitive weapon

In banks there still exists an enormous divide that separates Information Technology and management's need for knowledge and information. Sources of data and information from which the bank must derive its knowledge lie both outside the bank and within it. Within the bank that data and information will reside primarily in legacy databases and will be available in other systems and procedures of an organisation like its business practices, various departmental methods, its know-how and intra-organisational interfaces. An organisation must be able to draw on all of these sources. Only then the optimum use of the resources can be made by an organisation for its business strategies.

Following are some of the sources where important information about a financial institution can be found:

i) The customers - what they think, what they want, how they see the hank or the financial institution as a provider of service both materially and psychologically.

ii) The employees - what they know, their perceptions about the bank or the financial institution

iii) The legacy systems

iv) The actual data, information and knowledge that flows through the bank or the financial institution, and

v) The business environment.

13.2 DATA WAREHOUSING CONCEPTS :

Here we can find the concepts of data warehouse

i) Meaning of Data Warehouse

A data warehouse can be defined as a single, complete and consistent store of data obtained from a variety of sources and made available to end users in a way they can understand and use in a business context. It is not a single product. Instead, it is n flexible environment, comprising of several technologies. The figure 13.1 depicts the building blocks of a data warehouse.

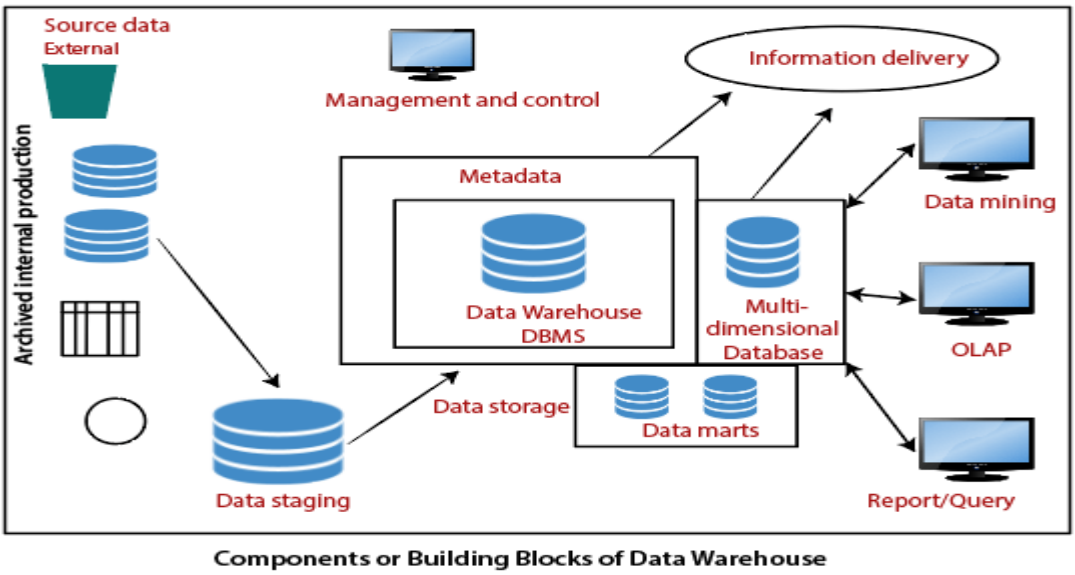


Figure 13.1: Building blocks of a Data Warehouse

The completeness and consistency of the data is critical for any successful implementation of data warehouse. In the context of a business, completeness of data is ensured by the process of 'enterprise modelling'. This involves understanding the business strategies and the data required supporting and tracking their achievement. This data may exist in various sources on different platforms. To ensure the consistency, all this data must be copied from these sources for use in the warehouse. The data must be combined according to the enterprise model.

A data warehouse is a physical separation of an organisation's Online Transaction processing (OLTP) systems from its decision support systems (DSS). It includes a repository of information that is built using data from the distributed, and often departmentally isolated, systems throughout the organisation. Data in the data warehouse can be modelled and analysed to make the organisation more competitive. Data warehousing is about turning data into information so that business users have more knowledge with which to make competitive decisions. Data in the warehouse are organised by subject rather than application, so the warehouse contains only the information necessary for' decision support processing.

The data in the warehouse are collected over time and used for comparisons, trends, and forecasting. These data are not updated in real time, but are migrated from operational systems on a regular basis when data extraction and transfer will not adversely affect the performance of the source operational systems.

ii) Importance of Data Warehouse:

The primary motivation for a bank to implement a data warehouse usually centres around improving the accuracy of information used in the decision-making process. The other important function of data warehouse is to consolidate the rules of business logic practised by o bank. With the increasing use of personal computers, there is high probability that at individual levels very significant organisational practices remain confined to end-user applications such as spreadsheets, personal databases, and other personal productivity tools. This individual-user-based data is used in a data warehouse to allow wider use.

When all the data is put together in a data warehouse, a complete picture of a bank or financial institution's business, merges. It helps a bank learn about its customers, including their buying habits and patterns. The bank or financial institution's functioning can be

understood in historical perspective, which allows better tracking and responding to business trends, facilitates forecasting and planning efforts, and thereby leading to strategic business decision. Figure 13.2 shows the value yield of a data warehouse solution. As a first step, the business develops sharper focus on the customer relations, which ensures customer loyalty and allows an organisation to adopt one stop service for its customers thereby leading to 1) increased revenue from the same customer base, and 2) reduced cost.

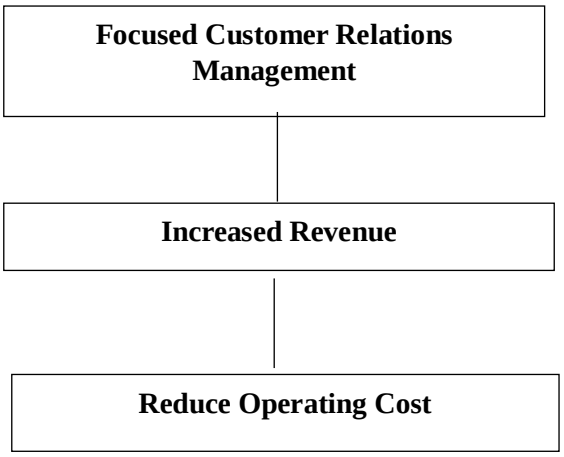


Figure 13.2: Value derived from a Data Warehouse Solution

13.3 BUILDING A DATA WAREHOUSE:

Hear is the process of Building data warehouse, The major steps for data warehouse implementation are:

i) Subject definition
ii) Data capture
iii) Data transformation
iv) Metadata management
v) Loading the warehouse

i. Subject definition : Determining which subjects will be created and populated in the data warehouse is called subject definition. Each subject has several entities associated with it. The process of defining the subjects and associated entities is the starting point for implementing a data warehouse. A subject is a logical concept; for example, customers. Subjects in a data warehouse for sales and marketing might consist of entities such as name, address, etc. Subjects do not necessarily have a one-to-one correspondence to operational data sources. Subject definition is a time-consuming, and at times somewhat tedious activity.

In the context of a data warehouse, through subject and entity definition, the process of abstracting the business logic that is generally scattered amongst the business groups and consolidating it into a central repository, is completed. A number of different methodologies have been devised for organisations to follow for this purpose. All the methodologies have following three main stages:

a) Conduct user and management interviews,
b) Build the logical data model, and
c) From the logical data model, build the transformation and physical data model.

As part of defining the business subjects, it is necessary to interview various individuals in the organisation in order to understand the various business objectives, the data currently in use for decision support, and the information-gaps in giving support to current and future decision-making activities. In h general business context, members of an organisation from both planning as well as operations side - business planners, business managers, and end users - must be included in the interview exercise. This is expected to provide a balanced and complete framework.

The next step is to develop a logical data model. It is seldom that a consistent logical model will follow the first step in the first attempt. In general, it may require several iterations between this and the first step before a consistent logical model of business data of the organisation is arrived at.

In the third step, a transformation model, which defines how to translate the operational data values for the data warehouse store, is constructed. The transformation model is built' by investigating the operational data sources to determine:

a) Whether a data source exists
b) Where it exists i.e., its physical location,
c) Its format,
d) Its level of granularity
e) Its access method, and
f) Any other physical properties that help description of data.

Using these properties of the data, a scheme is worked out to transfom this data for using in populating the warehouse. This stage is also used to create any derived information not stored explicitly in the operational data stores. The purpose of these models is to determine the structure and content of the data warehouse and to define how operational data must be acquired and transformed to populate the warehouse.

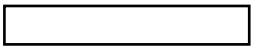
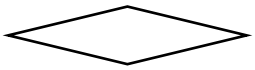
As a part of this step, the logical model is used to derive a physical data model, which will define the actual data storage architecture for the data warehouse. The physical design should take into account how the data is to be used, so the data can be organised in an optional fashion. In other words, access patterns to data in the warehouse are determined by analysis and reporting requirements, which determine the warehouse design. The physical data model also takes into consideration how any data marts might be defined, the frequency of the data load process, the types of summarisations required, and any other aspect relating to the physical storage of the data.

Summarisation or aggregation of data is done on a number of dimensions, such as time, geographical or organisational unit or by any other category of parameters. These summaries of data form the starting point for users to find information about the business or activities of the organisation. It is often necessary to carry out the analysis from summary to detailed level in specific areas. This is called 'drilling down'. The reverse of it is called 'drilling up'.

Physical models can be based on several design constructs. Some of these are discussed below:

a) Entity relationship model: Entity relationship model is based on set theory and Structured Query Language (SQL), the entity relationship model is the choice for modern OLTP database management systems (DBMSs). This model seeks to drive out all of the redundancy from the database by dividing the data into many discrete entities across a large number of small tables. When a transaction needs to change data (through adds, deletes, or updates), then the database only needs to be "touched" in one place. Figure 13.3 shows an E-R diagram with description of its components. However, being optimised for online update and fast transaction turnaround, this model is not well suited for the data warehouse environment.

The entity sets and the relationships between them use the following notations:

- Entity set is shown in rectangle 
- Relationship is shown as diamond 
- Attribute is shown as oval 
- Entity set, relationship and Attributes are joined by a line

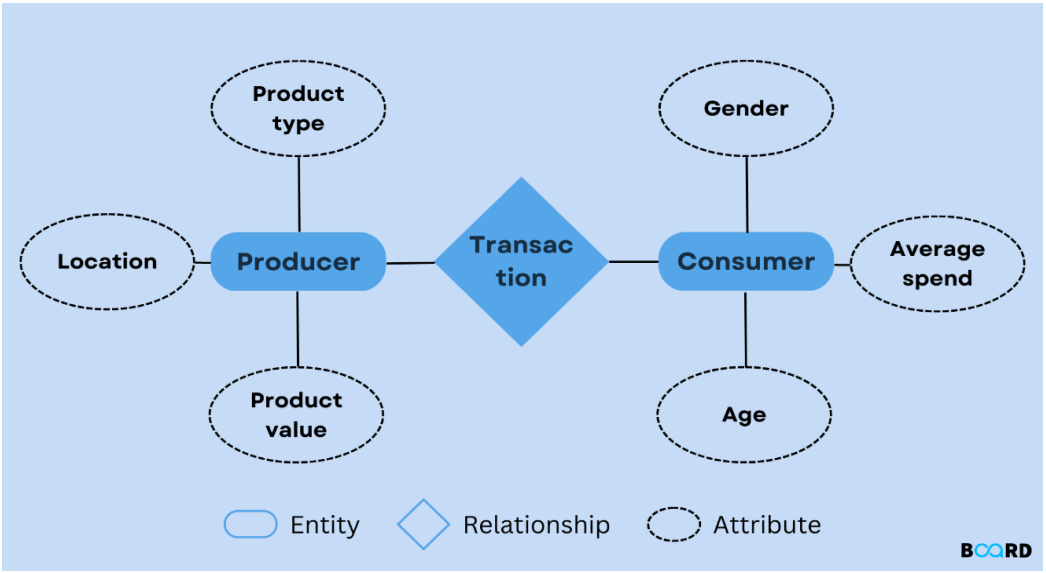


Figure: 13.3: Example of an E-R diagram

b) Star schema: Star schema uses an asymmetrical relationship model employing a single, large fact table of highly additive numeric values along with smaller tables holding descriptive data, or dimensions. In a common implementation, the fact table may contain hundreds of thousands of rows of continuous data values that can be added and quickly compressed into a small result set. Each dimension table holds a primary key and a composite, foreign key is held in the fact table. In this schema, typically almost 80 per cent of time is spent in building query constraints using values in the dimension tables and the remaining time is spent in taking the selected constraints and constructing a query that joins

fact and dimension tables together (through the primary/foreign key relationship). It generally leads to a slow response situation.

c) Snowflake schema: Snowflake schema uses a model similar to the star schema, with the addition of normalised dimension tables that create a tree structure. The normalisation of the dimension table reduces storage overhead, by eliminating redundant values in the dimension table.

d) Persistent multidimensional store: Persistent multidimensional stores use a specialised data storage structure called a multidimensional database (MDDB), where data is summarised at the dimension intersections and then stored as individual cells in a matrix format, rather than in the row-and-column format of relational database tables. The summarisations needed for multidimensional analysis are predetermined and data is organised and stored along dimensions such as time, products, regions, retail site, etc. Found at these intersecting points are the "facts" or data values for the dimensions. The goal is to make it extremely quick and easy for users to produce online answers to their multidimensional queries. MDDBs can also contain dimensions that are consolidated into hierarchies. These hierarchical consolidations provide the business user with the ability to view summary level information, and then drill down into successive levels of detail.

e) Summary tables: Summary tables consist of detail level data that has been transformed into a more compact form. Typically, summarisations tend to follow natural hierarchies. For example, summarisation of products sold may be done on a daily, weekly, monthly, and annual basis. By permanently storing these summaries, the end user can use tools to drill down or drill up into this summary information. Starting at the lowest level of summarisation (in this example, daily) and going up the hierarchy, The table storage requirements get smaller, but at the same time some of the detail data values are not carried over.

It is entirely possible that a single data warehouse implementation may combine one or more of these schemata.

ii. Data capture: The core of data capture is copying data from operational data stores in formats compatible with the design of data warehouse. The central technique that has developed in this regard is called Data Replication.

Data Replication is defined as 'a set of techniques that provides comprehensive support for copying and transforming data from source to target location in a managed, consistent I and well-understood manner'. The process of data replication consists of following logical steps:

a) Identify the source data: All the data items must be first defined in terms of existing definitions of the data, as these data items are already in existence.

b) Identify or define the target data: Target data often does not exist in advance of defining replication process. The structure of the target data should be defined through data modelling process.

c) Create the mapping between source and target: After the definitions of both source and target data are available, a mapping definition is required to handle a variety of different types of transformation, these may range from relatively simple types such as from EBCDIC format to ASCII format, to rather complex processes that combine a number of pieces of source data to generate new data in the target environment.

d) Define the replication mode: There are two basic modes of data replication - refresh and update. Refresh mode involves a bulk transfer of data from source to

target. Update mode, on the other hand, identifies and transfers only changed data from source to the target environment. It is necessary to define the mode of replication in advance.

e) Schedule the process of replication: The replication being a repetitive process, it needs to be scheduled at defined intervals which could be daily, weekly, monthly etc. depending on the nature of design of data warehouse.

f) Capture the required data from the source.

g) Transfer the captured data between source and target.

h) Transform the captured data based on the defined mapping.

i) Apply the captured data to target.

j) Confirm the success or failure of the replication.

k) Document the outcome of the replication in the metadata.

l) Maintain the definitions of source, target and mapping.

Data acquisition, as has been described in twelve steps above, refers to the program logic that attaches to the operational data stores. This is done through programmes written in languages like COBOL, or data access language calls, such as DL/1 for IMS (Information Management System, a commercial database from IBM), that can be used for writing programs that perform data acquisition logic. There are other solutions using fourth-generation languages to provide a single application environment that can abstract the different file access methods from the language syntax.

As an example, to take care of different data structures, the SAS System provides a family of access methods. The SAS System uses a layered input/output (1/O) model to abstract the physical properties and I/O specific logic to a data source for read, write, or update functions. This abstracted I/O model minimises the need to know a variety of data access languages. These access methods provide the framework for translating syntax for read, write, and update services into the appropriate Relational Database Management System (RDBMS) or file structure calls. Presently, it provides more than 50 different access methods for a variety of file types found in hardware environments. These methods include access to:

- Relational database management systems
- Hierarchical database management systems
- Network database management systems
- Data gateways and standard application program interfaces (APIs), such as Open Database Connectivity (ODBC)
- External file formats, such as VSAM
- Sequential for tape and other sequential access devices and media

iii. Data transformation :

Since data coming from the business is typically in an inconsistent form for decision support, data transformation is required. Data transformations are used to convert and summarise operational data into a consistent, business-oriented format. When data is moved into the data warehouse from the operational environment, their values should be represented in a consistent fashion. At this stage, exercise may also he carried out to generate any derived information that is not contained in operational systems but can be useful in the decision support domain. The data warehouse may contain different summarisation and transformation levels.

Transformation of data consists of two distinct steps:

a) Integration and conversation and
b) Summarisation.

Integration and conversion are aimed a' resolving data inconsistencies in value definitions and formats among data. This step is also an opportunity to create new columns for analytic purposes. Integration is combining different attributes from different sources to create a consistent entity. For example, customer names may be obtained from the business database. But in order to be able to conduct analysis about customers along a geographic dimension, we need to also include state and city code from the sales database. Conversion is standardising the values used to represent the same information among different transaction databases. For example, one database may use "M" to represent males and "F" to represent female and a second database may code males as "1" and females as "2." Before passing data from the operational environment into the warehouse, these data values must be made consistent.

Summarisation is another aspect of transformation. In the data warehouse environment, summarisation is critical to provide the business planners and analysts a historical view, rather than the record-by-record view provided by the operational database. Summarisation can also help reduce the volume of data the planners and analysts must process compared to the total volume of data found in the operational environment. Summaries consist of numerical summarisations as well as groupings, or counts. A desirable strategy is to pre-compute as many summaries as possible, minimising the need for the end-user access tool to compute summaries and counts on the fly. However, attempting to summarise and group every combination of values will quickly reach the point of diminishing returns as disk space is consumed. This is where a carefully modelled warehouse, constructed with a thorough end-user requirements-gathering phase, pays dividends.

iv. Meta data management:

To provide access to the data warehouse, it is necessary to maintain some form of data, which describes the data warehouse. This data is called metadata. It masks the complexities of the technology of a Data Warehouse from the users. It acts as a critical aid for navigating the data warehouse. It consists of:

a) Data definitions,
b) Attribute and domain values,
c) Data timeliness,
d) Data coverage,
e) Business rules, and
f) Data relationships.

Technical metadata is used by a data warehouse administrator to know when data was last refreshed, how it was transformed, and other details important for managing the data warehouse, Metadata resides at all levels within the data warehouse. Metadata is the "glue" which holds all the pieces together in warehouse environment. In most cases, metadata is scattered throughout the organisation. As a result, one of the major issues in implementing a data warehouse solution is the collection and consolidation of metadata information. Another way to view metadata is the warehouse repository that defines the rules and content of the warehouse and maps this data to the end user on one end and to the operational sources of data on the other.

There are advantages in having metadata accessible to the end user. It facilitates access of information from the data warehouse. It is essential to have meta data as an abstraction layer that masks these technologies, making information resources access-friendly. Ideally, end users access data from the data warehouse without knowing where the data reside, the format, or any other physical attributes. Examples of business metadata are:

- Defined subjects
- Hierarchies
- Actual values column in forecast of budget
- Budget values columns in forecast of budget
- Time Dimensions
- Critical success values columns
- Categorical columns
- Classification columns
- Dependent variable columns
- Independent variable columns
- Display attribute
- Value constraints, etc.

From a process management point of view, the other type of metadata required for the data warehouse is technical metadata. Because of the complexity of data flows from operational systems to the data warehouse, technical metadata is needed to manage and track the various processes. Technical metadata defines the attributes that describe the physical characteristics of an item-where it came from, how it was transformed, who is responsible for it, when it was last loaded, etc. While some of the technical metadata may be of interest to the business user, it is used mainly by the information technology specialists who have to manage all of the processes that are required to flow data from, the operational environment to the data warehouse environment.

v. Loading the warehouse :

In contrast to the online data in an organisation, a data warehouse does not change its state from moment to moment, but is loaded or refreshed by bringing static snapshots from the business transaction environment on a regularly scheduled basis. This periodic loading of static snapshots from the online transaction-processing environment gives the data warehouse its time-variant quality. By definition, the data warehouse is a time series. In most cases, the data warehouse designer must consider three loading strategies:

a) The loading of data already archived,

b) The loading of data contained in existing applications, and

c) Incremental changes from the online processing environment from the last time the data was loaded into the data warehouse.

The simplest loading technique is the loading of data already archived. Archival data is usually stored on some form of sequential bulk storage, such as magnetic tape. Application logic must be written that can access a variety of data types stored in a variety of data formats, and span multiple applications across multiple hardware environments. This style of loading is fast to build, but over time is not very scalable other data capture and loading techniques should also be considered.

The loading of data contained in existing applications is similar to loading archived data. Existing files and tables are scanned and data is transformed according to the established transformation model. In most cases, this process traverses a number of different technologies and file Systems. For example, a segment with IMS running under MVS is scanned, the data are transformed, and finally, the data are transported and loaded into a relational format on a UNIX file system. The resources consumed by this type of load are considerable, therefore, this method should be used for a one-time load.

One method for minimising the impact on the transaction-processing environment is to load the data elements into an application environment and perform the transformation inside the application. This approach has the advantage of only having to understand a single framework, as opposed to having to deal with various data access and data manipulation languages used by the various transaction processing data stores.

The third data warehouse loading strategy is to load only the changes into the warehouse that has been made since the last time the data warehouse was refreshed. This process is sometimes referred to as change data capture. A number of strategies for change data capture exist:

- Replacing the entire table from the OLTP source
- Scanning for date-time stamps in the OLTP source
- Reading operational audit files
- Trapping changes at the RDBMS level
- Reading RDBMS log tapes
- Comparing the OLTP "before" and "after" images with one another.

AS the data warehouse grows and expands, the only scalable solution is the change data capture. A method must be devised that captures only those data values that have changed since the last data warehouse refresh.

13.4 EXPLOITING THE DATA WAREHOUSE :

The exploitation components attached to the data warehouse are the pieces visible to the end users. Getting information structured and organised to meet business needs is vitally important, but it is a means to an end, not an end in itself. A data warehouse is incomplete until it provides the exploitation tools that enable end users to view, analyse, and report on data in ways that support their decision making.

Depending on the end users' requirements, data warehouse exploitation tools may be anything from ready-to-use, simple query and reporting tools to multidimensional analysis tools to advanced Executive Information System (EIS) applications to tools for complex analysis and modelling.

On Line Analytical Processing (OLAP) enables users to fully realise the business potential of organisation-wide data by delivering access to business data organised along the categories that make most sense to business users. This data is summarised at many levels of detail and probably most important, has history, allowing for the examination of trends, both backwards and forwards. Data are examined in spreadsheets or table-like viewers, reducing the need to learn something new to gain value from the summarised data.

"Slice and dice" have become the identifying metaphor for OLAP. This procedure describes the activity of drilling through the available data, in an unanticipated manner, allowing users

to change direction in their search at any time in their examination of the data. A typical slice-and-dice task might be:

i) Look at sales, by region, for this time period, compared to same time last year.

ii) Now, break this out by product group. and now, just look at product group A .... but now, only look at the last six months.

iii. Finally, look at product group A sales,over the last six months by sales team, within each region.

While the distinction between EIS solutions and OLAP solutions continues to blur, EIS applications are designed to ensure that decision makers have instant access to relevant and up-to-date information. Accessing information for the data warehouse, EIS solutions combine interactive, user-friendly interfaces with comprehensive functionality to place users in the driver's seat. Multidimensional viewing enables data to be viewed from an unlimited number of perspectives: drill-down, hot-spotting, and traffic lighting support the identification of business trends and long-term developments, while critical success factors and key performance indicators help decision makers to focus on key issues.

While each organisation has unique needs and expectations from its data warehouse, in general, the most successful implementations are those that provide an end-to-end solution. This architecture includes a data repository, a data warehouse administrator layer, a metadata manager, and front-end applications that address the specific needs of each team in the organisation to access data relative to their functions. An end-to-end data warehousing solution also allows for scalability and portability to ensure enterprise-wide access to data. The following figure 13.4 depicts an end-to-end implementation of data warehouse:

The business benefits derived from implementing n data warehouse are very significant. Data warehousing offers organisations an opportunity to reinvent the tools used for decision making by' making large amounts of data collected by business yield copious amounts of useful information about customers and business environment.

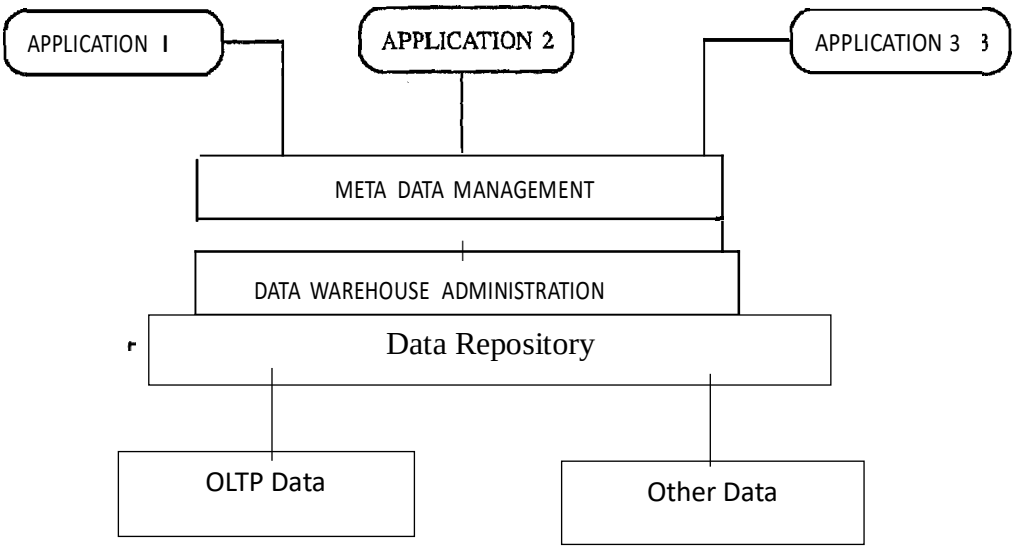


Figure 13.4: Schematic diagram of an end-to-end data warehouse solution.

13.5 DATA MART :

A data mart is a repository of data gathered from operational data and other sources that is designed to serve a particular community of knowledge workers. In scope, the data may be derived from an organisation-wide database or data warehouse or be more specialised. The emphasis of a data mart is on meeting the specific demands of a particular group of knowledge users in terms of analysis, content, presentation, and ease-of-use. Users of a data mart can expect to have data presented in terms that are familiar.

In practice, the terms 'data mart' and 'data warehouse' each tend to imply the presence of the other in some' form. However, in most cases design of a data mart tends to start from an analysis of user needs and that a data warehouse tends to start-from an analysis of what data already exists and how it can be collected in such a way that the data can later be used. A data warehouse is a central aggregation of data (which may be available in an architecture which is distributed physically); a data mart is a data repository that may derive from a data warehouse or not and that emphasises ease of access and usability for a particular designed purpose. In general, a data warehouse tends to be a strategic but somewhat unfinished concept; a data mart tends to be tactical and aimed at meeting an immediate need.

13.6 DATA WAREHOUSE IMPLEMENTATION IN FINANCIAL SERVICES INDUSTRY :

In financial institutions, a data warehousing solution provides accurate, consistent and comprehensive information, which in turn leads to improved decision support systems. The critical areas in which it helps include:

i) Risk Management
ii) Asset and Liability Management
iii) Profitability Analysis like customer profitability, product and service profitability, branch profitability, etc.

Analyses of customer and market information:

Following are some examples of implementation of data warehouse solutions in banks:

i) In Canadian Imperial Bank of Commerce, the solution is helping bank track sensitivities of its portfolios to market. In a typical case of search on derivatives, the time was reduced by a factor of almost ten.

ii) Capital One Financia Corporation is using the solution to fine-tune its approach to customers with highly individualised solicitations.

13.7 DATA MINING :

Comprehensive data warehouses that integrate operational data with customer, supplier, and market information lead to an explosion of information. In a competitive environment, it is essential to have timely and sophisticated analysis on an integrated view of the data. However, there is a growing gap between more powerful storage and retrieval systems and the ability of users in a bank or financial institution to effectively analyse and act on the information these systems contain. Both relational and OLAP technologies have great capabilities for navigating massive data warehouses, but simple navigation of data is not enough, because of the mass of data. A different approach is needed to structure and prioritise information for specific end-user problems in a bank or financial institution. The data mining tools provide this capability.

Data mining is extraction of hidden predictive information from large databases. It is a powerful new technology with great potential to help banks and financial institutions focus on the most important information in their data warehouses.

Data mining tools predict future trends and behaviours, allowing banks and financial institutions to make proactive, knowledge-driven decisions. The automated, prospective analyses offered by data mining technologies move beyond the analyses of past events which is, in general, provided by retrospective tools like in the case of decision support systems, Data mining tools provide response to business questions that traditionally were too time consuming to resolve. These tools search the databases for hidden patterns. Often it leads to finding of predictive information that are generally not expected in a conventional exercise of prognostications based of historical data.

As most banks and financial institutions already collect and refine large quantities of data, implementation of data mining solutions does not need a completely new infrastructure. Data mining techniques can be implemented rapidly on existing software and hardware platforms to enhance the value of existing information resources, and can be integrated with new products and systems as they are brought on-line.

As an example, when data mining solution is implemented on high performance client/ server or parallel processing computers, data mining tools can analyse large databases to deliver answers to questions such as, " Which customers are most likely to respond to the promotional campaign for a new banking product and why?"

Data Mining Technology: Data mining techniques are the result of a long process of research and product development. This evolution began when business data was first stored on computers. It continued with improvements in data access, and more recently, it has led to development of new technologies that allow users to navigate through their data in real time. Data mining takes this evolutionary process beyond retrospective data access and navigation to prospective and proactive information delivery. Data mining is supported by three technologies;

i) Large data collection
ii) Powerful multiprocessor computers
iii) Data mining algorithms

The size of a bank or financial institution's databases would in general depend on the kind of activities, which are being carried on by it. However, a typical bank or financial institution engaged in retail activities may have databases of size in gigabyte range. The accompanying need for improved computational engines can now be met in a cost-effective manner with parallel multiprocessor computer technology. The third component of data mining algorithms embodies techniques, which pull out information from the large mass of raw data residing in the databases.

In the evolution from business data to business information, each new step has built upon the previous one. For example, dynamic data access is critical for drill-through in data navigation applications in a data warehouse environment, and the ability to store large databases is critical to data mining.

The table 13.1 below gives characteristics of the four steps, in which the evolution up to data mining can be conceptualised:

Table 13.1 Steps in the evolution of data mining

Evolutionary Step			
Business Question	**Enabling Technologies**	**Characteristics**	**Data Collection**
1960's			
"What was my total revenue in the lilst five years?"	Computers, tapes, disks	Retrospective, static data delivery	Data Access
1980's			
"What were unit sales in Uttar Pradesh last March? Drill down to Lucknow	On-line analytic processing (OLAP), multidimensional databases, data warehouses	Retrospective, dynamic data delivery at multiple levels	Data Mining
1990's			
"What were unit I sales in Uttar I Pradesh last March? I Drill down to Lucknow."	On-line analytic processing (OLAP), multidimensional databases, data warehouses	Retrospective, dynamic data delivery at multiple levels	Data Mining
Emerging Today			
"What's likely to happen to Lucknow unit sales next month? and why?	Advanced algorithms, multiprocessor computers, large databases	Prospective, proactive information delivery	Data Mining

Table 13.1 Steps in the evolution of data mining

The core components of data mining technology have been under development for decades, in research areas such as statistics, artificial intelligence, and machine learning. Today, the maturity of these techniques, coupled with high-performance relational database engines and broad data integration efforts, make these technologies practical for current data warehouse environments.

Following are the most commonly used techniques in data mining:

i) **Artificial neural networks**: Non-linear predictive models that learn through training and resemble biological neural networks in structure.

ii) **Decision trees:** Tree-shaped structures that represent sets of decisions. These decisioils generate rules for the classification of a dataset. Specific decision tree methods include Classification and Regression Trees (CART) and chi Square Automatic Interaction Detection (CHAID).

iii) **Genetic algorithms:** Optimisation techniques that use processes such as genetic combination, mutation, and natural selection in a design based on the concepts of evolution.

iv) **Nearest neighbour method**: A technique that classifies each record in a dataset based on a combination of the classes of the record(s) most similar to it in a historical dataset.

v) **Rule induction**: The extraction of useful if-then rules from data based on statistical significance.

Many of these technologies have been in use for more than a decade in specialised analysis tools thnt work with relatively small volumes of data. These capabilities arc now evolving to integrate directly with industry-standard data warehouse and OLAP platforms.

DM Business Opportunities: Data mining derives its name from the similarities between searching for valuable business information in a large database - for example, finding linked products in gigabytes of stored data and mining a mountain for a vein of valuable core. Both processes require either sifting through an immense amount of material, or intelligently probing it to find exactly where the value resides. Given databases of sufficient size and quality, data mining technology can generate new business opportunities by providing following capabilities:

i) Automated prediction of trends and behaviours: Data mining automates the process of finding predictive information in large databases. Questions that traditionally require extensive hands-on analysis can now be answered directly from the data, and quickly. A typical example of a predictive problem is in the context of targeted marketing. Data mining uses data on past promotional campaigns to identify the targets most likely to maximise return on investment in future campaigns. Other predictive problems include forecasting bankruptcy and other forms of default, and identifying segments of a population likely to respond similarly to given events.

ii) Automated discovery of previously unknown patterns: Data mining tools sweep through databases and identify previously hidden patterns in one step. An example of pattern discovery is the analysis of retail sales data to identify seemingly unrelated products that are often purchased together. Other pattern discovery problems include detecting fraudulent credit card transactions and identifying anomalous data that could represent data entry keying errors.

iii) Integrating with legacy systems: Data mining techniques can yield the benefits of automation on existing software and hardware platforms, and can be implemented on new systems as existing platforms are upgraded and new products developed. When data mining tools are implemented on high performance parallel processing systems, ' these can analyse massive databases in minutes. Faster processing means that users can automatically experiment with more models to understand complex data. High speed makes it practical for users to analyse huge quantities of data, larger databases, in turn, yield improved predictions. Databases can be larger in both depth and breadth:

a) More columns: Business planners and analysts must often limit the number of variables they examine when doing hands-on analysis due to time constraints. Yet, variables that are discarded because they seem unimportant may carry information about unknown patterns. High performance data mining allows users to explore the full depth of a database, without preselecting a subset of variables.

b) More rows: Larger samples yield lower estimation errors and variance, and allow users to make inferences about small but important segments of a population.

DM Architecture and Applications:

The technique that is used in data mining to infer important things that were not known earlier or to predict what is going to happen next is called 'modelling'. In data mining a situation is identified which can be fully described in terms of definite parameters. The parameters are clearly defined and are determinable. On the basis of this definition, a model is created using these well-defined and known parameters. This model is then used to find out the unknown parameters in similar situations.

The exercise of model building is something that organisations have been doing for a long time, even before the advent of computers or data mining technology. However, with the computers, large amount of information about a variety of situations, where an answer is known, can be used to derive the characteristics of the data, which can be used to construct a model. Once the model is built it can then be used in similar situations to arrive at valuable business information, prognostications.

i) **Architecture**: The data mining solutions can be viewed as having two important dimensions:
   a) The user dimension, and
   b) The business database dimension.

It is necessary for any data mining solution to be fully integrated with the organisation's data warehouse as also with the interactive business analysis tools, used by the members in the organisation. However, many data mining tools available at present operate outside of the warehouse, requiring extra steps for extracting, importing, and analysing the data.

In an environment where the data mining tools are integrated with the organisation's data warehouse, the new business insights derived from data mining applications can be implemented operationally through the data warehouse. The resulting improved analytic data warehouse can be leveraged to add value to or reduce loss of value from the business processes throughout the organisation. The examples for such use would be in areas such as promotional campaign management, fraud detection, new product design, etc.

ii) **Applications:** The data mining technology has application in any organisation, which is generating large amount of data through its operations. The underlying assumption is that a great amount of information lies hidden in the large data, which can be mined gainfully using data mining tools.

At present, organisations in information-intensive industries such as financial services and direct mail marketing, have adopted this technology. However, it is applicable to any company looking to leverage a large data warehouse to better manage their customer relationships. Two critical factors for success with data mining are:

a) A large, well-integrated data warehouse and
b) A well-defined understanding of the business process within which data mining is to be applied (such as customer prospecting, retention, campaign management, and so on).

Some potential application areas are:

a) **Pharmaceutical company**: it can analyse its recent sales force activity and their results to improve targeting of high-value physicians and determine which marketing activities will have the greatest impact in the next few months. The data needs to include competitor market activity as well as information about the local health care systems. The results can be distributed to the sales force via a wide-area network that enables the representatives to review the recommendations from the perspective of the key attributes in the decision process. The ongoing, dynamic analysis of the data warehouse allows best practices from throughout the organisation to be applied in specific sales situations.
b) **Credit card company**: it can leverage its vast warehouse of customer transaction data to identify customers most likely to be interested in a new credit product.

c) **Transportation company**: a transportation company with a large direct sales force can appdata mining to identify the best prospects for its services. Using data mining to analyse its own customer experience, this company can build a unique segmentation identifying the attributes of high-value prospects.
d) **Consumer package goods company**: it can apply data mining to improve its sales process to retailers. Data from consumer panels, shipments, and competitor activity can be applied to understand the reasons for brand and store switching. Through this analysis, the manufacturer can select promotional strategies that best reach their target customer segments.

All of the above examples have a common ground. These are trying to leverage the knowledge about customers implicit in a data warehouse to reduce costs and improve the value of customer. relationships. These organisations can bring into focus their most important customers and prospects, and design targeted marketing strategies to best reach them.

13.8 SUMMARY:

The data warehouse is a technology that allows an organisation to leverage the data that it generates during the course of its business as well as data, which is available from different sources to derive information, which can be used by the user's organisation-wide to add value.

In implementing a data warehouse solution, the consistency and completeness of the data must be ensured. The design of the data warehouse must take into account the logic of business processes in the organisation. The objectives of the organisation need be integrated at each level of user interface to ensure the optimum use of the implementation. As a general approach, the data warehouse should have end-to-end span. The data mining tools provide the capability to structure and prioritise information derivable from a data warehouse for specific end-user problems in an organisation. The data mining solutions can be implemented on existing software and hardware platforms. These tools utilise algorithmic solutions to all patterns from the mass of data, which can be leveraged by the organisations to develop business intelligence.

13.9 KEY WORDS:

1. **Data marts** are basically data warehouses which are smaller usually departmentally based and managing information about a particular subject area, catering to the specific needs of a smaller group of users. A data mart is a data repository that may derive from a data ware house.
2. **Data mining** means extraction of hidden predictive information from large databases.
3. **Data warehouse** is a system where all information is stored using data from the distributed and often departmentally isolated systems, throughout the organisation, and made available to the end users in a way that they can understand and use it in a business context.
4. **Drilling down** means starting from summary and then narrowing down the analysis to specific areas in detail. The just reverse of this is called as 'drilling up'.
5. **Meta data** is data scattered throughout the organisation, residing at all levels within the data warehouse and describing the data warehouse. It makes information, access friendly.
6. **Multidimensional database (MDDB)** has the data summarized at the dimension intersections and stored as individual cells in a matrix format unlike the row and

column format as a star schema. MDDB solves the multidimensional queries much faster.

7. **Star schema** uses a large fact table along with smaller tables holding descriptive data or dimensions, thus the response is slow as more time is needed in building query constraints using values in the dimension tables and then constructing a query that joins fact and dimension tables together
8. **Technical metadata** helps to know where the data came from, how it was transformed, who is responsible for it, when it was last loaded/refreshed, etc. This information is required by technical specialist to manage and track the various processes that are required to flow data from the operational environment to the data warehouse environment.

13.10 SELF ASSESSMENT QUESTIONS:

1. Explain in detail about data warehouse?
2. What is a summarisation in data warehouse?
3. What are the sources of data for a data warehouse?
4. Explain the usefulness of data warehouse for bank?
5. What is data mining? What are the technologies, which support data mining solutions?
6. "Data mining enhances the utility of an organisation's data warehouse." Justify the statement?
7. How will you use data mining for launching a new product? Explain the process?
8. Is it possible to use data mining tools to manage Customer loyalty? If yes, how'?

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P. Girijasri

LESSON - 14

DESIGNING AND IMPLEMENTING COMPUTERIZBTION IN BANKING SECTOR

OBJECTIVES :

The objectives of this unit are:

- To understand the process of making feasibility study of a system
- To identify the factors to be considered for designing a system
- To list out the software quality certifications
- To Explain the Method of selection, procurement and implementation issues of a system
- To understand the Intricacies of outsourcing and co-sourcing activities and
- To appreciate the Merger and acquisition cycle.

STRUCTURE :

14.1 INFORMATION SYSTEM DESIGN: AN INTRODUCTION :

Now a days, computerization is a priority issue in the banking sector. This activity covers procurement of hardware, software, development of applications, and outsourcing. The Banks need to perform these activities in a professional way.

Information system analysis and design is the method of organizing data processing applications using computer systems. It refers to the process of examining a situation with the intent to improving it, through better procedures and methods. The objective of the information system is to improve the internal functioning of the system to make it more efficient, modify its goal, to change the outputs and, may be, to achieve same goal with a different set of inputs, etc. It has two important components namely information system analysis and information system design. System analysis may be considered as an intermediate phase between actual need and the computer-based solution. It is a management technique used to design a new system or improving the existing one. The development of an information system requires many coordinated activities and the use of a variety of tools aid models.

The logical way of starting a system project is first to understand the problem, that is users' requirements. What is the existing system? What is expected of the new information

system? What type of system might meet the requirements? These are some of the questions that are required to be answered before starting the system design process. System analyst considers various alternative solutions with cost and benefit analysis. The feasibility study assists in choosing from a range of alternatives. In feasibility study, there are three areas to concentrate: Economic feasibility, technical feasibility, Operational feasibility.

i) **Economic feasibility**: The information systems are developed with an objective of enhancing information quality, reducing cost, increasing revenue, timeliness of output and as a Decision Support System tool. So, the benefits drawn out of it should necessarily be higher than the cost involved. Cost-benefit analysis should be done to see that the project is economically viable and also it should be comparable with other options available. Besides comparing tangible benefits, the analysts should consider the intangible benefits also. One example of intangible benefit is improving "customer service and image" through Automated Teller Machine (ATM) for the Banking sector.

ii) **Technical feasibility**: Technical feasibility study begins with an assessment of technical viability of the proposed system solution. All the technicalities from requirement for new technology to development risks are to be studied while examining technical feasibility. Technical feasibility study should cover infrastructure i.e., hardware and software capacities, technical capabilities of the personnel and interface between the existing system and the proposed one.

iii) **Operational feasibility**: Operational feasibility should determine whether the new system will be used as intended or not. It should ascertain the feasibility in respect of:

a) Whether the user is satisfied with the current methods?
b) Whether there is any effect on speed and efficiency?
c) Whether the user will be affected?
d) What is the level of user involvement?
e) whether the individual performance is not going to be reflected correctly after implementation of the system.

iv) **Preparation of system specifications report**: System specifications report is a document that describes the function, constraints and performance of the system. Thus, it serves as the foundation for software engineering, data base management and personnel management. System specifications report is project specific. This document mentions about the benchmark against which the new system is to be tested.

v) **System Design**: Design is a phase of transition from problem environment (the user-oriented requirement specification document) to coding environment (system team-oriented document). Design provides a means to handle complex task efficiently with lesser error. It is of technical nature and needs necessary skills. The generally applied principles are:

a) Problem partitioning
b) Abstraction
c) Top-Down / Bottom-up strategy

a) Problem Partitioning: It is also called modularization technique. The problem is divided into modules. A module is a logically separable part of the software, for example: macro, procedure, function and subroutine, etc. Modularization is not simply chopping the project into a set of modules but based on criterion of coupling and cohesion. Coupling is the strength of interconnection between modules. Cohesion represents that how tightly bound the internal elements of the module are to one another. As the cost of development per module is directly proportionate to complexity of module, it is inversely proportionate

to the number of modules as complexity of the modules goes on reducing. Similarly, the cost of integration of various modules is directly proportionate to the number of modules. The analyst should keep this in mind and avoid over modularity or under modularity.

b) Abstraction: Abstraction is a concept to fix boundaries for reference. There are various levels of abstractions like: Highest level abstraction and Lowest level of abstraction. In highest level of abstraction, the solution is described on broad terms like 'Paying-in-slip' whereas in lowest level of abstraction, the solution is stated in a detailed manner so that it can be implemented directly. For example, "Customer's name, Account No., Date, particulars of deposits, Amount in words and in figures, signature of the depositors, etc." are items of lowest level of abstraction. There are also different types of abstractions depending upon the area of application, like: Procedural abstraction and Data abstraction. Procedural abstraction relates to functions so it is known as Functional abstraction also.

c) Top-Down / Bottom-up strategy: A design is termed as top-down or bottom-up if it has hierarchy of modules, or components. Each module should have only one entry sub-routine and similarly only one exit sub-routine. The highest level of component corresponds to total system representing basic division of work and the lowest level contains the detailed division of the work. If the design of system uses hierarchy from highest level to lowest level, it is said to be developed using top-down strategy and if the hierarchy moves from lowest level to highest one, it is bottom-up concept. However, pure top-down or pure bottom-up hierarchy is not practical.

Quality Management: In system development process, ensuring quality is all the more important because of its intangible nature, mission critical and complex process. Software product, being a creative one, attracts personal attachment and ego, making the task sensitive. So, it should be made clear that the purpose of examining quality of the developed system is to give repeatable and auditable software product and process, and not to question the capabilities of the developer.

Quality measurement: There are some quality matrices for measuring quality of a system. These are: 1. Software quality indices, 2. Software maturity index and 3. Software process maturity indices.

i) **Software quality indices**: These are based on various scales of measurement like: level of modularity used in the software, level of dependencies of the modules in the system, data base organization adopted for the system, etc.

ii) **Software maturity index**: It measures the level of maturity of the software product by using statistics like: changes incorporated per release of the software, number of operators and operands, and control flow used, etc.

iii) **Software process maturity indices**: The Software Engineering Institute (SE1) at Carnegic Mellon has introduced five levels of process maturity concept. It is known as Capability Maturity Model (CMM). The CMM levels are: initial level, repeatable level, defined level, managed level and optimized. The outline and actions supposed to be taken to go to next level is given in the table 14.1 below:

Level of process maturity	**Outline of control measures adopted**	**Actions to be taken to go to next level**
1. Initial level	Ad-hoc, tools informally applied to the process	Initiate regroups process control, review and quality assurance measures.
2. Repeatable level	Achieved stable process	Introduce software

		engineering methods and technologies and establish process group.
3. Defined level	Achieved continuing progress in process maturity	Establish a process database and a basic set of process.
4. Managed	Substantial progress in quality improvement and adopted comprehensive process measurement	Use data to analyse and modify process while gathering process data in automatic way
5. Optimized	Major quality and quantity improvement.	Continue to improve and optimise process.

Table 14.1: Software maturity levels

Quality certification : There are various certification agencies that audit the system and the process of system development, and issue certificate regarding quality of the system and organization. IS0 9000 describes quality assurance elements in generic terms that can be applied to any business regardless of the products or services offered by it. There are different authorized auditors who audit the organization and issue the certificate under this provision.
There are five main documents of IS0 9000 dealing with different areas of applications, IS0 9001 relates to software engineering. In order to obtain certification for IS0 9001 a software development organization must establish policies and procedures in connection with each phase of software development. The three steps involved are:

i) Management involvement, organizational commitment and team spirit;
ii) Preparation process and
iii) Audit preparation.

In other words. key quality processes are understood, it is implemented throughout the organization and the processes are documented and maintained to an outside agency. Activities relating to IS0 certification include: Work instructions, Procedures specification, Quality policy, Training the personnel, Implementation of the policies and Internal-audit for self-assessment and subsequently certification audit.
The road map for IS0 registration starts from identifying the key performance area and moves through various steps like:

i) Defining Management responsibilities;
ii) Designing Quality system;
iii) Training of management and employees;
iv) Devising appropriate system for various activities such as:
    a) Design control,
    b) Document and data control,
    c) Contract review,
    d) Purchasing,
    e) Control of customer suppled product,
    f) Product identification and traceability,
    g) Process control,
    h) Inspection and testing,
    i) Control of inspection, measuring, and test equipment,
    j) Inspection and test status,
    k) Control of non-conforming product,

l) Corrective and preventive action,
m) Handling, storage, packaging, preservation, and deliver,
n) Servicing and
o) Statistical techniques, etc.

v) Creating self-assessment questions,
vi) Measuring compliance to quality procedures,
vii) Maintaining Control of quality records;
viii) Establishing Internal quality audits;
ix) Calling independent assessors for audit, etc.

Though IS0 9000 do not dictate any standards of its own, it improves quality, customer satisfaction, competitive edge, quality awareness, productivity and efficiency because the organization enforces its declared aims and procedures by defining responsibilities and adopting customer focus. Acquiring IS0 certification is good to show the quality consciousness of an organization, but it requires continuous efforts to maintain the status. Periodically the organization should be audited by the outside auditors to maintain the certifications. The auditors understand that errors may occur but they insist that it should not recur. The organization has flexibility in choosing the scope of the registration, which may be limited to individual product, particular site and functional entity, etc.

14.2 INFORMATION SYSTEM SELECTION AND PROCUREMENT :

More and more vendors are coming up with their systems leading the users to have some evaluation methodologies to select the best suited one. In view of the various options available for hardware and software with the organization, the system staff is required to evaluate them. The steps involved in evaluation of a system are:

i) Identification of problem,
ii) Examining the required features,
iii) Preparation of request for proposal,
iv) Raising proposals from the vendors,
v) Reviewing and manual checking of the proposals for gross short comings,
vi) Querying about technology,
vii) Examining product lines,
viii) Comparing performance and technical criteria,
ix) Benchmarking and simulation, etc.

Choice of System: The first area lo consider is what features of the system is required by the organization. The features should be examined in details and listed out. After the requirements are assessed, request for the proposal should be raised to invite responses from vendors. The uses of the system would not only be interested in the equipment / available to meet the needs, but also in knowing the after-sale support, the systems being used by other users in the area of operation and how to dispose of the existing system, I etc. Essentially the cost-benefit analysis and necessity are the guiding factor.

Purchasing a personal computer is a routine matter. But for specialized equipment like Communication equipment, ATM for banks, etc., the best way is to survey the market, study the equipment being used by the other users in the market, if possible, the competitors. After sufficient analysis, steps for obtaining proposals from vendors to provide software, hardware, and services (known as technology building blocks or, platforms), are initiated. The formal document prepared for obtaining vendor's response is called RFP (Request for Proposal). On receipt of the proposals, these are thoroughly examined, to see if they meet the requirements

or are simply a useless quotation. The of request for proposal should be prepared using a format to include:

i) Introduction,
ii) Imperatives and Desirables,
iii) Requirements relating to vendors standing, etc.,
iv) Guidelines for preparation of proposal,
v) system requirements,
vi) Full description of the platforms,
vii) Financial plans and Evaluation methodologies, etc.

Sources & Selection: Sourcing of technology is a complex job. Despite the wide choice for the systems, overhead cost and time required to select appropriate technology are the limiting factors in regard to popular use of the technique. The main sources for locating available options are: Computer magazines, Buyer's guides, Manufacturers' or Distributors' representatives, Local suppliers, Friends/ Associates and market survey reports, etc. When an organization purchases a given technology, it actually purchases the knowledge passed through it. Greater the monopoly of the seller and greater the need of the purchaser, the greater is the price of the systems.

Selection process: After the user department places requisition for new system, information service department conducts preliminary survey and assesses the features of the required system. Various options available for acquiring a system are examined based on the benchmark specifications. For arriving at the decision, the important steps may be clubbed into phases as shown in Fig.14.1.

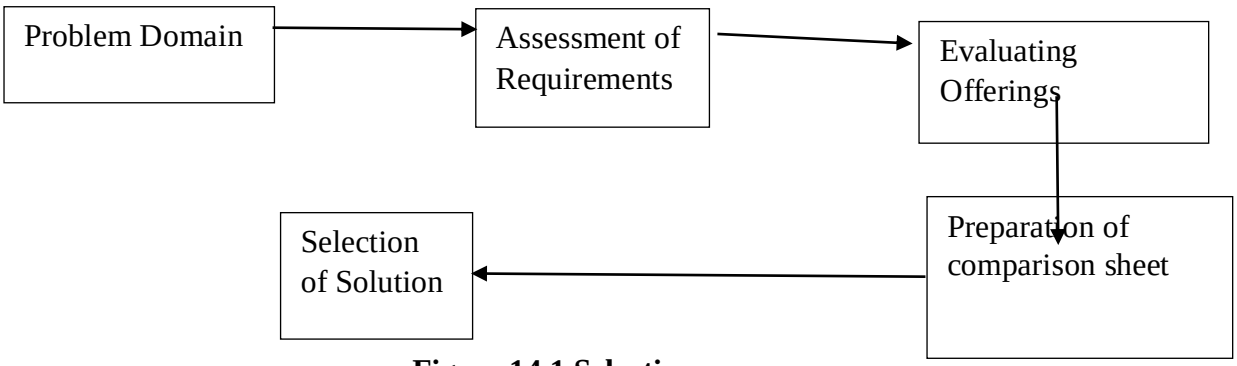

Figure 14.1 Selection process

Prior to taking decision a detailed comparison sheet should be prepared and the shopping 1 list should be redrawn in minute detail. Some of the variables to be taken care of in this regard are: degree of customization, proven track record among the present users, service and support, and suitability to various platforms. Thus, the list is narrowed down and it is easier to arrive at a decision of selecting on solution.

Evaluating Systems: One of the major activities in acquiring new system is evaluation of the performance of the product. Well-planned criteria should be drawn to evaluate each proposal. The criteria should include evaluating performance, features, ease of conversion, experience of other users and additional benefits, if any, etc. Approaches adopted to evaluate the options are:

i) Assigning interval score, based on its performance. As every criterion has different value for the user it is assigned with some weighted value. The interval score is multiplied with the weighted value of the criterion to get the weighted score.

ii) Preparing brief scenario of the functioning of the user department with each option.

The above approaches to evaluation help the user to take decision in choosing the correct solution. Evaluation criteria will be different for hardware and software. It should include the factors like expected useful life of the system, expected effect on the functioning of the organization, execution time, response time, possible enhancement, cost and vendors support etc. While evaluating the offerings it is suggested to follow certain guidelines such as:

iii) Developing an evaluation plan,

iv) Several individuals should rank a package on each criterion then average should be calculated to have a conservative but balanced view.

v) Vendors' references should be checked religiously,

vi) Assigning the job of evaluation only to qualified professionals

vii) Vendors after-sale support, financial standing and technical skill should be examined individually and thoroughly

viii) No compromise on quality of evaluation on account of resources etc. be allowed.

Performance Benchmarking: It is far too easy to be swayed by a convincing sales presentation; with a benchmark, the user can determine exactly what is present and what has been omitted from various offerings. It is a pre-requisite for a system proposal to undergo benchmark test. After the proposals are examined through the various stages, as discussed above, and a narrow list remains the process of benchmark is applied to penetrate the proposal in minute terms.

Benchmark represents a sample of the nature of the existing job and the workload. It is an existing job that has been recorded for the system being evaluated. Benchmark testing is useful in assuring that the proposed system will actually solve the problem, that is, it meets the requirements. Applications that are representative of the systems design alternatives, called test problems, should be run on the systems proposed by the vendors in order to test:

i. Anticipated workload,
ii. Operating system,
iii. Compilers,
iv. Application software
v. Communication software

The bench mark test problems should be of same kind that will run on the system. The key is total performance measurements. Published benchmarks can be misleading as the vendor can make the product run much more efficiently than its potential user. If the system is procured without benchmarking and implemented with full load, there is always a possibility that the system may fail to handle the input and output load. Any aspect of a system can be evaluated using benchmarking technique. There are five essential steps in the benchmark process:

i) Selection of exact configuration of the system to be tested
ii) Selection of suitable types of benchmarks
iii) Generation of codes from the benchmarks
iv) Compilation of the codes and execution of the benchmarks
v) Observe and study the benchmarks' reports

For a thorough evaluation, different benchmarks should be designed and run on a system. Benchmarking should he a cooperative effort. on the part of the potential user and the vendor. Benchmarks are, many times, criticized by the vendors considering it unfair and biased. Therefore, they should be made a participant in the process to avoid any confusion and finger pointing. Benchmarks offer a high level of flexibility.

14.3 INFORMATION SYSTEM IMPLEMENTATION :

The installation of a new system should be treated as system design project in order to achieve the goal of smooth transition. A plan should be prepared showing the schedule and

activities relating to changeover, it should be explained to the user and their cooperation needs to be solicited. While testing and training are technical aspect of implementation phase, the user part is considered as installation. The software is considered useful only if it is extensively used by the user. Analyst should prepare detailed plan for installation of the new system.

i) System Conversion: Conversion is the change over from one system to another. The new system may involve installation of new equipment, change in sitting arrangements of staff and placement of equipment and change the work procedure etc. There are three types of conversions, parallel conversion, Phased Conversion and direct conversion. Which one is to be adopted by the user depends upon the situation.

In the case of parallel conversion user is required to enter data in both the systems and compare results. As shown in Figure 14.2 the result of parallel conversion is either modification of the new system or shifting to the new system.

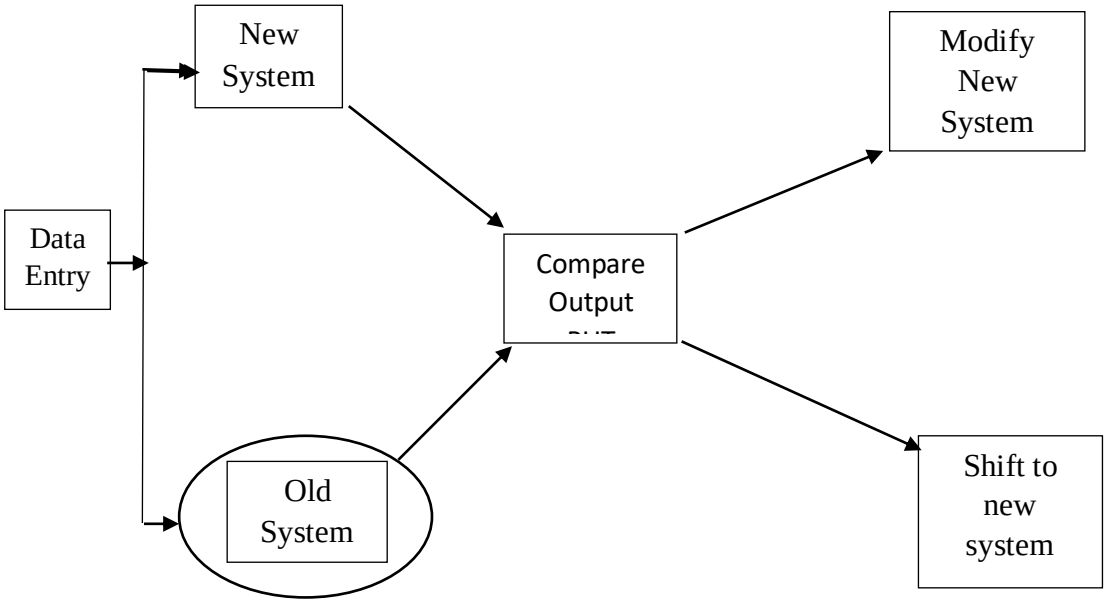

Fig 14.2 Parallel Conversion

Besides providing a security to the user in case of failure of the new system, the parallel conversion method gives a correct guidance to the developer for modifying the system. It builds confidence in the user towards the new system. It is a costly affair because both the systems are used simultaneously for quite some time, as shown in Fig. 14.3, so the process should bet restricted 'to minimum possible period and the system should bet modified fast.

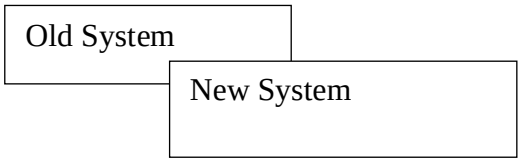

Fig 14.3 Parallel conversion (transition)

In the case of phased Conversion, the user shifts from the old system to new one gradually. Once the user ia satisfied with a particular module of the new package, he adopts the new one and that portion of the old system is discarded. Thus, the new system is adopted in step-by-step manner, It costs lesser to the user than the parallel method but it expects the new system to be capable of implementation module wise i.e. the modules of the new system should be loosely coupled. It is also known as staged conversion because new system is introduced piece-by-piece, as shown in Fig,14,4.

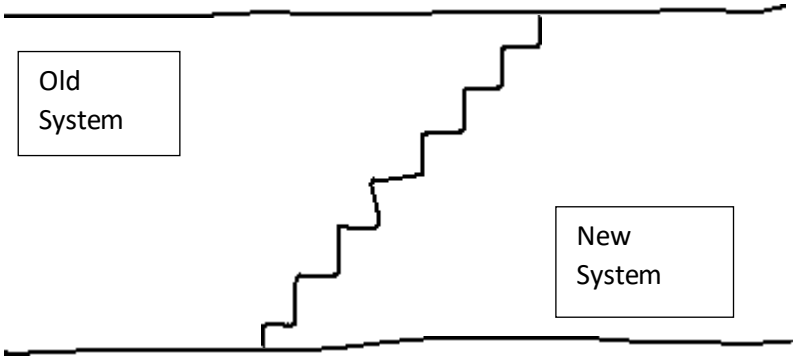

Figure 14.4 Phased Conversion

Sometimes the user may be confused as to whether the output is from the module of the old or the new system. This method is difficult to be used for conversion in general as it expects both the systems to be used in modules and data should be compatible.

The direct conversion method involves immediate change over from old server to the new one. In older to adopt this method the new system should thoroughly tested. User should be sufficiently trained and confident otherwise it is hazardous to use a new system in any running organization. Though it costs least it is not advisable to adopt this system for complex applications. As shown in figure 14.5 the new system takes over without any back-up support from the old system.

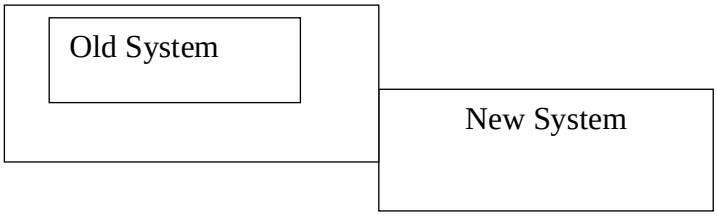

Figure 14.5 Direct Conversion

ii) Training: The main objective of training is to introduce the system to its users. As the new system may cause changes in Work-culture, procedure and control, people feel insecure and there may be resistance, as accepted by management gurus, every change has to face resistance, the management should plan in such a way that before the system reaches the organization the environment is made congenial.

iii) Trainee groups: Users, its management and computer-support staff are the main target groups to whom training is to be imparted.

Users and operators are supposed to provide data to the system, run the routine's to ' process it and supply the output to various departments. They need to know all the features of the system and how to utilise its potential for maximum benefit to the organization.

Managers need a broad view of how the new system will help them in more productively fulfil their responsibilities, how it can provide timely and better arranged data quickly. They are more concerned for knowing the information the system generates.

The computer support staff is supposed to maintain the system for day-to-day operations like user maintenance; back-up, restore, purging of database; and routine error handling etc. So, their focus is on some internal functioning of the system. Thus, the training needs are entirely different. This aspect is depicted in Fig.14.6.

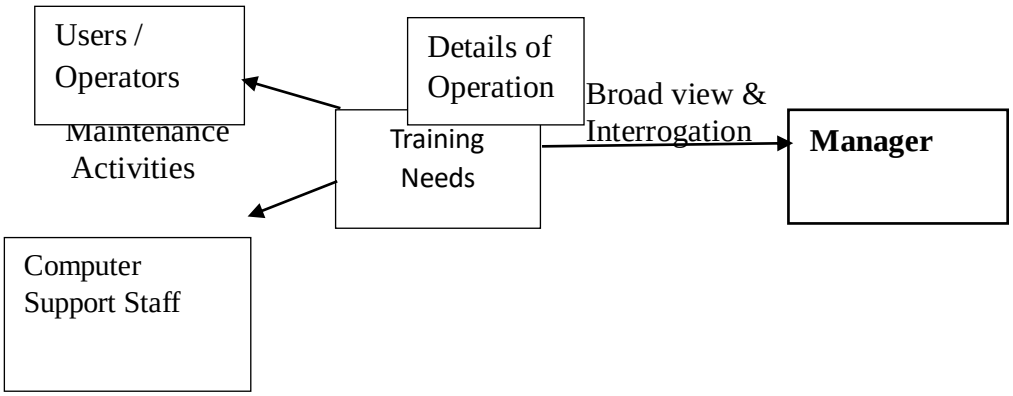

Fig 14.6 Training Requirements of various groups

iv) **System maintenance**: The maintenance of a system means improvements of the system functions and the correction of the faults that arises during the operation of a system. The need for modification of system may arise on account of error in the system, requirement to enhance the functionality of the system and due to advancement of technology.

One way to reduce maintenance cost is through adoption of maintenance management and system modification audits. The various problems associated with maintenance may be listed as under:

a) Non-adherence of standard methods of system development.
b) Developing software in ad-hoc manner.
c) Non-adoption of good testing methodologies.
d) No or poor documentation.
e) Maintenance is considered as boring job as it seldom gives recognition to the efforts.

v) Management Issues and network implementation: Management has to control personnel, other resources, and the customers as well as the outside agencies. Their view is clear about the corporate goals so it is their responsibility to create healthy environment and team spirit. Developing a system is a simple job if it is done in an ad-hoc manner. But then quality and maintainability of the product will be very poor. Therefore, a balanced control of the management on the system development process is essential.

Major areas of concentration for the management are:

a) Defining the job in details
b) Allocating the job to right people
c) Estimation of time and cost
d) Maximum time required for developing any module should not be more than two man weeks
e) Preparation of test plans
f) Ensuring smooth conversion of the systems
g) Fixation of acceptance norms

h) Taking a note of the legal complications while preparing agreements, etc.

The efficiency of the development team increases if the roles of different personnel are defined clearly. It makes controlling and monitoring the progress easy. Every person may not be equally efficient in all the jobs, so choosing right person and allocating him the right job improves productivity. However, it is necessary to train a number of persons in every area.

vi) Management issues of Network implementation: From management point of view, implementation of communications system starts from the very time of feeling the need of having a system to serve in the area. They need to consider all the components of communications system. Questions that arise before the management are: 'How to set-up the organizational Network? What are the technologies available? Which type of network should be selected'? What are the other problems in establishing the network? These are the problems, which every organization face before having their own network. The basic factors, which affect network implementation, are:

a) Technical factors,
b) Economical factors,
c) Political and other factors

a) Technical Factors: Availability of Technology and its suitability to the organization should be examined first. Then the services of the carrier providers like: ATM, ISDN, Leased TI, Microwave, X.25, should be verified to see its suitability to the organizational needs. While selecting service providers like ICNET, VVNET and ERNET the under noted factors should be kept in mind.

- Number of modems available for dial in
- Availability of time when the organization wants to login
- Disk space allotted to the organization
- Service options like Gopher, Telnet, etc.,

In order to utilize the potentialities of the network system, it is essential for the management to have a fair understanding of network technology like:

- Hardware components
- Software components
- Protocols: SLIP, PPP, CSLIP, TCPIIP, SNA, etc.,
- Other factors like: Operating system, WINDOWS, Communications Software.

b) Economic Factors: There must be economic gain if an organization is adopting some new technology and investing in it. May be sometimes it is indirect but the efficiency and productivity must gain remarkable advantages after adopting the technology. Some of the important aspects are:

- The first question to he addressed is that "Is the network required'? If so, what is its functionality?
- Selection of Network components based on the size and growth of' the organizational information needs.
- Is it is thought that the components are less expensive than n given system, the overall cost of services and expansion will show that network may turn out to be more costly proposition. For example:
- Low-cost modem in turn may prove to be costly as they attract, in several cases, more amount in telephone bills. Whereas the high-cost modems may raise less amount in telephone bills.

- Taping on ethernet directly or connecting through hubs, is also important decision because distance is not the sole reason for higher telephone bills. It should be noted that sometimes long-distance calls are cheaper than local calls.

c) **Political and other Factors**: Network designers are mostly worried about the technical part of the implementation i.e, whether they are doing the right technical thing or not. However, it is the management which should take care of the corporate policies. They should discuss the important and relevant aspects with the technical personnel and ensure that the corporate sight is not missed out. Similarly, the political factors of the area of operation should be considered by the management and should not be left to the technical staff. The political factors prevailing in the area of location of network nodes and paths etc. will affect the reliability and cost of communications.

Similarly, intra-personal relations are also to be maintained in best possible state. Because when designing and configuring network funny things may creep-up in which there is no logical sense, which have no basis for reasonable reality and which are of questionable use. Maybe it is due to ego clash or fight of complexity. To avoid/reduce politics, the designer has to have good rapport with the people he is working and interacting with. For example, while laying cables all concerned people have to be taken into confidence. Ignoring such issues would do nothing but increase implementation problems as a whole and ultimately affect the utility of the system.

14.4 OUTSOURCENG :

Outsourcing is the strategic use of outside resources to perform activities traditionally handled by internal staff and resources, Outsourcing is a management strategy by which an organization, outsource major, non-core functions to specialized, efficient service, providers. Outsourcing is basically a concept where company shares or assigns complete responsibility for delivery of a particular service to an outside party. Information Technology is one area in which this approach is growing.

Outsourcing scenario: Outsourcing is seen as an increasingly important area for banks. Traditionally outsourcing has taken one of two forms: Service companies use their own, systems and run the banks computer software in these systems, based at the service, companies' own computer centers. This form is a more flexible interpretation of the old computer bureau, concept. A bank either sells its computer operations to the new operator as an entire entity or gibes the services company a long-term contract, to run the systems based at the Bank's own computer center.

Outsourcing strategy has the effect of freeing senior management from having to deal with the purchase and maintenance of systems, as this is covered by the service level contract negotiated with the outsourcer. It also protects the bank from having to make large, irregular capital payments for new systems as the outsourcer will have the responsibility for ensuring adequate systems are available.

i) Advantages of outsourcing are:

a) Economies of scale achieved by outsourcer using same resources for many different companies.

b) The outsourcer can develop better knowledge of the business area as they can draw on the experience of performing the task for more than one company.

c) It is easier to define and keep to service level agreements with outside firms which have an incentive to stay within the agreement.

d) Cost reductions are the responsibility of the outsourcer not the bank itself.

e) Certainty of cash flows

ii) Disadvantages of outsourcing are:

a) It is difficult to differentiate a service if it is performed by an outsourcer
b) The IT support necessary for the business may be remote from the business itself leading to delays in business process change.
c) Banks can get locked into outsourcing arrangements which are very hard to pull out of as the resources used in service provision is controlled by a third party.

Co-Sourcing: With computer services companies becoming increasingly involved in their customer's business by taking over responsibility for IT and business functions. It seems logical that they have a stake in the success of the financial institutions, which they work with. Recently this interest has become formalised with outsourcing companies entering into arrangements where they share their client's business risk by supporting them to enter into new business. Rewards are based on the profits of these new operations.

Increasingly the supply of IT resources is seen as a partnership between a bank and one or more suppliers. Indeed, to start a new operation, a bank may need the support of a large hardware firm, a specialist software, a systems integrator, a communications company and a consultancy. In recent years the largest systems integrators and now some of the hardware companies are willing to develop complete business operations for their clients based on a win – win arrangements. Almost every case study in this document is based on the mutual co-operation of IT companies and their customers. Increasingly forms wish to move these arrangements.

i) Advantages of Co-Sourcing:

- Banks can share risk with IT companies.
- Banks get access to latest technologies,
- IT firms can get access to business knowledge of banks to exploit their technology

ii) Disadvantages of Co-Sourcing

- The arrangement is based on a win/win outcome, which conversely means that both sides lose if the business fails to deliver. This is a major risk for IT firms which are used to being paid for delivering systems.
- Management control in the long run may be a problem. IT firms are not likely, to have a role in the long-term running of banking business themselves, though they will accept long-run management of the IT.
- Such arrangements may exclude the active participation of the banks' internal IT teams, leading to a lack of integration of the overall IT infrastructure.

Phases of outsourcing: Organizations that have successfully outsourced go through three major phases in the process. These phases are:

i) Internal Analysis and Evaluation
ii) Need Assessment and Vendor Selection
iii) Implementation and' Management.

i) Internal Analysis and Evaluation: In this phase senior management examines the need for outsourcing and develops a strategy to implement it. Only the top-level executives have the power to define the vision and implement the changes that are necessary for outsourcing to succeed. As you develop a strategy, consider the following

a) Clarify organizational goals in relation to outsourcing.

b) Identify areas to outsource. Define the core competencies of the organization and the functions of the business that are not core. An organization should outsource its non-core functions so that it can focus on its core competencies.

c) Develop a long-term strategy. If you are outsourcing a function that already exists, remember that employee support and morale will be critical. 'Job retention should be a major feature of your strategy. In some relationships, workers are hired by the new vendor. From the beginning, communicate honestly and openly with employees about how their needs will be met.

ii) Needs Assessment and Vendor Selection: In phase 2, people inside and outside of the organization provide more detailed information and advice. This is a research phase in which you learn about your own specific needs, and find out which qualified vendors will be best to meet those needs.

a) Research needs: To find out more about your own needs, research the needs within the organization, and learn from other companies who have outsourced the same kind of Information Systems function. Plan to visit these companies to find out what their experience has been. Form a team of people to help you ask the right questions and analyse the information you gather. You may need team members with expertise in the areas of legal, human resources, finance and procurement.

b) Write a Request for Proposal: A request for proposal is a valuable opportunity for a vendor to grapple with real costs and problems and prove to the company that they can do an excellent job. Just as company will use the proposals to assess vendors, vendors use RFP to assess the company. A well-written, clearly defined RFP tells vendors the company is serious about the project. On the other hand, a vague or unrealistic RFP will make the most qualified and experienced vendor think twice before spending any time going after business that may be unprofitable and unmanageable.

c) Assess vendors and make selection: Form a team to review proposals. The team should identify which vendor comes closest to meeting your needs. As they assess proposals, team members should use networks and references to find out about vendor reputation in the industry and look at the vendor's total plan and capabilities, not just price or a single aspect of what they do. To make the rightv choice, be sure the vendor demonstrates:

- A clear understanding of your needs and ability to solve your problems
- Financial stability
- Cultural fit
- Proven track record

d) Negotiate a contract: Once the vendor has been chosen, you will negotiate and sign a contract. While negotiating one should keep the following issues in mind:

- Negotiate a reasonable price and performance measures
- communicate often and openly
- show your willingness for both sides to succeed
- write a contract that defines the service level and the consequences if the level is not met

iii) Implementation and Management: Decide in advance how you are going to manage the relationship. Create a system that allows you to:

a) Monitor and evaluate performance
b) Identify and communicate issues early
c) Resolve issues quickly and fairly
d) Help people in your organization adapt to a new way of doing things

Strategic Outsourcing Relationship

In business today, one fact has become clear: The ability to forge, manage and sustain strategic sourcing relationships are increasingly critical to compete and succeed. Such relationships, however, are often handled in an ad hoc, trial-and-error manner.

Organizations have to have Strategic Outsourcing Architecture i.e., a systematic set of practices and frameworks for creating strategic outsourcing arrangements. This architecture, or process, is designed to help organizations forge relationships. These relationships will not only cut costs, but also allow them to join forces with a strategic sourcing partner in order to find broader, breakthrough benefits in terms of revenue growth, market share gains and customer service improvements-in short, to become a more powerful competitor. An outsourcing strategy should be an outgrowth of company's overall strategic plan and should be directly aligned with the company's directions and goals. It is important that the managers who are responsible for implementing the outsourcing plan have a clear understanding of the overall strategy, and the role of outsourcing in it. It is equally important, that the managers play an integral role in shaping the implementation plan for outsourcing.

Outsourcing relationships can vary widely. Which type is right for the company depends on motives for outsourcing. The table 14.2 below shows how various motives relate to the types of relationships described in the Strategic Sourcing Spectrum.

	Major Stage Differentiators				
	Transaction -Based		**Relationship Based**		
	Stage 1: Transaction Oriented Outsourcing	Stage 2: Co-sourcing Partner Relationships	Stage 3: Strategic Sourcing Strategic Relationships	Stage 4: Value-Chain Networking Shared Asset Relationships	Stage 5: Entrepreneurial venturing / Hybrid Spin-off relationships
Motive for Outsourcing	Fix immediate problem	Leverage resources, technology	Positioning vehicle for the future	Co-creating future value, focus on asset influence pooling	Capture of specific breakthrough bypass business opportunity
Provider Selection	Vendor procurement based	Negotiated Partner Selection	Strategic alliance agriculture based	Strategic alliance agriculture based	Strategic alliance agriculture
Measures	Better, cheaper, Faster	Productivity Leverage Best-in-class Value-	STROI/ balanced measures System	STROI/ balanced measures System Integration	STROI/ balanced measures System Integration Trust measures

		added projects	Integration Trust measures	Trust measures	
Strategic Orientation	Short-term	Medium to Long-Term	Long-term	Long-term, Open Ended	Long-term, Open Ended
Structure	Transactional	Hybrid of relational	Relational	Completely relationship based	Primarily leading to stand-alone entity
Pricing Framework	Low-bidder	Cost-cognizant but not domination sometimes shared risk/reward	Win - Win shared risk or reward	Win-win, Shared risk or reward	Win-win, shared Risk / Reward
Strategic Planning	Little or none	Significant resources for decision	Extensive Planning and due diligence	Intimately linked to Corporate vision	Driven from distinct venture plan
Formal Control	High	Low level collaborative mechanisms	Based on shared outcomes/ objectives	Control exercised through collaboration	Medium to low
Integration Level	Very little or none	Loose integration	Very substantial	Very High	Very High
Trust	Low	Based on partnering	High trust	Highest degree of trust based on performance	Highest degree of mutual trust based on performance of opportunity.

Table 14.2 Various motives relate to the types of Relationships

Assess Organizational Readiness: Although a lot of attention is typically given to a potential sourcing partner's capability, it is important to understand own organization's suitability as a partner. Organizational readiness has a number of components, including:

i) **The ability to build relationship**: Look for people who have experience in managing outsourcing and strategic sourcing relationships, especially those who understand the spectrum of relationships that are possible and best practices for implementing a strong strategic sourcing relationship.

ii) **Management support**: Senior managers need to set clear strategic direction, but they also need to provide a supportive atmosphere that encourages innovation and allays fears about trying new approaches. Don't begin an outsourcing evaluation without support from the top.

iii) **A plan for overcoming roadblocks**: An effort tr outsource often will run into cynics, sceptics and protectors of "turf." It is crtical to identify and understand such internal political and cultural resistance early in the process, and to quickly design plans for overcoming it.

iv) **Develop and document a preliminary Outsourcing Mission, Strategy and Goals (OMSAG) statement**:

An Outsourcing Mission, Strategy and Goals (OMSAG) statement is a document that sums up the organization's outsourcing intentions and the strategic rationale for outsourcing. The OMSAG statement should describe the:

a) Processes to be outsourced and the broad objectives for outsourcing.
b) Relationship of outsourcing to the overall corporate strategy.
c) Links between the outsourced process and your company's core competencies.
d) Strategic forces that are driving your organization into a relationship.
e) Expected positioning of the relationship on the Strategic Sourcing Spectrum.
f) Scope of coverage (international, across business lines and so forth).
g) Critical risks involved.
h) Expected duration of the relationship.

The OMSAG statement should include a value proposition that focuses on the expected value that the outsourcing arrangement will bring to the customers of the process - both internal and external. This proposition is at the heart of the OMSAG, because it helps executives understand why they want to outsource the process in question. and because it helps ensure that the outsourcer will remain focused on giving the organization what it needs.

Business Processes Outsourcing (BPO) : In recent years outsourcing the operation of IT systems has been supplemented by a move to outsourcing not just systems, but whole business processes. These processes can be either internal function such as payroll processing (which do not have a direct relationship to the business of the company), moving more recently to operations which were once seen as critical to the success of the business. A good example of this is the outsourcing of cheque processing.

Once such processes were ring fenced by the company as being too important for third parties to manage. However, whilst on the one hand the core services of banks are becoming increasingly technologically intensive, these services are also increasingly taking on the characteristics of hygiene factors, in that they become commodities to the point where they do not add to the competitive edge oi the bank. They are a minimum requirement to remain in the market. As such, they are increasingly subjected to the possibility of outsourcing as the economic arguments described above take precedence over strategic ones. Thus, the key business processes are being outsourced as they:

i) Become increasingly capital intensive;

ii) Become a generic process, common to all institutions; and
iii) Lose their role in supplying competitive advantage.

Two major forms of business process outsourcing exist :

i) Outsourcing by a number of banks forming a mutually-owned company to carry out the process
ii) Outsourcing to a third party

The former case is suitable for smaller and medium-sized institutions, which have more difficulty in obtaining the economies of scale, in order to compete with larger companies.
The (as test-growing areas of back-office outsourcing are applications process, tax compliance, sourcing/procurement, and HR. This non-IT, back-office process outsourcing? Market for large corporations. The outsourcing market follows the development of the Business Process Applications (BPA) market closely. As Enterprise Resource Planning (ERP) applications for processes are developed and implemented, BPO follows by about 18 months. This progression occurs because:
i) ERP systems are the most common base technology of the outsourcing vendors that serve the corporate market, and
ii) ERP systems define hack-office business process and standardize it. From a process functionality standpoint, relatively little differentiation exists for back-office systems offered by major vendors SAP, Oracle, People Soft, Baan, and J.D. Edwards. This process standardization means it is possible to develop a service to deliver this process and that the effort is profitable because the market is large enough to support it.

The Ramifications : Outsourcing is not a standalone phenomenon. It is part of a larger movement within organizations to define the value-add of a process. Outsourcing will affect large corporations in several different ways:

i) It will eliminate anything known as a "cost centre." Corporations will run only profitable processes. All other processes will be outsourced to a company that can make money on the process.
ii) It will necessitate process-based costing, best known as activity-based costing (ABC). Companies will begin looking at the process as a unique business to determine whether or not it is contributing to economic profit.
iii) It will change the type of leaders necessary for success in large corporations. Much of the back-office processing will be done using virtual staff in virtual corporations. Managers and leaders will need to rely more on negotiation and less on hierarchical direction. Diplomatic skills will be more important than technical skills.

14.5 MERGERS AND ACQUISITIONS :

Mergers and acquisitions are happening today with such frequency that they are practically routine across many industries including high technology, finance and banking. Acquisitions have even become part of the growth strategies for many companies. Mergers and acquisitions present a minefield of challenges that, more often than not, can derail deals. We examine the factors driving the growing numbers of mergers and acquisitions and outlines the lifecycle or these deals.

i) **Mergers & acquisitions - the driving factors**: Today, mergers and acquisitions are transforming entire industries. The question is, what is fuelling this trend?

The growing numbers of startups and small independent companies with attractive technologies or products are a very strong driving factor. These companies are easy to sell and easy to buy. Indeed, many are started with the express aim of selling them at n quick profit.

ii) **Customer demand**: As markets become increasingly competitive, acquisitions can help companies gain critical mind share to meet demands. Due to changing business models in the new economy, many companies are driven to make acquisitions to obtain complementary products or to divest unproductive business segments.

Global economy is opening up new merger and acquisitions opportunities, including the ability to obtain a worldwide workhorse.

Other driving factors include gaining competencies that enable diversification; obtaining skills; obtaining technology infrastructures, processes and capital. These drivers keep the mergers and acquisitions trend growing.

Some analysts predict that merger and acquisition activity will go through the roof with a record 90% of mid-to-large-size companies being involved in the next few years.

Mergers and 'acquisitions can be caused for potential business disruptions. These include staff malaise causing longer project times and higher costs; missing the window to prepare for Internet-driven competition among others. Awareness and preparation are key to overcoming the many pitfalls inherent in mergers and acquisitions. To succeed, it's crucial to look carefully at the consequences of the merger on projects and infrastructure first and then choose the appropriate systems to integrate.

The mergers and acquisitions lifecycle can be viewed in four distinct phases. Fully understanding thc phases is important to effective planning and smooth execution.

i) Assessment (due diligence): Assessment provides a high-level snapshot of the state of both acquirer and target company functions at the outset of the deal. Using this "as is" snapshot, you can run analyses to support bid and planning decisions, identify material items and risk areas, and compare company capabilities. The acquirer should look at a target company's business and IT strategy, applications, infrastructure, processes, people, and the vendors with whom it has license agreements. This information lets potential acquirers begin validating how the merged organization would look if certain assumptions held true. During this phase it is important to ensure that technology will enable business objectives. If not, the deal can fail, under deliver or provide some costly surprises. Engaging IT experts during due diligence is a proven success factor. These experts can assess how the technologies of both companies can fit together and map an integration approach to best support business goals. Using IT experts can ensure core applications scalability because they can project and simulate the workload of the future integrated IT infrastructure. This allows them to identify and correct potential problems in areas directly affecting internal and external customers, such as response time and batch processing windows. Also, by putting common platforms and processes in place, IT experts can help you to meet challenges involved in managing assets.

ii) Solution development (pre-merger planning): No deal can succeed without the buying of the people involved. The merger and acquisition process, therefore, must progress from a number-based transaction to a people-based transition. This happens in the solution development phase. Here establish designated program offices including IT, line of business, and human resources. These offices would report into a corporate office that oversees the enterprise-wide merger project. Whereas assessment (due diligence) focused on looking at the companies as they are ("as is"), pre-merger planning deals with what the merged company will become, the "to be" company. At this point the focus shifts to creating the "to be" view of the company and making a

transmission road map for getting there. You need to decide what the new integrated company will look like and how the businesses will be merged. This typically begins with selecting the application suites that best support the merger strategy. During phase two, company should be alert to "organizational drift." Organizational drift begins immediately after a deal is announced, when uncertainty and inertia can take hold. Worry over possible layoffs can lead to defections and lower productivity. At the precise time when your newly combined company most needs to focus on the demands of the marketplace, it is least able to. At this critical juncture, building bridges between cultures can help employees collaborate rather than compete. Good internal communication and proper incentives can help retain top talent. This is the time for exchanging information and establishing priorities and evaluation criteria for selecting business products, IT assets and processes. During this phase, you develop and deliver the proposed integration solution. You determine the integration approach, create a high-level transition plan and select your transition team.

iii) **Integration and consolidation (merger implementation):** The third phase is the time for executing on the integration projects defined. Emphasis should be on obtaining skilled people to execute critical-path merger projects. There are a number of ways to do this, including retraining personnel, partnering with external vendors, and out tasking functions. Merger implementation activities include establishing a project office, developing detailed project work plans, and identifying market-driven priorities. Phase three is the time for deploying chosen, standard systems configuration to end-user locations.

This phase also includes to determine requirements for upgrading, expanding or implementing new information processing technology in a multi-vendor, multi-platform environment. System integration plans designed to enhance existing business processes can give a competitive edge, help protect investments and provide a basis for future expansion and changes.

Phase three of the mergers and acquisitions process also presents a number of challenges surrounding the physical environments supporting IT equipment. Supporting the changing environment may entail expansion, remodelling, or even building new facilities for handling information processing requirements. Careful planning, design, construction, equipment installation and testing can reduce potential risks. Engaging professional site services experts can help to plan a total solution for addressing physical infrastructure needs and help to create the best physical environment for the merged company.

iv) **Continuous improvement (post-merger projects):** In the final phase of the mergers and acquisitions lifecycle execute non-critical-path projects that put the merged company on a continuous improvement track. For example, you may have a project that requires reengineering and may result in a 30% cost savings. Phase four also is the time for establishing project work plans and teams, reporting on progress and results, delivering on projects, and delivering a cost/benefit analysis. The fourth phase is when you validate the business case for the merger.

14.6 SUMMARY :

Computerization of an application in banking sector should start with feasibility study covering, economic, technical and operational issues. A modular approach is appropriate for design of a system. The system development process should be followed such that quality can be measured. Either IS0 9001 or CMM quality certifications show the quality consciousness of an organization. For procurement of any system an appropriate RFP has to be prepared to

meet the user requirements. The implementation of the new system may be done using either of parallel, phased, direct conversion approaches. Now a days, in banking sector, outsourcing is management strategy by which bank outsource major, non-core functions to specialized, efficient service providers, but they should have a strategic outsourcing architecture through which sustainable sourcing relationships to be built with the vendors.

14.7 KEY WORDS :

1. **Cohesion**: It represents the strength of bounding between the internal elements of the module to one another.
2. **Coupling**: It is the strength of' inter connection between modules.
3. **Modularization**: It is a technique of dividing the problem into logically separable parts of the software based on the criterion of coupling and cohesion.
4. **Outsourcing**: Outsourcing is a strategy where organisation shares or assigns complete responsibility for delivery of a particular service or performing of activities traditionally handled by internal staff and resources to an outside party.
5. **Outsourcing Mission, Strategy and Goals (OMSAG)** statement is a document that sums up the organisation's outsourcing intentions and includes a value proposition that focuses on the expected value that the outsourcing arrangement will bring to the customers of the process - both internal and external.
6. **System Conversion**: means changing from one system to another such as installation of new equipment, changes in sitting arrangements of the staff, placement of equipment, change in work procedure etc.

14.8 SELF ASSESSMENT QUESTIONS :

1.. What are the components of feasibility study?
2. Discuss various phases of system procurement?
3. What are the different criteria being used to evaluate a proposal?
4. What arc the management issues of network implementation?
5. Explain different phases of outsourcing phases?
6. What is a merger and acquisition cycle?

14.9 REFERENCES :

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M.COM (Banking)
Semester - IV
PAPER - III: Banking and Technology

TIME: 3Hours **MAX MARKS: 70**

SECTION A ---- (4x5= 20 Marks)

Answer any **FOUR** of the following

1. a) Information Technology
   b) Technologies Applications
   c) Electronic Banking
   d) Internet banking
   e) Networked economy
   f) Technological innovation
   g) E-Commerce
   g) CRM

Section B — (5x10=50 marks)

Answer all following questions

2. What is the significance of Information Technology in Banking?

   Or

   Explain Information Technologies Applications used in Banking Sector?

3. What are the advantages of IT in Banking?

   Or

   What are the challenges of IT in Banking?

4. Explain the role and functions of Electronic Banking in India?

   Or

   Explain the functions of IFCI?

5. Discuss the short- and long-term measures suggested by Shere committee on legal aspects of e-banking?

   Or

   What are the various stages of a system development life cycle and how are the efforts distributed over these phases?

6. What are the various outputs of each stage of the system development life cycle?

   Or

   Explain the technology related risks for a bank?