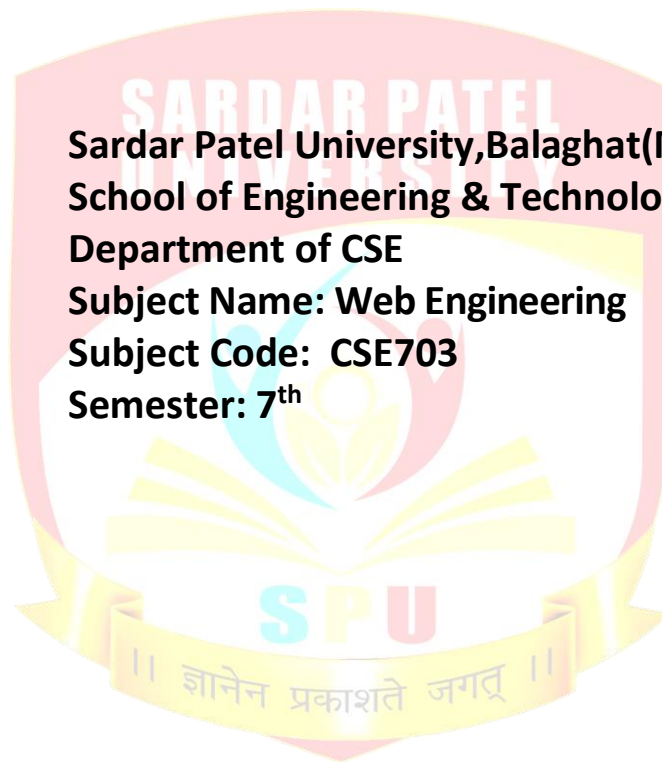


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Department of CSE
Subject Name: Web Engineering
Subject Code: CSE703
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UNIT-I

Introduction:

Web engineering is way of developing and organizing knowledge about Web application development and applying that knowledge to develop Web applications, or to address new requirements or challenges. It is also a way of managing the complexity and diversity of Web applications. A Web-based system is a living system. It is like a garden — it continues to evolve, change, and grow. A sound infrastructure must be in place to support the growth of a Web-based system in a controlled, but flexible and consistent manner. Web engineering helps to create an infrastructure that will allow evolution and maintenance of a Web system and that will support creativity.

History-Within a short period, the Internet and World Wide Web have become ubiquitous, surpassing all other technological developments in our history. They have also grown rapidly in their scope and extent of use, significantly affecting all aspects of our lives. Industries such as manufacturing, travel and hospitality, banking, education, and government are Web-enabled to improve and enhance their operations. E-commerce has expanded quickly, cutting across national boundaries. Even traditional legacy information and database systems have migrated to the Web. Advances in wireless technologies and Web-enabled appliances are triggering a new wave of mobile Web applications. As a result, we increasingly depend on a range of Web applications.

Evolution of Web Applications:

The Web has become closely ingrained with our life and work in just a few years. The web today is a growing universe of interlinked web pages and web apps, teeming with videos, photos, and interactive content. What the average user does not see is the interplay of web technologies and browsers that makes all this possible. Over time, web technologies have evolved to give web developers the ability to create new generations of useful and immersive web experiences. Today's web is a result of the ongoing efforts of an open web community that helps define these web technologies, like HTML5, CSS3 and WebGL and ensure that they are support in all web browsers.

Some of the Contributions to the evolution and growth of the Web are-

- **Media:** - Integration of different types of media such as data, text, graphics, images, audio and video, and their presentation (animation, 3D visualization); different types of interaction and channels of communications (one-to-one, one-to-many, many-to-one, and many-to-many).
- **Information science:** - information organization, presentation, indexing, retrieval, aggregation, and management; and collaborative and distributed content creation.
- **Information and communication technology and networking:-** Efficient and cost-effective storage, retrieval, processing, and presentation of information; infrastructures that facilitate transfer and sharing of data and information; wired and wireless Internet communication; and personalized and context-aware Web applications.

Need for Web Engineering:

The web has changed into an environment employed for the delivery of many different types of applications. Such applications range from small-scale information-dissemination-like applications, typically developed by writers and artists, to large-scale commercial, enterprise-planning and scheduling, collaborative-work applications. In today's world many Industries such as Construction, Education, and Hospitality, manufacturing, banking, government and business-utilized web based applications to improve and increase their operations.

Categories of Web Applications: We can categorize web applications as follows:

Document centric web application- Document centric web sites are static html documents stored on web server that sent directly to the client on request. The web pages are manual updated with the help of respective tools. These applications are static, simple, stable and take less time to respond.

Interactive web application- Interactive web application is offer by CGI, HTML Forms. It includes radio buttons, selection menus, forms etc. These applications are simple and fast. In this kind of application, the web pages and links are generating according to user input.

Transactional web application- These kinds of web applications have facility of modification by user. These applications are more interactive and support structured queries from database. The database system handles data consistently and efficiently.

Workflow based web application- These kinds of web applications are capable of handing the workflow among companies, private authorities or public authorities. Web services are included for interoperability. It is robust, reliable and flexible to handle workflow with autonomy of companies. B2B e-commerce solutions are best example of such applications.

Collaborative web application- These kinds of application are mainly use as group applications where group communications are important part. Chatrooms, online forums, e-learning websites or websites where information are shared with option of editing like Wikipedia.

Portal-oriented web application- This kind of web applications are those where single access point is there to separate different sources of information and services. Search engines, community portals etc. are best examples of portal oriented application.

Knowledge-based web application- This kind of application is use for providing knowledge for both human and machine. The knowledge management is based on semantic web technologies. Mining the web, linking and reusing knowledge are a few examples.

Characteristics of Web Applications- The following WebApp characteristics drive the process:

Immediacy- Web-based applications have an immediacy that is not found in any other type of software. That is, the time to market for a complete Web site can be a matter of a few days or weeks. Developers must use methods for planning, analysis, design, implementation, and testing that have been adapted to the compressed time schedules required for WebApp development.

Security- Because WebApps are available via network access, it is difficult, if not impossible, to limit the population of end-users who may access the application. In order to protect sensitive content and provide secure modes of data transmission, strong security measures must implemented throughout the infrastructure that supports a WebApp and within the application itself.

Aesthetics- An undeniable part of the appeal of a WebApp is its look and feel. When an application has been design to market or sell products or ideas, aesthetics may have as much to do with success as technical design.

Web Engineering Models-

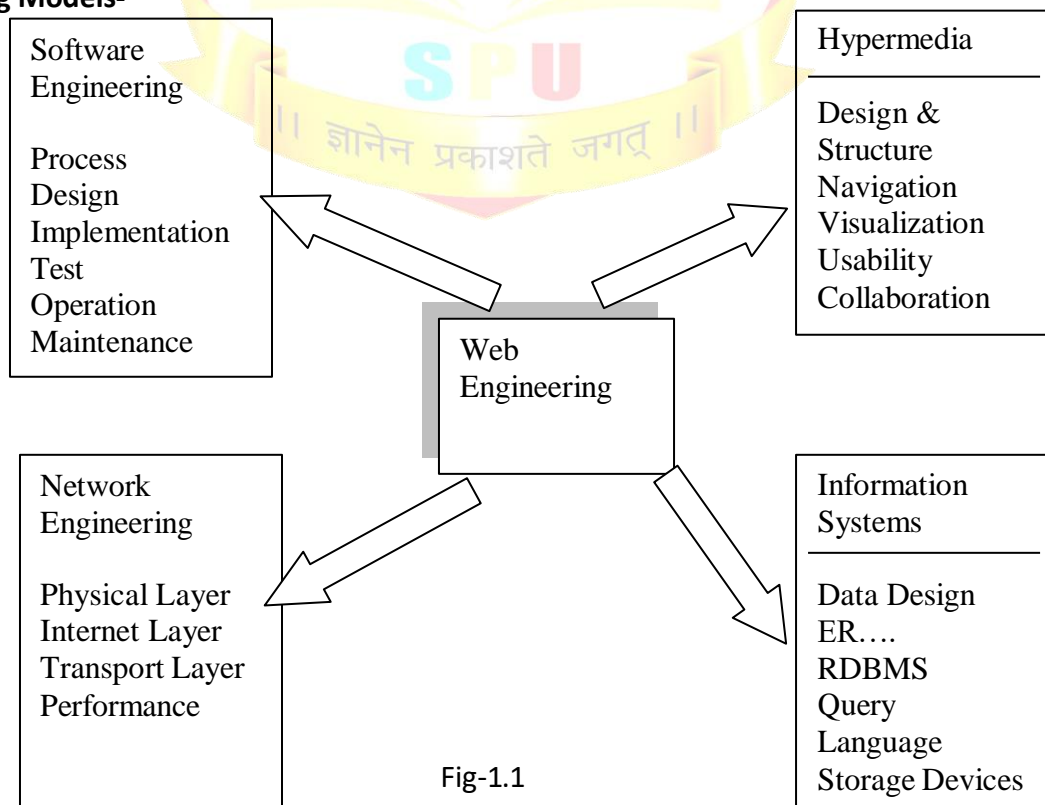


Fig-1.1

Software Engineering v/s Web Engineering-

Software engineering is using software to solve a problem, i.e. applying the science of making software to solve a problem such as making a program or game. Engineering is just solving any problem using science. A software engineer creates software through the practice of software engineering. Software is the product; software engineering is the process to create the product. Software engineering is a branch to make software this is a continuous task while software system is a product, which is made by the software engineering. Software engineering based on computer science, information science and discrete mathematics. In software engineering, two main concerns are cost of development and reliability measured by the no. of errors per thousand lines of source code.

In Web Engineering, Web development is the process of developing the software of web sites, and especially the software unique to each one. That may or may not include the web server and browser, usually includes any web-app frameworks but no other kinds, and generally does not include the languages or other such tools used, but certainly the unique code that runs in order to fulfill any functionality. Software development can be a part of web development, but web development is not always so. When you need a website or a web segment to run on it, you are looking for website development services.

World Wide Web: Stands for "World Wide Web." It is important to know that this is not a synonym for the Internet. The World Wide Web, or just "the Web," as ordinary people call it, is a subset of the Internet. The Web consists of pages that can be accessed using a Web browser. The Internet is the actual network of networks where all the information resides. Things like Telnet, FTP, Internet gaming, Internet Relay Chat (IRC), and e-mail are all part of the Internet, but are not part of the World Wide Web. The Hyper-Text Transfer Protocol (HTTP) is the method used to transfer Web pages to your computer. With hypertext, a word or phrase can contain a link to another Web site.

Berners-Lee developed three essential technologies for WWW:

1. Universal Document Identifier (UDI)
2. Hypertext Mark-up Language (HTML)
3. Hypertext Transfer Protocol (HTTP)

Introduction to TCP/IP-TCP/IP is made up of two acronyms, TCP, for Transmission Control Protocol, and IP, for Internet Protocol. TCP handles packet flow between systems and IP handles the routing of packets. However, we will expound further on that simplistic answer. All modern networks are now designed using a layered approach. Each layer presents a predefined interface to the layer above it. By doing so, a modular design can be developed to minimize problems in the development of new applications or in adding new interfaces.

The ISO/OSI protocol with seven layers is the usual reference model. Since TCP/IP designed before the ISO model was developed, it has four layers; however, the differences between the two are mostly minor **OSI**

Protocol Stack

- | | |
|-----------------|---|
| 7. Application | -- End user services such as email. |
| 6. Presentation | -- Data problems and data compression |
| 5. Session | -- Authentication and authorization |
| 4. Transport | -- Guarantee end-to-end delivery of packets |
| 3. Network | -- Packet routing |
| 2. Data Link | -- Transmit and receive packets |
| 1. Physical | -- The cable or physical connection itself. |

Software Components of TCP/IP-

Application Layer-Some of the applications we will cover are SMTP (mail), Telnet, FTP, Rlogin, NFS, NIS, and LPD Transport Layer The transport uses two protocols, UDP and TCP. UDP, which stands for User Datagram Protocol, does not guarantee packet delivery and applications, which use this, must provide their own means of verifying delivery. TCP does guarantee delivery of packets to the applications, which use it. Network Layer The network layer is concerned with packet routing and used low-level protocols such as ICMP, IP, and IGMP. In addition, routing protocols such as RIP, OSPF, and EGP will be discussed.

Link Layer-The link layer is concerned with the actual transmittal of packets as well as IP to Ethernet address translation. This layer is concerned with Arp, the device driver, and RARP.

WAP-In 1997, several companies organized an industry group called the WAP Forum. This group produces the WAP specification, a (long and detailed) series of technical documents that define standards for implementing wireless network applications. Hundreds of industry firms have given strong backing to the WAP Forum, so the technology should become widely adopted, and it is already well-hyped.

These three protocols can think of as "glue layers" in WAP:

- Wireless Transaction Protocol (WTP)
- Wireless Transaction Layer Security (WTLS)
- Wireless Datagram Protocol (WDP)

WTP provides transaction-level services for both reliable and unreliable transports. It prevents duplicate copies of packets from received by a destination, and it supports retransmission, if necessary, in cases where packets dropped. In this respect, WTP is analogous to TCP. However, WTP also differs from TCP. WTP is essentially a pared-down TCP that squeezes some extra performance from the network. WTLS provides authentication and encryption functionality analogous to Secure Sockets Layer (SSL) in Web networking. Like SSL, WTLS is optional and used only when the content server requires it. WDP implements an abstraction layer to lower-level network protocols; it performs functions similar to UDP. WDP is the bottom layer of the WAP stack, but it does not implement physical or data link capability. To build a complete network service, the WAP stack must implemented on some low-level legacy interface not technically part of the model. These interfaces, called bearer services or bearers, can be IP-based or non-IP based. WAP specifies architecture based on layers that follow the OSI model closely

DNS:-Domain Name Server as the name suggests is a distributed naming system for computer, services and resources connected to the internet. The main function is that it translates the domain name to the numerical IP address needed for the location of computers. The domain name system distributes the responsibility of assigning domain names to Authorities name servers. Authorities name servers are assigned to control their particular domain. They can also assign other authorities name servers for their sub domain. This method helps the DNS distribution fault free and avoids the need of the central register to be regularly consulted and updated.

E-MAIL:- Electronic mail (e mail) is one of the use of the Electronic mail (e mail) is one of the use of the World Wide Web, according to most businesses, improves productivity. Traditional methods of sending mail within an office environment are inefficient, as it normally requires an individual requesting a secretary to type the letter. A faster method, and more secure method of sending information is to use electronic mail where by a computer user can exchange messages with other computer users (or groups of users) via a communications network. Electronic mail is one of the most popular uses of the Internet. For example, a memo with 100 words will sent in a fraction of a second. Other types of data can also be sent with mail message such as images, sound, and so on.

The main standards that relate to the protocols of email transmission and reception are:

Simple Mail Transfer Protocol (SMTP) - which is use with the TCP/IP protocol suite? It has traditionally been limited to the text based electronic messages.

Multipurpose Internet Mail Extension (MIME) - Which allows the transmission and reception of mail that contains various types of data, such as speech, images, and motion video? It is a newer standard than STMP and uses much of its basic protocol.

TELNET:-Telnet is a network protocol used on the Internet or local area networks to provide a bidirectional interactive text-oriented communication facility using a virtual terminal connection. User data is interspersed in-band with Telnet control information in an 8-bit byte oriented data connection over the Transmission Control Protocol (TCP).Telnet is a client-server protocol, based on a reliable connection-oriented transport. Typically, this protocol is use to establish a connection to Transmission Control Protocol (TCP) port number 23, where a Telnet server application is listening. Telnet, however, predates TCP/IP and originally run over Network Control Program (NCP) protocols.

TELNET Overview-TELNET is a general protocol, meant to support logging in from almost any type of terminal to almost any type of computer. It allows a user at one site to establish a TCP connection to a login server or terminal server at another site. A TELNET server generally listens on TCP Port 23.

HTTP:- HTTP is a set of standards that allow users of the World Wide Web to exchange information found on web pages. When wanting to access any web page enter http:// in front of the web address, which tells the browser to communicate over HTTP. For example, the full URL for Computer Hope is http://www.computerhope.com. Today's modern browsers no longer require HTTP in front of the URL since it is the default method of communication. However, it is still used in browsers because of the need to access other protocols such as FTP through the browser. Below are a few of the major facts on HTTP.

- The term HTTP was coined by Ted Nelson.
- HTTP commonly utilizes port 80, 8008, or 8080.
- HTTP/0.9 was the first version of the HTTP and was introduced in 1991.
- HTTP/1.0 is specified in RFC 1945 and introduced in 1996.

HTTPS- Short for Hypertext Transfer Protocol over Secure, HTTPS is a secure method of accessing or sending information across a web page. All data sent over HTTPS is encrypted before it is sent, this prevents anyone from understanding that information if intercepted. Because data is encrypted over HTTPS, it is slower than HTTP, which is why HTTPS is only used when requiring login information or with pages that contain sensitive information such as an online bank web page.

File Transfer Protocol: – FTP is an open protocol standard that is widely used to transport and receive large files. It can also be used to send configuration files and software updates for network switches and routers. FTP uses ports for communications and uses encryption to protect the information being received and sent.

FTP is, for web developers, a way of moving information from the computer you are working on to the server where a website is hosted. If you want to install WordPress on a web server, for example, you are going to need FTP to copy the files over.

It is also occasionally used as a way to share files. One person may upload a file to an FTP server, and then share a link to it with another person. This sort of usage has become less common in the age of easy-to-use cloud services, but some people prefer to have their files hosted on a home server, and use FTP to enable that.

How It Works:- TCP and IP are the two major protocols that keep the internet running smoothly. TCP manages data transfer while IP directs traffic to internet addresses. FTP is an outgrowth of TCP and shuttles files back and forth between FTP server and FTP client. Because FTP requires that two ports be open--the server's and the client's--it facilitates the exchange of large files of information. First, you as client make a TCP control connection to the FTP server's port 21, which will remain open during the transfer process. In response, the FTP server opens a second connection that is the data connection from the server's port 20 to your computer. Using the standard active mode of FTP, your computer communicates the port number where it will stand by to receive information from the controller and the IP address-- internet location-- from which or to which you want files to be transferred. If you are using a public--or anonymous--FTP server, you will not need proprietary sign-in information to make a file transfer, but you may be asked to enter your email address. If you are using a private FTP server, however, you must sign in with a user name and password to initiate the exchange of data.

Browser and search engines:

Web Browser- A web browser (commonly referred to as a browser) is a software application for retrieving, presenting and traversing information resources on the World Wide Web. A Uniform Resource Identifier (URI/URL) that may be a web page, image identifies an information resource, video or other piece of content. Hyperlinks present in resources enable users easily to navigate their browsers to related resources. The most popular web browsers that are used today are Mozilla Firefox, Google Chrome, Microsoft Internet Explorer, Apple Safari and the Opera browser. These browsers are free and available for download and use.

Search engines -A **web search engine** is a software system that is designed to search for information on the World Wide Web. The search results are generally present in a line of results often referred to as search engine results pages. The information may be a mix of web pages, images, and other types of files. Some search engines also mine data available in databases or open directories. Unlike web directories, which are maintained only by human editors, search engines also maintain real-time information by running an algorithm on a web crawler.

Search strategy-A search strategy is a structured organization of terms used to search a database. The search strategy shows how these terms combine in order to retrieve the best results. Different databases work in different ways, so you need to adapt your search strategy for each of the databases you use.

Directories search engines and Meta search engines-

Directories, by contrast, are human-powered. Site owners submit their sites to directories (sometimes for a fee, sometimes free) and human editors determine the value of site, whether it should include in directory. Directory visitors can search the director or drill down to the appropriate category. Although directories have fallen out of fashion (even Yahoo's directory is now hidden at Yahoo.com under the "more" tab), there are still benefits to being listed there. Being list in an important directory helps your search engine visibility because it counts as an incoming link, which is one of the variables in the search engine's algorithm.

Metasearch engines do not build their own index. They piggyback on actual search engines, and make the search engines do the crawling work. Metasearch takes advantage of the indexes created by the bigger search engines, and usually returns results from a number of true search engines like Google, Bing. Some metasearch engines will also include other third-party sources directly in their web search results.

Working of the search engines-

Search engines use programs, often referred to as spiders, robots or crawlers, to search the internet. Those programs used by search engines build an index of internet. However most search engines will provide tips on how to improve your page ranking, the exact algorithms used are well guarded and change frequently to avoid misuse. However, by following a few well-accepted search engine optimization (SEO) techniques you can ensure that your website is well index and remains high in the rankings.

Web server -**Web server** is a computer where the web content is stored. Web server is use to host the web sites but there exists other web servers also such as gaming, storage, FTP, email etc.

Web Server Working

Web server respond to the client request in either of the following two ways:

- Sending the file to the client associated with the requested URL.
- Generating response by invoking a script and communicating with database

Multi-processing-In this single process (parent process) initiates several single-threaded child processes and distribute incoming requests to these child processes. Each of the child processes is responsible for handling single request. It is the responsibility of parent process to monitor the load and decide if processes should be kill or forked.

Multi-threaded-Unlike Multi-process, it creates multiple single-threaded processes.

Hybrid-It is combination of above two approaches. In this approach, multiple processes created and each process initiates multiple threads. Each of the threads handles one connection.

Web servers' features:

- Create one or more websites
- Configure log file settings, including where the log files are saved.
- Configure website/directory security.
- Create an FTP site. An FTP site allows users to transfer files to and from the site.
- Create virtual directories, and map them to physical directories

web caching- A web cache (or HTTP cache) is an information technology for the temporary storage (caching) of web documents, such as HTML pages and images, to reduce server lag. A web cache system stores copies of documents passing through it; subsequent requests may be satisfied from the cache if certain condition is meeting. A web cache system can refer either to an appliance, or to a computer program.

Advantage of web caching

Web caching reduces the number of requests made to the server. Due to which less bandwidth is consume and web server load is reduce. It also helps users to visit a web page if web server is down.

Case Study of IIS

Internet Information Services (IIS) on Windows Server 2012 is NUMA-aware and provides the optimal configuration for the IT administrators. The following section describes how **IIS 8.0** takes advantage of NUMA hardware to provide optimal performance.

IIS supports following two ways of partitioning the workload:

1. Run multiple worker processes in one application. If you are using this mode, by default, the application pool is configured to run in a single worker process. For maximum performance, you should consider running the same number of worker processes, as there are NUMA nodes, so that there is 1:1 affinity between the worker processes and NUMA nodes. This can be done by setting "Maximum Worker Processes" App Pool setting to 0. When this setting is configured, IIS will determine how many NUMA nodes are available on the hardware and will start the same number of worker processes.

2. Run multiple application pools in single workload/site. In this configuration, the workload/site is divided into multiple application pools. For example, the site may contain several applications that are configured to run in separate application pools. Effectively, this configuration results in running multiple IIS worker processes for the workload/site and IIS intelligently distributes process affinity for maximum performance. Depending upon the workload, administrator partitions the workload into multiple worker processes. Once a workload is correctly partitioned, IIS 8.0 identifies the most optimal NUMA node when the IIS worker process is about to start. By default, IIS picks the NUMA node with the most available memory. IIS has the knowledge of the memory consumption by each NUMA node and uses this information to "load balance" the IIS worker processes. This option is different from Windows default of round robin and specially designed for IIS workload.

Apache-The Apache HTTP Server, commonly referred to as Apache, is a web server application notable for playing a key role in the initial growth of the World Wide Web. Originally based on the NCSA HTTP server, development of Apache began in early 1995 after work on the NCSA code stalled. Apache quickly overtook NCSA HTTP as the dominant HTTP server, and has remained the most popular HTTP server in use since April 1996. In 2009, it became the first web server software to serve more than 100 million websites. Apache is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation.

Unit - II

Information architecture (IA)

IA is the art of expressing a model or concept of information used in activities that require explicit details of complex systems. Among these activities are library systems, Content Management Systems, web development, user interactions, database development, programming, technical writing, enterprise architecture, and critical system software design. Information architecture has somewhat different meanings in these different branches of IS or IT architecture. Most definitions have common qualities: a structural design of shared environments, methods of organizing and labelling websites, intranets, and online communities, and ways of bringing the principles of design and architecture to the digital landscape.

Role of information architect

An Information Architect organizes a website so that users have a better online experience. In general, their main responsibilities are to:

- Assign tasks to team members.
- The Information Architect often doubles up as the Project Manager.
- Capture the site's design goals.
- Communicate the business objectives, such as the site's sales targets, audience, and language requirements.
- Create access points to content from different in-coming pages.
- Design the navigation system, menus, sitemaps etc.
- Label and organize data.
- Map content to the appropriate section.
- Protect users from getting lost on the site.
- Before any coding begins, the Information Architect meets the client and defines the project's scope, objectives and target audience.

Documentation of Success Criteria-The meeting minutes are then returned to the client for confirmation. Once confirmed, they're circulated to all members involved in the development process. When the project enters the production stage, the Information Architect works with the web designers to develop the interface, icons and ensure the navigation systems are integrated correctly with the overall site architecture. For very complicated sections, the Information Architect and Software Engineers work together to ensure that each site component make sense so that the user can easily achieve their goal. The Information Architect communicates with the team during all key stages in the development cycle. On small projects the Information Architect may perform Project Management duties as these two areas frequently overlap. It is imperative to record client feedback at all stages and circulate it accordingly.

Communication-Lack of planning at the kick-off phase often results in untold disasters at later stages-often with serious financial repercussions. This may occur when, for example, the person delegated to lead the project lacks sufficient technical understanding to extract relevant information from the client. Finally, the Information Architect also works with the Quality Control team. To ensure that the site is performing correctly and, for example, by analysing the log files, identify areas where users are struggling to locate date or getting lost.

Collaboration and Communication

The information architect must communicate effectively with the web site development team. This is challenging, since information architecture is highly abstract and intangible. Besides communicating the architecture verbally, documents (such as blueprint diagrams) must be creating in ways that can understand by the rest of the team regardless of their own disciplinary backgrounds.

Web collaboration techniques include phone/text chat and remote multiuser conferences/seminars via intranet or phone systems. Web collaboration also facilitates employee communication and interaction within an organization. Web collaboration is a component of unified communications, which facilitate organizational teamwork and workflow. If unified communications is not well, develop within an organization, Web collaboration implementation is challenging for management and personnel. However,

most projects will require expertise in marketing, information architecture, graphic design, writing and editing, programming, and project management.

Marketing: The marketing team focuses on the intended purposes and audiences for the web site. They must understand what will bring the right people to the web site and what will bring them back again.

Information Architecture: The information architects focus on the design of organization, indexing, labelling, and navigation systems to support browsing and searching throughout the web site.

Graphic Design: The designers are responsible for the graphic design and page layout that defines the graphic identity or look of the web site. They strive to create and implement a design philosophy that balances form and function.

Editorial: Editors focus on the use of language throughout the web site. Their tasks may involve proof reading and editing copy, massaging content to ensure a common voice for the site, and creating new copy.

Technical: The technical designers and programmers are responsible for server administration and the development or integration of site production tools and web site applications. They advise the other teams regarding technology-related opportunities and limitations.

Project Management: The project manager keeps the project on schedule and within budget. He or she facilitates communication between the other teams and the clients or internal stakeholders. The success of a web site design and production project depends on successful communication and collaboration between these specialized team members. A linear, black-box, throw-it-over-the-wall methodology just will not work. Everyone needs to understand the goals, perspectives, and approaches of the other members of the team. For example, while the marketing specialist may lead the audience analysis process, he or she needs to anticipate the types of questions about the audience that the specialists will have. Otherwise, each will need to start from scratch in learning about that audience, wasting substantial time and resources.

Organizing Information: Here organize to understand, to explain, and to control. Our classification systems inherently reflect social and political perspectives and objectives. We live in the first world. They live in the third world. She is a freedom fighter. He is a terrorist. The way we organize, label, and relate information influences the way people comprehend that information. As information architects, we organize information so that people can find the right answers to their questions. We strive to support casual browsing and directed searching. Our aim is to apply organization and labelling systems that make sense to users. The Web provides us with a wonderfully flexible environment in which to organize. We can apply multiple organization systems to the same content and escape the physical limitations of the print world. So why are many large web sites so difficult to navigate? Why can't the people who design these sites make it easy to find information? These common questions focus attention on the very real challenge of organizing information.

Organizational Challenges: In recent years, increasing attention has been focused on the challenge of organizing information. Yet, this challenge is not new. People have struggled with the difficulties of information organization for centuries. The field of librarianship has been largely devoted to the task of organizing and providing access to information.. This quiet yet powerful revolution is driven by the decentralizing force of the global Internet. Not long ago, the responsibility for labelling, organizing, and providing access to information fell squarely in the laps of librarians. As the Internet provides us all with the freedom to publish information, it quietly burdens us with the responsibility to organize that information. As we struggle to meet that challenge, we unknowingly adopt the language of librarians.

Heterogeneity: Heterogeneity in web engineering is usually referring to the composition of a software system. A heterogeneous system is one that is made up of software that could be written in different languages, running on different operating systems, perhaps use different standards for communication. Simply, there is variation between the components that are used to run the software. The opposite of a heterogeneous system is a homogeneous system, where all of the components are the same and there is no variation. It is a challenge of developing techniques for building dependable software that is flexible enough to cope with the changing customer's requirements in the future.

Internal Politic: Politics exist in every organization. Individuals and departments constantly position for power or respect. Because of the inherent power of information organization in forming understanding and opinion, the process of designing information architectures for websites and intranets can involve a strong undercurrent of politics. The choice of organization and labelling systems can have a big impact on how users of the site perceive the company, its departments, and its products.

Organizing Web sites and Intranets- The organization of information in web sites and intranets is a major factor in determining success, and yet many web development teams lack the understanding necessary to do the job well. Our goal in this chapter is to provide a foundation for tackling even the most challenging information organization projects. Organization systems are composed of organization schemes and organization structures. An organization scheme defines the shared characteristics of content items and influences the logical grouping of those items. An organization structure defines the types of relationships between content items and groups. Before diving in, it's important to understand information organization in the context of web site development. Organization is closely related to navigation, labelling, and indexing. The hierarchical organization structures of web sites often play the part of primary navigation system. The labels of categories play a significant role in defining the contents of those categories. Manual indexing is ultimately a tool for organizing content items into groups at a very detailed level. Despite these closely knit relationships, it is both possible and useful to isolate the design of organization systems, which will form the foundation for navigation and labelling systems. By focusing solely on the logical grouping of information, you avoid the distractions of implementation details and design a better web site.

Web design and development phases

There are numerous steps in the web site design and development process. From gathering initial information, to the creation of your web site, and finally to maintenance to keep your web site up to date and current. The exact process will vary slightly from designer to designer, but the basics are generally the same.

- Information Gathering
- Planning
- Design
- Development
- Testing and Delivery
- Maintenance

1. Information Gathering: The first step in designing a successful web site is to gather information. This first step is actually the most important one, as it involves a solid understanding of the company. It involves a good understanding of you – what your business goals and dreams are, and how the web can utilize to help, you achieve those goals. It is important that your web designer start by asking many questions to help them understand your business and your needs in a web site. Certain things to consider are:

- **Purpose:** What is the purpose of the site?
- **Goals:** What do you hope to accomplish by building this web site?
- **Target Audience:** Is there a specific group of people that will help you reach your goals.
- **Content:** What kind of information will the target audience be looking for on your site? Are they looking for specific information, a particular product or service, online ordering?

2. Planning: Using the information gathered from phase one, it is time to put together a plan for your web site. This is the point where a site map is developed. The site map is a list of all main topic areas of the site, as well as sub-topics, if applicable. This serves as a guide as to what content will be on the site, and is essential to developing a consistent, easy to understand navigational system. A good user interface creates an easy to navigate web site, and is the basis for this. During the planning phase, your web designer will also help you decide what technologies should implement. Elements such as interactive forms, ecommerce, flash, etc. discussed when planning your web site.

3 Design: Drawing from the information gather up to this point, it is time to determine the look and feel of your site. Target audience is one of the key factors taken into consideration. As part of the design phase, it is also important to incorporate elements such as the company logo or colors to help strengthen the identity of your company on the web site. Your web designer will create one or more prototype designs for

your web site. Your designer should allow you to view your project throughout the design and development stages. The most important reason for this is that it gives you the opportunity to express your likes and dislikes on the site design. In this phase, communication between both you and your designer is crucial to ensure that the final web site will match your needs and taste. It is important that you work closely with your designer, exchanging ideas, until you arrive at the final design for your web site.

4. Development: The developmental stage is the point where the web site itself is creating. At this time, your web designer will take all of the individual graphic elements from the prototype and use them to create the actual, functional site. This is done by first developing the home page. The shell serves as a template for the content pages of your site, as it contains the main navigational structure for the web site. Once the shell has been creating, your designer will take your content and distribute it throughout the site, in the appropriate areas. Elements such as interactive contact forms, flash animations or ecommerce shopping carts are implement and made functional during this phase. This entire time, your designer should continue to make your in-progress web site available to you for viewing, so that you can suggest any additional changes or corrections you would like to have done.

5. Testing and Delivery: At this point, web designer will attend to the final details and test your web site. They will test things such as the complete functionality of forms or other scripts, as well last testing for last minute compatibility issues (viewing differences between different web browsers), ensuring that your web site is optimized to be viewed properly in the most recent browser versions. The basic technologies currently used are XHTML and CSS (Cascading Style Sheets). As part of testing, designer should check to be sure that all of the code written for web site validates. Valid code means that your site meets the current web development standards – this is helpful when checking for issues such as cross-browser compatibility as mentioned above. Once you give your web designer final approval, it is time to deliver the site. An FTP (File Transfer Protocol) program is use to upload the web site files to your server. Most web designers offer domain name registration and web hosting services as well. Once these accounts have been setup, and your web site uploaded to the server, the site should put through one last run-through. This is just precautionary, to confirm that all files have been upload correctly, and that the site continues to be

6.

7.

8 fully functional. This marks the official launch of your site, as it is now viewable to the public.

9. Maintenance: The development of your web site is not necessarily over, though. One way to bring repeat visitors to your site is to offer new content or products on a regular basis. Update your own content, there is something called a CMS (Content Management System) that can implemented to the web site. This is something that would decide upon during the Planning stage. With a CMS, your designer will utilize online software to develop a database driven site for you. A web site driven by a CMS gives you the ability to edit the content areas of the web site yourself.

Design issues- Here are a few common issues that designers have to face during web design and development.

Website accessibility: The Web is basically designed to work for all people, irrespective of the culture, language, location, or physical or mental ability. However, one of the major challenges a web designer faces is to enhance the accessibility of websites. A good designer should ensure that the website is not only accessible across the world but also its various features are fully functional as well.

Compatibility with browsers: With the introduction of different browsers, designers are constantly facing the challenge of building a website which is compatible with almost all the major browsers. After designing a website, it should be tested on all browsers to ensure that the website is completely functional.

Navigational structure: Navigational structure is one of the vital aspects of any website, as the usability of the website is based on an excellent navigational structure. Hence, in order to avoid any such issues, designers have to ensure that they provide a proper navigational structure to the users.

Positioning of content: Another aspect of a website that the users should find it readable. While designing the structure of the website, the designer should place the content in such a manner that it enhances easy reading. In addition, use suitable colours when it comes to font.

Conceptual Design-Conceptual Design is an early phase of the design process, in which the broad outlines of function and form of something are articulated. It includes the design of interactions, experiences, processes and strategies. It involves an understanding of people's needs - and how to meet them with products, services, & processes. Common artefacts of conceptual design are concept sketches and models.

High-Level Design-High-level design (HLD) explains the architecture that would be used for developing a software product. The architecture diagram provides an overview of an entire system, identifying the main components that would be developed for the product and their interfaces. The HLD uses possibly nontechnical to mildly technical terms that should be understandable to the administrators of the system. In contrast, low-level design further exposes the logical detailed design of each of these elements for programmers.

Indexing the Right Stuff- Search engines are frequently used to index an entire site without regard for the content and how it might vary. Every word of every page, whether it contains real content or helps with information, advertisement, navigation, menus and so on. However, searching becomes much better when the information space is defined narrowly and contains homogeneous contents. By doing so, the site's architects are ignoring two very important things: that the information in their site is not all the same. In addition, that it makes good sense to respect the lines already drawn between different types of content. For example, it has been cleared that German and English content are vastly different and that audience's overlap very little (if at all) so why not create separately searchable indices along those divisions?

Grouping Content- A content designer designs content for media and publishing content for media or software. The term is mainly used in design fields like Graphic Design, Visual Design and Sound Design (Music Industry). Content design can be used in print work. However, the term generally refers to content on the internet or in the Sound Industry (Music Production). Content designers work in many industries and are responsible for the organization and layout of web content. Moreover, the term can be stretched to include producers of anything that a user will interact.

Architectural Page Mock-ups- Architectural page mockups are useful tools during conceptual design for complementing the blueprint view of the site. Mockups are quick and dirty textual documents that show the content and links of major pages on the web site. They enable you to clearly (yet inexpensively) communicate the implications of the architecture at the page level. They are also extremely useful when used in conjunction with scenarios. They help people to see the site in action before any code is written. Finally, they can be employed in some basic usability tests to see if users actually follow the scenarios as you expect. Keep in mind that you only need to mockup major pages of the web site. These mockups and the designs that derive from them can serve as templates for the design of subsidiary pages.

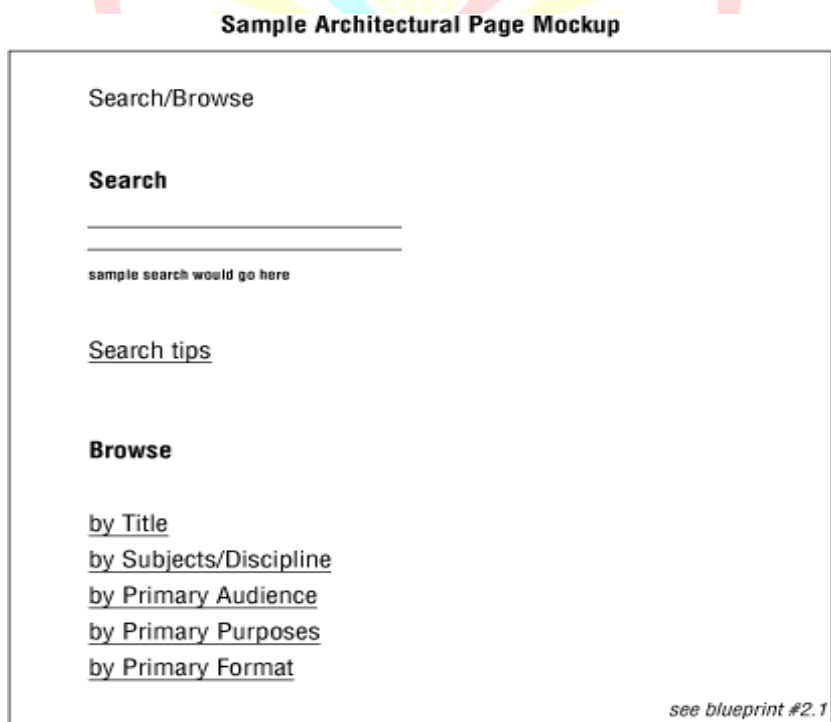


Fig-2.1

Design Sketches

Once you have developed high-level blueprints and architectural page mock-ups, you are ready to collaborate with your graphic designer to create design sketches on paper of major pages in the web site.

In the research phase, the design team has begun to develop a sense of the desired graphic identity or look and feel. The technical team has assessed the information technology infrastructure of the organization and the platform limitations of the intended audiences. They understand what is possible with respect to features such as dynamic content management and interactivity. In addition, of course, the architect has designed the high-level information structure for the site. Design sketches are a great way to pool the collective knowledge of these three teams in a first attempt at interface design for the top-level pages of the site. This is a wonderful opportunity for interdisciplinary user interface design. Using the architectural mock-ups as a guide, the designer begins sketching pages of the site on sheets of paper. As the designer sketches each page, questions arise that must be discussed. Here is a sample sketching session dialog:

1. Programmer: I like what you are doing with the layout of the main page, but I would like to do something more interesting with the navigation system.

2. Designer: Can we implement the navigation system using pull-down menus? Does that make sense architecturally?

3. Architect: That might work, but it would be difficult to show context in the hierarchy. We have had good reactions to that type of approach from users in the past.

4. Programmer: We can certainly go with that approach from a purely technical perspective. How would a tear-away table of contents look? Can you sketch it for us? I'd like to do a quick-and-dirty prototype.

As you can see, the design of these sketches requires the involvement of people from all three teams. It is much cheaper and easier for the group to work with the designer on these rough sketches than to begin with actual HTML page layouts and graphics.

Designing Navigation Systems-Navigation systems can be designed to support associative learning by featuring resources that are related to the content currently being displayed. For example, a page that describes a product may include see also links to related products and services (this type of navigation can also support a company's marketing goals). As users move through a well-designed navigation system, they learn about products, services, or topics associated to the specific content they set out to find. Any page on a web site may have numerous opportunities for interesting see also connections to other areas of the site. The constant challenge in navigation system design is to balance this flexibility of movement with the danger of overwhelming the user with too many options. Navigation systems are composed of a variety of elements. Some, such as graphical navigation bars and pop-up menus, are implemented on the content-bearing pages themselves. Others, such as tables of contents and site maps, provide remote access to content within the organization structure. While these elements may be implemented on each page, together they make up a navigation system that has important site-wide implications. A well-designed navigation system is a critical factor in determining the success of your web site.

Browser Navigation Features: When designing a navigation system, it is important to consider the environment the system will exist in. On the Web, people use web browsers such as Netscape Navigator and Microsoft Internet Explorer to move around and view web sites.

These browsers sport many built-in navigation features.

- Open URL allows direct access to any page on a web site.
- Back and forward, provide a bidirectional backtracking capability.
- History menu allows random access to pages visited during the current session, and Bookmark enables users to save the location of specific pages for future reference. If the hypertext link leads to another web site on another server, prospective view provides the user with basic information about this offsite destination.

Types of Navigation Systems: A complex web site often includes several types of navigation systems. To design a successful site, it is essential to understand the types of systems and how they work together to provide flexibility and context.

1. Hierarchical Navigation Systems: Although we may not typically think of it this way, the information hierarchy is the primary navigation system. From the main page to the destination pages that house the actual content, the main options on each page taken directly from the hierarchy. The hierarchy is extremely important, but also rather limiting.

2. Global Navigation Systems: A global or site-wide navigation system often complements the information hierarchy by enabling greater vertical and lateral movement throughout the entire site. At the heart of

most global navigation, systems are some standard rules that dictate the implementation of the system at each level of the site. The simplest global navigation system might consist of a graphical navigation bar at the bottom of each page on the site. On the main page, the bar might be unnecessary, since it would duplicate the primary options already listed on that page. On second level pages, the bar might include a link back to the home page and a link to the feedback facility

3. Local Navigation Systems: For a more complex web site, it may be necessary to complement the global navigation system with one or more local navigation systems. To understand the need for local navigation systems, it is necessary to understand the concept of a sub-site. For example, a software company may provide an online product catalogue as one area in their web site. This product catalogue constitutes a sub-site within the larger web site of the software company. Within this sub-site area, it makes sense to provide navigation options unique to the product catalogue, such as browsing products by name or format or market.

4. Ad Hoc Navigation: Relationships between content items do not always fit neatly into the categories of hierarchical, global, and local navigation. An additional category of ad hoc links is more editorial than architectural. Typically, an editor or content specialist will determine appropriate places for these types of links once the content has placed into the architectural framework of the web site. In practice, this usually involves representing words or phrases within sentences or paragraphs (i.e., prose) as embedded hypertext links. This approach can be problematic if these ad hoc links are important, since usability testing shows "a strong negative correlation between embedded links (those surrounded by text) and user success in finding information." Apparently, users tend to scan pages so quickly that they often miss these less conspicuous links. You can replace or complement the embedded link approach with external links that are easier for the user to see.

Searching Systems:

- 1) As the amount of information on the website increases it become difficult to find the required information. If the navigation systems are not properly designed and maintained then to find the required information searching systems are required.
- 2) If your site has enough contents and users come to your site to look for information then site need searching systems.
- 3) Search system should be there on your site if it contains highly dynamic contents e.g. web based newspaper.
- 4) A search system could help by automatically indexing the contents of a site once or many times per day. Automating this process ensures that users have quality access to your website's contents.

Good Web Design and bad Web Design-

Good sites have clearly defined conversion paths that guide the user down the intended course and lead them to the content that is most important to them. Looking at your Google Analytics Behavior Flow, you can evaluate if users are following your intended path through the hierarchy of your website. By using meaningful language for headings and calls to action that resonate with the user, and allow them to easily identify what they came to the site for, you can guide them through your site as opposed to letting them struggle to find their way themselves.

Bad sites tend to throw everything at you at once. Instead of focusing more on the user experience, bad websites focus primarily on promoting the companies features and benefits. Throwing a ton of information at the user before knowing what their need is, can overwhelm them and make them work harder to sift through all the information you provided to find what they are looking for. It is much better to provide the most meaningful content along with a conversion to reach out should they have any questions.

In addition, keep these concepts in mind:

Text

- Background does not interrupt the text
- Text is big enough to read, but not too big
- The hierarchy of information is perfectly clear
- Columns of text are narrower than in a book to make reading easier on the screen

Navigation

- Navigation buttons and bars are easy to understand and use
- Navigation is consistent throughout web site
- Navigation buttons and bars provide the visitor with a clue as to where they are, what page of the site they are currently on
- Frames, if used, are not obtrusive
- A large site has an index or site map

Links

- Link colors coordinate with page colors
- Links are underlined so they are instantly clear to the visitor

Graphics

- Buttons are not big and dorky
- Every graphic has an alt label
- Every graphic link has a matching text link
- Graphics and backgrounds use browser-safe colors
- Animated graphics turn off by themselves

General Design

- Pages download quickly
- First page and home page fit into 800 x 600 pixel space
- All of the other pages have the immediate visual impact within 800 x600 pixels
- Good use of graphic elements (photos, subheads, pull quotes) to break up large areas of text
- Every web page in the site looks like it belongs to the same site; there are repetitive elements that carry throughout the pages

Web publishing, or "online publishing," is the process of publishing content on the Internet. It includes creating and uploading websites, updating webpages, and posting blogs online. The published content may include text, images, videos, and other types of media.

In order to publish content on the web, you need three things:

- 1) Web development software,
- 2) An Internet connection, and
- 3) Web server

The software may be a professional web design program like Dreamweaver or a simple web-based interface like WordPress. The Internet connection serves as the medium for uploading the content to the web server. Large sites may use a dedicated web host, but many smaller sites often reside on shared servers, which host multiple websites. Most blogs are publishing on public web servers through a free service like Blogger.

Since web publishing does not require physical materials such as paper and ink, it costs almost nothing to publish content on the web. Therefore, anyone with the three requirements above can be a web publisher. Additionally, the audience is limitless since content posted on the web can viewed by anyone in the world with an Internet connection. These advantages of web publishing have led to a new era of personal publishing that was not possible before.

Web-site enhancement-

Plan you are Web Site:

Determine the audience, purpose and content for your Web site.

Who is the audience?

What are they looking for on your site?

How can you organize your content so the audience can find what they want?

Do you have information that they might not realize they will need?

Do you need to lay out a process, or sequence of steps?



Try to do this from the perspective of your audience, rather than from your own organizational structure, reporting needs, or processes. Think through the organization of your content to present your information in a logical manner, understandable to your anticipated audience. Prepare a schedule for maintaining links and updating content.

Get Approval (new sites or additions to existing sites): Work through your normal reporting channels for approval to produce a Web site for your class, program, department or unit.

Avoid Duplication: Evaluate the information already published Web site to avoid duplication of information or contradictions with prior publications. If you have doubts about whether your content may already exist on the Web site, check with Web Coordinator. Do not post duplicate copies of existing documents; link to them at their original Web address. This helps prevent broken links. Official institutional publications are already on the Web. These include the undergraduate Bulletin, the Graduate Bulletin, and handbooks and so on. You must link to these documents to avoid multiple or conflicting versions of University information. If your site includes information about programs, minors, specializations or course descriptions, you must call them by their official name and link to existing documents.

Submission of website to search engines-

Firstly, you do not need to submit your website to search engines because search engines have evolved beyond the point of needing to directly notify when a new website, or page on a website, is created. There was a time when it was recommended to submit your site to the major search engines, but that time was years ago. Unfortunately, there are still various SEO companies offering to submit websites to Google and Bing in return for a fee. It is in the interest of those companies for them to perpetuate the myth that search engine submissions are still required, but if you pay them to submit your business's site to search engines then you are paying them for nothing. Search engines charge no fee to be included in their search results. They will include in their results any website that does not contravene their guidelines, which are lenient and only take exception to sites that engage in manipulative and unethical practices. The only reason you would need to pay a search engine is to appear in the paid listings sections of the results (pay per click). If your website has been live on the internet – meaning that it can be access by typing the domain name directly into the address bar of a web browser – for more than a week then it is highly likely that it can already found in Google and Bing. This is because these days “submissions” to search engines happen automatically. Where some confusion arises is around the issue of a website not showing up for the keywords that someone wants it to show up for. However, this has nothing to be with search engine submissions. You cannot submit your site to search engines and tell them that you want to be rank for this keyword and that keyword. If you want your website to show up when people search for specific keywords then you need to do both on-site SEO and off-site SEO. Which keywords your site ultimately is rank for is dependent on search engine algorithms and their assessment of your site's relevance and authority. To find out if search engines have found your website you need to do a search in Google or Bing for the homepage URL of your website (i.e. www.yourdomain.com). If your site shows up in the results then it has already been found, crawled and indexed by search engines.

Even if you do nothing at all, your site will still eventually be included within Google and Bing. If you want to speed up the process though, or find that even after a week your site still has not been crawled and indexed, you can take a few actions. These are simple, quick and free.

Webmaster Tools

Both Google and Bing recommend that you set-up Webmaster accounts with them. Doing so allows them to communicate to you any problems with, or recommendations for, your website. Whilst you should therefore be setting up these accounts with them at some point, doing it straight after creating your site is equivalent to submitting your website to them. Some of the options and tools within both Webmaster Tools accounts may seem complicated, however, you don't need to concern yourself with those if you don't want to. Simply setting up the accounts and linking them to your website is sufficient for getting instantly included in their search results.

Backlinks

A link on another webpage, especially if that webpage is on an established and regularly updated site, pointing towards to your site will ensure that search engines find your site. A single backlink will be sufficient; though creating a few backlinks gives search engines more chances to find your site. The best

way to get such a link is by making a comment on a newly published article on a popular blog, as most blogs allow you to link back to your own site when making a comment.

Google+

The primary reason for creating a Google+ page for your business is that it builds trust and authority with Google, but there is an added benefit too, which is that you can link your business's Google+ page to your own website. As soon as you create that link within your Google+ account your website will be instantly crawled and indexed by Google. Alternatively, if you have a personal Google account, login to your account, access the + section and 'share' your website's URL. Or, if you have integrated social media buttons into your site, you can click the +1 button for instant submission/indexation into Google.

Web security: issues:-Web sites are unfortunately prone to security risks. In addition, so are any networks to which web servers are connected. Setting aside risks created by employee use or misuse of network resources, your web server and the site it hosts present you are most serious sources of security risk.

Web servers by design open a window between your network and the world. The care taken with server maintenance, web application updates and your web site coding will define the size of that window, limit the kind of information that can pass through it and thus establish the degree of web security you will have.

Security audit:-WSSA examines your website pages, applications and web servers to find security weaknesses and vulnerabilities that would give hackers an opportunity to do damage. Simply give us your domain and an email address and you will receive a complete report with the recommendations you need to take corrective action. We will quickly identify website security issues and then test your site routinely to keep it secure! There is nothing to install and our tests will not disturb your site or visitors.

Web effort estimation-Project planning in software industry represents one of the most complex tasks, especially when there is a need to estimate the time, cost and effort needed for development of software projects. In the field of development effort estimation for classical software, projects a number of methods have been developed, tested and successfully implemented. Web projects are, by their nature, different from classical software projects.

Productivity Measurement-In analyzing the trade-off between security and productivity, it's generally easy to measure the impact reduced security will have on productivity. It is much harder to assess the risks, and benefits of lowering those risks, at different levels of security.

First, minimize the productivity impact of security by making it as transparent as possible to the end user. Ideally, they will not have to use any extra commands, no pop ups, no extra. The Windows User Access Control slider provides a great example. If you give users the option, they will turn down the security level to avoid having to respond to an extra prompt. In other words, if you are going to give them the authority to do certain actions after a prompt, why trouble them with the extra steps.

For example, data loss, these same controls can also enforce best practice. In addition to controlling actions because of a security risk, we can stop people from doing things that they should not do because of the operational risk presented. In addition, with proper controls we can do better than "Are you really sure you want to" pop-ups that most just click through anyway. There is also great potential in using data on what people are doing to improve productivity.

Evaluating the quality of web development-If you have a website are planning having one created, it is important that you evaluate the quality of web development to make sure that it is up to the task. Below is a checklist of best practices for web development that you can use to assess your website:

Quality- 1.To check Quality of code – look at web standards

2. Design – browser compatibility
3. Design – Mobile device compatibility
4. SEO Quality
5. Accessibility

Usability- Usability refers to the quality of a user's experience when interacting with products or systems, including websites, software, devices, or applications. Usability is about effectiveness, efficiency and the overall satisfaction of the user. It is important to realize that usability is not a single, one-dimensional property of a product, system, or user interface. 'Usability' is a combination of factors including:

Intuitive design: a nearly effortless understanding of the architecture and navigation of the site

Ease of learning: how fast a user who has never seen the user interface before can accomplish basic tasks?

Efficiency of use: How fast an experienced user can accomplish tasks?

Memorability: after visiting the site, if a user can remember enough to use it effectively in future visits

Error frequency and severity: how often users make errors while using the system, how serious the errors are, and how users recover from the errors

Subjective satisfaction: If the user likes using the system

Reliability: Identify the name of the individual, group or institution that created the website. A reliable website should clearly state the name of its creator. Generally, websites created by government institutions (.gov) and educational institutions (.edu) are considered more reliable.

Identify the source of any facts mentioned on the website. A reliable website should reference the published or unpublished source of any facts found on the site.

Identify any contact information supplied by the website. A reliable website should provide a way for users to contact an individual associated with the website. Contact information allows users to ask questions regarding the website and dispute any information found on the site.

Identify the purpose of the website or motivations of its creators. A reliable website should be objective in presenting information. If the purpose of a website is to sell wooden baseball bats, you should be suspicious of the information it presents regarding the problems associated with metal baseball bats.

Identify the date that the website last modified. A reliable website should present up-to-date information. The importance of this may vary depending on the information presented.

REQUIREMENTS ENGINEERING FOR WEB APPLICATIONS-

INTRODUCTION-Requirements engineering is a software engineering process with the goal to identify, analyze, document and validate requirements for the web application to be developed. One of the most important factors of success in the software development is the elicitation, management, and analysis of requirements, which is used to assure the quality of the resulting software. This is especially true in Web engineering due to the heterogeneous audience of the Web, which may lead to websites difficult to comprehend by visitors and complex to maintain by designers. The development of Web systems usually involves more heterogeneous stakeholders than the construction of traditional software. In addition, Web systems have additional requirements for the navigational and multimedia aspects as well as for the usability as no training is possible. Therefore, a thorough requirements analysis is even more relevant. The most useful requirements analysis specifies in detail what the user should be able to accomplish on the site and provides guidance on designing site interactions. Proposed work focuses on various requirements analysis tasks and in each task navigation and customization, phases should be concentrated as they play an important role in web application development. First step is to produce various artifacts that provide different lenses on the system and its uses to elicit more detail requirements, such as actor tables and use cases. Negotiation of priorities is followed by this. Categorizing the structural requirements is followed then which includes the application and program flow. Subsequent strides are documentation, validation and finally managing the requirements.

Requirements Fundamentals-At its most basic, a software requirement is a property that must be exhibited by something in order to solve some problem in the real world. It may aim to automate part of a task for someone to support the business processes of an organization, to correct shortcomings of existing software, or to control a device—to name just a few of the many problems for which software solutions are possible. By extension, therefore, the requirements on particular software are typically a complex combination from various people at different levels of an organization, and who are in one way or another involved or connected with this feature from the environment in which the software will operate.

Requirement Source-An essential task of the elicitation activity is therefore the systematic identification of relevant requirement sources. Relevant requirement sources include the stakeholders involved in the process, existing documentation, and existing predecessor systems.

Type-

Functional requirements-How the system should react to particular inputs and how the system should behave in particular situations.

Non-functional requirements-Constraints on the services or functions offered by the system such as timing Constraints, constraints on the development process, standards, etc.

Domain requirements-Requirements that come from the application domain of the system that reflect the characteristics of that domain.it may be functional or non-functional

Notation Tools- Requirement Engineering tools are quickly evolving. The demand for flexibility, lean and agile development, worldwide collaboration, and advanced software and systems ecosystems is changing how we manage requirements. For instance, agile teams are less document-centric and more code-oriented—they expect brief requirements directly related to code changes—so their RE tool should be lightweight. On the other hand, distributed development teams need to easily and comprehensively access requirements and specifications with traceability throughout the life cycle. Their RE tool should assure service for generations of software. RE tools are adapting to these demands with changes to their design and architecture. Traditionally, RE tools are proprietary and well maintained by their vendors; they are often oriented toward distinct environments and niche markets (for example, automotive, medical, and defense), development processes (for example, agile development, product management, and prototyping), or utilization settings (for example, local versus global software development). This alone is enough reason to evaluate RE tools and technologies with different use cases

Principles Requirements Engineering Activities-

The key activities that make up requirements engineering are:

Requirements Elicitation: Obtain the requirements from the stakeholders

Requirements Analysis: Ensure that all stakeholders and their needs have identified and that all types of requirements (functional, performance, quality) and design constraints have captured.

Requirements Specification: Capture the requirements in the appropriate format and obtain commitments from stakeholders

Requirements Validation: Ensure that the requirements, as documented, are cohesive, consistent, atomic, traceable to their source, unambiguous, and verifiable

Requirements Management: Manage changes to the requirements of the system through the design, development, and maintenance activities

Adapting RE Methods to Web Application-For RE Methods to Web Application, follow SWOT is an acronym for Strengths, Weaknesses, Opportunities, and Threats. A SWOT Analysis is a structured planning method used to evaluate strengths, weaknesses, opportunities, and threats involved in a project. It is an analytical technique which is commonly used as part of strategic planning as a foundation for evaluating the internal potential and limitations and the probable/likely opportunities and threats from the external environment. It views all positive and negative factors inside and outside the area/field that affect the growth/scope. It looks at the following scenarios, namely, internal strengths, internal weaknesses, Opportunities in the external environment, Threats in the external environment.

- Deals with principles, methods, and tools for eliciting, Describing, validating, and managing requirements
- Unavailable stakeholders,
- Volatile requirements and constraints,
- Unpredictable operational environments
- Inexperience with Web technologies
- Particular importance of quality aspects such as usability, or performance

Unit-III

Technologies for Web Applications:

HTML-First developed by Tim Berners-Lee in 1990, HTML is short for Hypertext Markup Language. HTML is used to create an electronic document (called pages) that is display on the World Wide Web. Each page contains a series of connections to other pages called hyperlinks. Every web page you see on the Internet is written using one version of HTML code or another. HTML code ensures the proper formatting of text and

images so that your Internet browser may display them as they are intended to look. Without HTML, a browser would not know how to display text as elements, load images, or other elements. HTML also provides a basic structure of the page, upon which Cascading Style Sheets are overlaid to change its appearance. One could think of HTML as the bones (structure) of a web page, and CSS as its skin (appearance).

How does it work-HTML consists of a series of short codes typed into a text-file by the site author — these are the tags. The text is then saved as a html file, and viewed through a browser, like Internet Explorer or Netscape Navigator. This browser reads the file and translates the text into a visible form, hopefully rendering the page as the author had intended. Writing your own HTML entails using tags correctly to create your vision. You can use anything from a rudimentary text-editor to a powerful graphical editor to create HTML pages.

DHTML- DHTML is essentially Dynamic HTML. It is a new way of looking at and controlling the standard HTML codes and commands. DHTML is collections of technologies are used to create interactive and animated web sites. DHTML gives more control over the HTML elements. It allows one to incorporate a client-side scripting language, such as JavaScript, a presentation definition language, such as CSS, and the Document Object Model in HTML web pages.

DHTML also allows the pages to change at any time, without returning to the Web server first. It allows scripting languages to change a web page's look and function after the page has been fully loaded and during the viewing process. It also allows the user to add effects to their pages that are otherwise difficult to achieve.

Some differences between HTML and DHTML:

HTML is a mark-up language, while DHTML is a collection of technology.

DHTML creates dynamic web pages, whereas HTML creates static web pages.

DHTML allows including small animations and dynamic menus in Web pages.

DHTML used events, methods, properties to insulate dynamism in HTML Pages.

DHTML is using JavaScript and style sheets in an HTML page.

HTML sites will be slow upon client-side technologies, while DHTML sites will be fast enough upon client-side technologies.

HTML creates a plain page without any styles and Scripts called as HTML. Whereas, DHTML creates a page with HTML, CSS, DOM and Scripts called as DHTML. HTML cannot have any server side code but DHTML may contain server side code. In HTML, there is no need for database connectivity, but DHTML may require connecting to a database as it interacts with user. HTML files are stored with .htm or .html extension, while DHTML files are stored with .dhtm extension. HTML does not require any processing from browser, while DHTML requires processing from browser which changes its look and feel.

The HTML Document Structure:- Using the correct HTML document structure when creating a web page is important. If the HTML document structure is incorrect, the web page can break or the search engine spider may not be able to read the page. Starting with the very first line in your HTML document:

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
</head>
<body>
<h1>My First Heading</h1>
<p>My first paragraph.</p>
</body>
</html>
```

HTML Elements: - HTML documents are defined by HTML elements. An HTML element is everything from the start tag to the end tag. The start tag is often called the opening tag. The end tag is often called the closing tag.

Start tag <p>Element Content</p> End tag

HTML Element Syntax

An HTML element starts with a start tag / opening tag

An HTML element ends with an end tag / closing tag

The element content is everything between the start and the end tag

Some HTML elements have empty content

Empty elements are closed in the start tag

Most HTML elements can have attributes

Example

```
<html>
<body>
<p>This is my first paragraph</p>
</body>
</html>
```

The Head Tags - Opening Head Tag- The <head> and </head> tags identify the document's head area. The information between these two tags is not visible on your page.

Character Encoding- The character encoding meta tag tells the browser which character set the web page uses. <Meta http-equiv="Content-Type" content="text/html; charset=ISO-8859-1">

Title Tag- The title tag creates the page title that is seen in the title bar of the web page.

```
<Title>Title of the document</title>
```

Meta Tags- The Meta tags provide information about your web page.

```
<metaname="Description" content="Your description">
<meta name="Keywords" content="first, second, third">
<meta name="Author" content="Author Information">
<meta name="Copyright" content="Copyright Statement">
<meta name="Distribution" content="Global">
<meta name="Expires" content="Tue, 01 Jun 1999 19:58:02 GMT">
<meta name="Robots" content="index,follow">
```

Link Tag- The link tag is used to link other documents to this one. This example shows linking to an external stylesheet.

```
<link rel="stylesheet" type="text/css" href="styles/stylesheet.css">
```

Script Tag- The script tag defines what type of script the browser is to execute. This tag can also be included in the body of your page.

```
<script type="text/javascript"> <!--
<!--Your script -->
-->
</script>
```

Style Tag- The style tag is used to set the style of your document elements. It is better to use an external style sheet using the link tag so if you wish to change something you only have to change it in one spot.

```
<style type="text/css"> your style types </style>
```

Closing Head Tag- The closing head tag defines the end of the document's head section.

```
</head>
```

The Body Tags- The body tags surround the body (contents) of your web page.

```
<Body>
```

```
The body of the document </body>
```

Closing HTML Tag- The closing HTML tag is the last line in your HTML document. Do not put anything after this tag! Your page will not validate if you do.

```
</html>
```

DOCTYPE - DTD - Document Type Declaration:- The DOCTYPE Declaration (DTD or Document Type

Declaration), what it does and why each web page needs it.

Character Encoding Character encoding tells the browser and validator what set of characters to use when converting the bits to characters.

Linking- The <link> tag defines a link between a document and an external resource.

The <link> tag is used to link to external style sheets.

```
<head>
<link rel="stylesheet" type="text/css" href="theme.css">
</head>
```

Anchor attributes - An anchor is a piece of text, which marks the beginning and/or the end of a hypertext link.

HTML <a> Tag-

```
<a href="https://www.be.rgpvnotes.in">Visit RGPV Notes for Engg. Notes</a>
```

The <a> tag defines a hyperlink, which is used to link from one page to another.

The most important attribute of the <a> element is the href attribute, which indicates the link's destination.

By default, links will appear as follows in all browsers:

- An unvisited link is underlined and blue
- A visited link is underlined and purple
- An active link is underlined and red

Image map- In HTML and XHTML, an image map is a list of coordinates relating to a specific image, created in order to hyperlink areas of the image to different destinations (as opposed to a normal image link, in which the entire area of the image links to a single destination). For example, a map of the world may have each country hyperlinked to further information about that country. The intention of an image map is to provide an easy way of linking various parts of an image without dividing the image into separate image files.

Meta Information- Metadata is "data about data". The term is ambiguous, as it is used for two fundamentally different concepts (types). **Structural metadata** is about the design and specification of data structures and is called "data about the containers of data", **descriptive metadata**, on the other hand, is about individual instances of application data, the data content. By describing the contents and context of data files, the quality of the original data/files is increased. For example, a web page may include metadata specifying what language it is written in, what tools were used to create it, and where to go for more on the subject, allowing browsers to automatically improve the experience of users.

Image Preliminaries- In HTML, images are defined with the tag. The tag is empty, which means that it contains attributes only and it has no closing tag. To display an image on a page, you need to use the src attribute. Src stands for "source". The value of the src attribute is the URL of the image you want to display on your page.

Syntax

```

```

The URL points to the location where the image is stored.

Layouts- The simplest and most popular way of creating layouts is using HTML <table> tag. These tables are arranged in columns and rows, so you can utilize these rows and columns in whatever way you like.

HTML5 offers new semantic elements that define the different parts of a web page:



- `<header>` - Defines a header for a document or a section
- `<nav>` - Defines a container for navigation links
- `<section>` - Defines a section in a document
- `<article>` - Defines an independent self-contained article
- `<aside>` - Defines content aside from the content (like a side bar)
- `<footer>` - Defines a footer for a document or a section
- `<details>` - Defines additional details
- `<summary>` - Defines a heading for the `<details>` element

Backgrounds- Authors may specify the background of an element (i.e., its rendering surface) as either a color or an image. In terms of the box model, "background" refers to the background of the content, padding and border areas. Border colors and styles are set with the border properties. Margins are always transparent. Background properties not inherited, but the parent box's background will shine through by default because of the initial 'transparent' value on 'background-color'.

The background of the root element becomes the background of the canvas and covers the entire canvas, anchored (for 'background-position') at the same point as it would be if it was painted only for the root element itself. The root element does not paint this background again.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01//EN">
```

```
<TITLE>Setting the canvas background</TITLE>
```

```
<STYLE type="text/css">
```

```
BODY {background: url("http://example.com/marble.png") }
```

```
</STYLE>
```

```
<P>My background is marble.
```

HTML color codes are hexadecimal triplets representing the colors red, green, and blue (#RRGGBB). For example, in the color red, the color code is #FF0000, which is '255' red, '0' green, and '0' blue. These color codes can use to change the color of the background, text, and tables on a web page.

Colors –Color Values

A color is defined using a hexadecimal notation for the combination of red, green, and blue color values (RGB). The lowest value that can be given to one light source is 0 (hex #00). The highest value is 255 (hex #FF). This table shows the result of combining red, green, and blue:

How to Change Text Color in HTML-While you can change text color using the tag in HTML, this method is no longer support in HTML5. Instead, you will use basic CSS to define what color the text will appear in various elements on your page. Using CSS will ensure that your web page is compatible with every possible browser.

Fonts-The `` tag in HTML is deprecated. The World Wide Web Consortium (W3C) has removed the `` tag from its recommendations. In future versions of HTML, style sheets (CSS) will use to define the layout and display properties of HTML elements.

Use the `` Tag Should NOT

Tables- Tables-

Tables are defined with the `<table>` tag. A table is divided into rows (with the `<tr>` tag), and each row is divided into data cells (with the `<td>` tag). The letters td stands for table data, which is the content of a data cell. A data cell can contain text, images, lists, paragraphs, forms, horizontal rules, tables, etc.

Frames- Frames allow a visual HTML Browser window to split into segments, each of which can show a different document. This can lower bandwidth use, as repeating parts of a layout can used in one frame, while variable content is displayed in another. This may come at a certain usability cost, especially in non-visual user agents, due to separate and independent documents (or websites) being

displayed adjacent to each other and being allowed to interact with the same parent window. Because of this cost, frames (excluding the <iframe> element) only allowed in HTML 4.01 Frame-set.

In HTML 4.01, a document may contain a <head> and a <body> or a <head> and a <frameset>, but not both a <body> and a <frameset>. However, <iframe> can be used in a normal document body.

<frameset>...</frameset>

Contains the set of frame elements for a document. The layout of frames is given by comma separated lists in the rows and cols HTML attributes.

<frame> or <frame/>

Defines a single frame, or region, within the frameset. A separate document is linked to a frame using the src attribute inside the frame element.

<noframes>...</noframes>

Contains normal HTML content for user agents that don't support frames.

<iframe>...</iframe>

An inline frame places another HTML document in a frame. Unlike an object element, an inline frame can be the "target" frame for links defined by other elements, and it can be selected by the user agent as the focus for printing, viewing its source, and so on.

The content of the element is used as alternative text to be displayed if the browser does not support i-frames.

HTML - <layer> Tag-The HTML <layer> tag is used to position and animate (through scripting) elements in a page. A layer can be thought of as a separate document that resides on top of the main one.

<!DOCTYPE html>

<html>

<head>

<title>HTML layer Tag</title>

</head>

<body>

<layer id = "layer1" top = "250" left = "50" width = "200"
height = "200" bgcolor = "red">

<p>layer 1</p>

</layer>

<layer id = "layer2" top = "350" left = "150" width = "200"
height = "200" bgcolor = "blue">

<p>layer 2</p>

</layer>

<layer id = "layer3" top = "450" left = "250" width = "200"
height = "200" bgcolor = "green">

<p>layer 3</p>

</layer>

</body>

</html>

Audio and Video Support with HTML Database integration-

The HTML <video> Element

To show a video in HTML, use the <video> element:

<video width="320" height="240" controls>

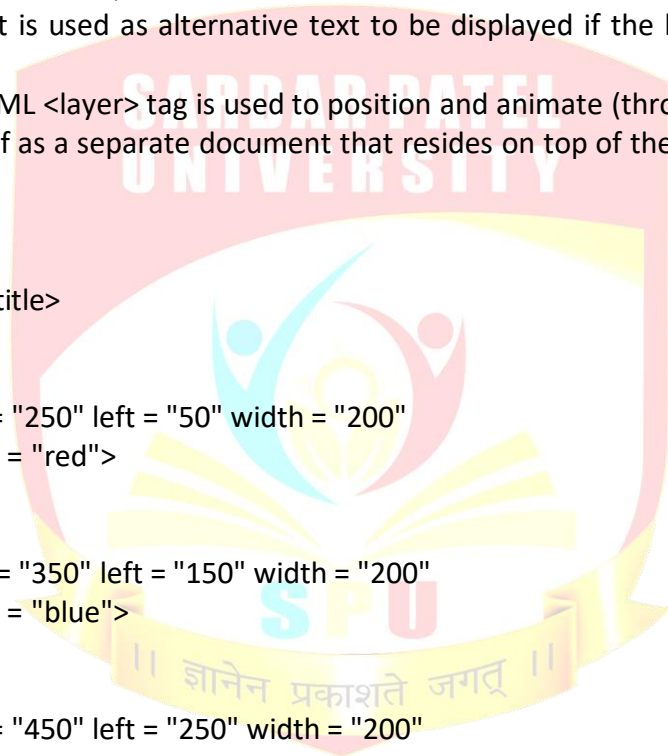
<source src="movie.mp4" type="video/mp4">

<source src="movie.ogg" type="video/ogg">

Your browser does not support the video tag.

</video>

How it Works



The controls attribute adds video controls, like play, pause, and volume. It is a good idea to include width and height attributes. If height and width are not set, the page might flicker while the video loads. The <source> element allows you to specify alternative video files that the browser may choose from. The browser will use the first recognized format. The text between the <video> and </video> tags will only be displayed in browsers that do not support the <video> element.

HTML <video> Autoplay

To start a video automatically use the autoplay attribute:

```
<video width="320" height="240" autoplay>
  <source src="movie.mp4" type="video/mp4">
  <source src="movie.ogg" type="video/ogg">
```

Your browser does not support the video tag.

</video>

CSS- Cascading Style Sheets a new feature being added to HTML that gives both Web site developers and users more control over how pages are displayed. With CSS, designers and users can create style sheets that define how different elements, such as headers and links, appear. These style sheets can then be applied to any Web page. The term cascading derives from the fact that multiple style sheets can be applied to the same Web page. CSS was developed by the W3C.

CSS Syntax

The selector points to the HTML element you want to style. The declaration block contains one or more declarations separated by semicolons. Each declaration includes a CSS property name and a value, separated by a colon.

A CSS declaration always ends with a semicolon, and declaration blocks are surrounded by curly braces.

In the following example all <p> elements will be center-aligned, with a red text color:

Example

```
p {
  color: red;
  text-align: center;
}
```

External Style Sheet- An external style sheet is ideal when the style is applied to many pages. With an external style sheet, you can change the look of an entire Web site by changing one file. Each page must link to the style sheet using the <link> tag. The <link> tag goes inside the head section:

```
<head>
<link rel="stylesheet" type="text/css" href="mystyle.css"> </head>
```

An external style sheet can write in any text editor. The file should not contain any html tags. Your style sheet should save with a .css extension. An example of a style sheet file is shown below:

```
hr {color:sienna;}
p {margin-left:20px;}
body {background-image:url("images/back40.gif");}
```

Internal Style Sheet- An internal style sheet should be used when a single document has a unique style. You define internal styles in the head section of an HTML page, by using the <style> tag, like this:

```
<head>
<style>
hr {color:sienna;}
p {margin-left:20px;} body {background-
image:url("images/back40.gif");} </style>
</head>
```

Inline Styles- An inline style loses many of the advantages of style sheets by mixing content with presentation. To use inline styles you use the style attribute in the relevant tag. The style attribute can contain any CSS property. The example shows how to change the color and the left margin of a paragraph: `<p style="color:sienna;margin-left:20px;">This is a paragraph.</p>`

CSS Colors

Colors in CSS are most often specified by:

- a valid color name - like "red"
- an RGB value - like "rgb(255, 0, 0)"
- a HEX value - like "#ff0000"

CSS Border Style

The border-style property specifies what kind of border to display.

The following values are allowed:

- dotted - Defines a dotted border
- dashed - Defines a dashed border
- solid - Defines a solid border
- double - Defines a double border
- groove - Defines a 3D grooved border. The effect depends on the border-color value
- ridge - Defines a 3D ridged border. The effect depends on the border-color value
- inset - Defines a 3D inset border. The effect depends on the border-color value
- outset - Defines a 3D outset border. The effect depends on the border-color value
- none - Defines no border
- hidden - Defines a hidden border

CSS Margins

The CSS margin properties used to generate space around elements. The margin properties set the size of the white space outside the border. With CSS, you have full control over the margins. There are CSS properties for setting the margin for each side of an element (top, right, bottom, and left).

Positioning with Style sheets- CSS positioning allows one to exactly place the elements of a Web page. A traditional computer coordinate system is used for specifying X-Y locations. The upper left corner of the HTML page display area in a Web browser is considered the axis origin (0,0). The X-axis progresses positively to the right. The Y-axis progresses positively down.

To communicate to the browser where a page element is to be placed, CSS positioning contains elements with a transparent rectangle, termed a **bounding box**.

Position an <h2> element:

```
h2 {  
    position: absolute;  
    left: 100px;  
    top: 150px;  
}
```

Forms Control- An HTML form contains form elements.

Form elements are different types of input elements, as if text fields, checkboxes, radio buttons, submit buttons, and more.

The <input> Element

The most important form element is the **<input>** element.

The <input> element can display in several ways, depending on the **type** attribute.

Example

```
<input name="firstname" type="text">
```

The <select> Element

The **<select>** element defines a **drop-down list**:

Example


```
<select name="cars">
  <option value="volvo">Volvo</option>
  <option value="saab">Saab</option>
  <option value="fiat">Fiat</option>
  <option value="audi">Audi</option>
</select>
```

The **<option>** elements define an option that can be selected.

By default, the first item in the drop-down list is selected.

The **<textarea>** Element

The **<textarea>** element defines a multi-line input field (a **text area**):

Example

```
<textarea name="message" rows="10" cols="30">
the cat was playing in the garden.
</textarea>
```

Introduction to CGI,

CGI is the granddaddy of interfaces for passing data from a submitted web page to a web server. Perl is an open-source language optimized for writing server-side applications. Together, CGI and Perl make it easy to connect to a variety of databases. Apache tends to be the web server used because it runs on all major operating systems and is highly reliable. Other open-source languages such as C and Python can also be used. For high-end applications, especially e-commerce sites like amazon.com this technology is used because it is so powerful. However, other technology stacks can be implemented more easily and quickly.

PERL- Perl is a general-purpose programming language originally developed for text manipulation and now used for a wide range of tasks including system administration, web development, network programming, GUI development, and more.

Perl is a stable, cross platform programming language.

Perl stands for Practical Extraction and Report Language.

Perl is Interpreted- Perl is an interpreter, which means that your code can run as is, without a compilation stage that creates a non-portable executable program. Traditional compilers convert programs into machine language. When you run a Perl program, it's first compiled into a byte code, which is then converted (as the program runs) into machine instructions. So it is not quite the same as shells, or TCL, which are **strictly** interpreted without an intermediate representation.

JAVA SCRIPT- Scripting languages, also called script languages, are programming languages that are interpreted or compiled each time they run. Scripts are executed directly from their source code, which are generally text files containing language specific markup. Thus, "scripts" are often treated as distinct from "programs", which are typically compiled from source code into binary executable files only after they are changed, and are then run from these binary files without needing the source code. Scripts were created to shorten the traditional edit-compile-link-run process.

JavaScript:- JavaScript is a scripting language most often used for client-side web development. Client-side refers to operations that are performed by the client (in our case the client is the browser) in a client-server relationship.

Despite the name, JavaScript is essentially unrelated to the Java programming language.

- JavaScript was designed to add interactivity to HTML pages
- A scripting language is a lightweight programming language
- A JavaScript consists of lines of executable computer code
- A JavaScript is usually embedded directly into HTML pages
- JavaScript is an interpreted language (means that scripts execute without preliminary compilation)

What can a JavaScript Do?

- **JavaScript gives HTML designers a programming tool** - HTML authors are normally not programmers, but JavaScript is a scripting language with a very simple syntax! Almost anyone can put small "snippets" of code into their HTML pages.

- **JavaScript can put dynamic text into an HTML page** - A JavaScript statement like `write("<h1>" + name + "</h1>")` can write a variable text into an HTML page
- **JavaScript can react to events** - A JavaScript can be set to execute when something happens, like when a page has finished loading or when a user clicks on an HTML element
- **JavaScript can read and write HTML elements** - A JavaScript can read and change the content of an HTML element
- **JavaScript can use to validate data** - A JavaScript used to validate form data before it is submit to a server. This saves the server from extra processing
- **JavaScript can be used to detect the visitor's browser** - A JavaScript can be used to detect the visitor's browser, and - depending on the browser - load another page specifically designed for that browser
- **JavaScript can be used to create cookies** - A JavaScript can be used to store and retrieve information on the visitor's computer

JSP- JSP (Java Server Pages)-

Java Server Pages (JSP) is a technology for developing web pages that support dynamic content which helps developers insert java code in HTML pages by making use of special JSP tags, most of which start with `<%` and end with `%>`.

A Java Server Pages component is a type of Java servlet that is design fulfills the role of a user interface for a Java web application. Web developers write JSPs as text files that combine HTML or XHTML code, XML elements, and embedded JSP actions and commands.

Using JSP, you can collect input from users through web page forms, present records from a database or another source, and create web pages dynamically.

JSP tags can be used for a variety of purposes, such as retrieving information from a database or registering user preferences, accessing JavaBeans components, passing control between pages and sharing information between requests, pages etc.

Why Use JSP?

Java Server Pages often serve the same purpose as programs implemented using the Common Gateway Interface (CGI). However, JSP offer several advantages in comparison with the CGI.

- Performance is significantly better because JSP allows embedding Dynamic Elements in HTML Pages itself instead of having a separate CGI files.
- JSP are always compile before the server unlike CGI/Perl, which requires the server to load an interpreter, processes it and the target script each time the page is request.
- Java Server Pages are built on top of the Java Servlets API, so like Servlets; JSP also has access to all the powerful Enterprise Java APIs, including JDBC, JNDI, EJB, JAXP etc.
- JSP pages can used in combination with servlets that handle the business logic, the model supported by Java servlet template engines.

Finally, JSP is an integral part of Java EE, a complete platform for enterprise class applications. This means that JSP can play a part in the simplest applications to the most complex and demanding.

Advantages of JSP:

Following is the list of other advantages of using JSP over other technologies:

- **Vs. Active Server Pages (ASP):** The advantages of JSP are twofold. First, the dynamic part is writing in Java, not Visual Basic or other MS specific language, so it is more powerful and easier to use. Second, it is portable to other operating systems and non-Microsoft Web servers.
- **Vs. Pure Servlets:** It is more convenient to write (and to modify!) regular HTML than to have plenty of `println` statements that generate the HTML.
- **Vs. Server-Side Includes (SSI):** SSI is really only intended for simple inclusions, not for "real" programs that use form data, make database connections, and the like.
- **Vs. JavaScript:** JavaScript can generate HTML dynamically on the client but can hardly interact with the web server to perform complex tasks like database access and image processing etc.
- **Vs. Static HTML:** Regular HTML, of course, cannot contain dynamic information.

PHP

PHP started out as a small open source project that evolved as more and more people found out how useful it was. Rasmus Lerdorf unleashed the first version of PHP way back in 1994.

- PHP is a recursive acronym for "PHP: Hypertext Preprocessor".
- PHP is a server side scripting language that is embedded in HTML. It is used to manage dynamic content, databases, session tracking, even build entire e-commerce sites.
- It is integrated with a number of popular databases, including MySQL, PostgreSQL, Oracle, Sybase, Informix, and Microsoft SQL Server.
- PHP is pleasingly zippy in its execution, especially when compiled as an Apache module on the UNIX side. The MySQL server, once started, executes even very complex queries with huge result sets in record-setting time.
- PHP supports a large number of major protocols such as POP3, IMAP, and LDAP. PHP4 added support for Java and distributed object architectures (COM and CORBA), making n-tier development a possibility for the first time.
- PHP is forgiving: PHP language tries to be as forgiving as possible.
- PHP Syntax is C-Like.

Common uses of PHP

- PHP performs system functions, i.e. from files on a system it can create, open, read, write, and close them.
- PHP can handle forms, i.e. gather data from files, save data to a file, through email you can send data, return data to the user.
- You add, delete, and modify elements within your database through PHP.
- Access cookies variables and set cookies.
- Using PHP, you can restrict users to access some pages of your website.
- It can encrypt data.

Characteristics of PHP

Five important characteristics make PHP's practical nature possible –

- Simplicity
- Efficiency
- Security
- Flexibility
- Familiarity

"Hello World" Script in PHP

To get a feel for PHP, first start with simple PHP scripts. Since "Hello, World!" is an essential example, first we will create a friendly little "Hello, World!" script.

As mentioned earlier, PHP is embedding in HTML. That means that in amongst your normal HTML (or XHTML if you're cutting-edge) you'll have PHP statements like this –

```
<html>
  <head>
    <title>Hello World</title>
  </head>
  <body>
    <?php echo "Hello, World!";?>
  </body>
</html>
```

It will produce following result –

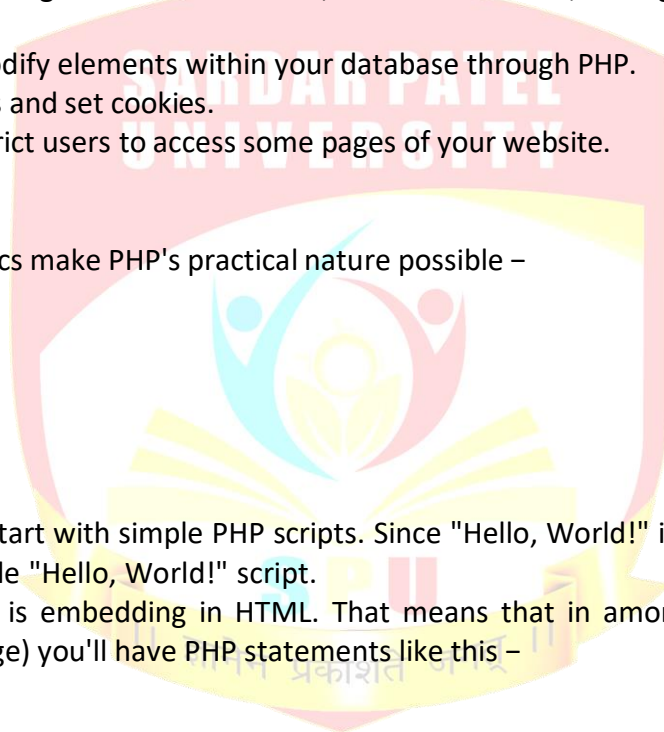
Hello, World!

If you examine the HTML output of the above example, you will notice that the PHP code is not present in the file sent from the server to your Web browser. All of the PHP present in the Web page is processed and stripped from the page; the only thing returned to the client from the Web server is pure HTML output.

All PHP code must be included inside one of the three special markup tags that are recognized by the PHP Parser.

```
<script language="php"> PHP code goes here </script>
```

A most common tag is the <?php...?> and we will also use the same tag in our tutorial.



From the next chapter we will start with PHP Environment Setup on your machine and then we will dig out almost all concepts related to PHP to make you comfortable with the PHP language.

ASP- Active Server Pages (ASP), also known as Classic ASP or ASP Classic, was Microsoft's first server-side script engine for dynamically generated web pages. Initially released as an add-on to Internet Information Services (IIS) via the Windows NT 4.0 Option Pack (ca. 1996), it was subsequently included as a free component of Windows Server (since the initial release of Windows 2000 Server). ASP.NET, first released in January 2002, has superseded ASP.

ASP 3.0 does not differ greatly from ASP 2.0 but it does offer some additional enhancements such as: Server.Transfer method, Server.Execute method, and an enhanced ASP Error object. ASP 3.0 also enabled buffering by default and optimized the engine for better performance.

The use of ASP pages with Internet Information Services (IIS) is currently supported on all supported versions of IIS. The use of ASP pages will be supported on Windows 8 for a minimum of 10 years from the Windows 8 release date.

AJAX- AJAX stands for **A**synchronous **J**avaScript and **X**ML. AJAX is a new technique for creating better, faster, and more interactive web applications with the help of XML, HTML, CSS, and JavaScript.

- Ajax uses XHTML for content, CSS for presentation, along with Document Object Model and JavaScript for dynamic content display.
- Conventional web applications transmit information to and from the server using synchronous requests. It means you fill out a form, hit submit, and are directed to a new page with new information from the server.
- With AJAX, when you hit submit, JavaScript will make a request to the server, interpret the results, and update the current screen. In the purest sense, the user would never know that anything was even transmitting to the server.
- XML is commonly used as the format for receiving server data, although any format, including plain text, can be used.
- AJAX is a web browser technology independent of web server software.
- A user can continue to use the application while the client program requests information from the server in the background.
- Data-driven as opposed to page-driven

Rich Internet Application Technology

AJAX is the most viable Rich Internet Application (RIA) technology so far. It is getting tremendous industry momentum and several tool kits and frameworks are emerging. However, at the same time, AJAX has browser incompatibility and JavaScript supports it, which is hard to maintain and debug.

AJAX is based on Open Standards- AJAX is based on the following open standards:

- Browser-based presentation using HTML and Cascading Style Sheets
- Data is stored in XML format and fetched from the server.
- Behind-the-scenes data fetches using XMLHttpRequest objects in the browser
- JavaScript to make everything happen

Cookies- Cookies are data, stored in small text files, on your computer.

When a web server has sent a web page to a browser, the connection is shut down and the server forgets everything about the user. Cookies are invented to solve the problem "how to remember information about the user":

- When a user visits a web page, his name can be stored in a cookie.
- Next time the user visits the page, the cookie "remembers" his name
- Cookies are saved in name-value pairs like:

Username = John Doe

- When a browser requests a web page from a server, cookies belonging to the page are added to the request. This way the server gets the necessary data to "remember" information about users.

Cookies: Creating and Reading- Cookies are data, stored in small text files, on your computer. When a web server has sent a web page to a browser, the connection is shut down, and the server forgets everything about the user. Cookies were invented to solve the problem "how to remember information about the user": When a user visits a web page, his name can be stored in a cookie.

Next time the user visits the page, the cookie "remembers" his name. Cookies are saving in name-value pairs like: username=John Doe

When a browser request a web page from a server, cookies belonging to the page is add to the request. This way the server gets the necessary data to "remember" information about users.

JavaScript Cookie Example

In the example to follow, we will create a cookie that stores the name of a visitor. The first time a visitor arrives to the web page, he will ask to fill in his name. The name is then stored in a cookie. The next time the visitor arrives at the same page, he will get a welcome message. For the example, we will create 3 JavaScript functions:

1. A function to set a cookie value
2. A function to get a cookie value
3. A function to check a cookie value



XML- XML stands for Extensible Markup Language. It is a markup language much like HTML. It was design to carry data, not to display data. Its tags are not predefined. You must define your own tags. XML is design to be self-descriptive.

Need of XML-

Data-exchange

- 1) XML is use to aid the exchange of data. It makes it possible to define data in a clear way.
- 2) Both the sending and the receiving party will use XML to understand the kind of data that's been sent. By using XML, everybody knows that the same interpretation of the data is used.

Replacement for EDI

- 1) EDI (Electronic Data Interchange) has been for several years the way to exchange data between businesses.
- 2) EDI is expensive; it uses a dedicated communication infrastructure. And the definitions used are far from flexible.
- 3) XML is a good replacement for EDI. It uses the Internet for the data exchange. And it's very flexible.

HTML Vs XML-

SNO	HTML	XML
1	HTML is used to display data and focuses on how data looks.	XML is a software and hardware independent tool used to transport and store data. It focuses on what data is.
2	HTML is a markup language itself.	XML provides a framework to define markup languages.
3	HTML is not case sensitive.	XML is case sensitive.
4	HTML is a presentation language.	XML is neither a presentation language nor a programming language.
5	HTML has its own predefined tags.	You can define tags according to your need.
6	HTML is static because it is used to display data.	XML is dynamic because it is used to transport data.

Validation of documents- When you validate your XML file, the XML validator will check to see that your file is valid and well formed. The XML editor will process XML files that are invalid or not well formed. The editor uses heuristics to open a file using the best interpretation of the tagging that it can. For example, an element with a missing end tag is simply assume to end at the end of the document. As you make updates to a file, the editor incrementally reinterprets your document, changing the highlighting, tree view, and so on. DTD, Ways to use, XML for data files, Embedding XML into HTML documents, Converting XML to HTML for Display- There exist several ways to convert XML to HTML for display on the Web.

Using HTML alone- If your XML file is of a simple tabular form only two levels deep then you can display XML files using HTML alone.

Using HTML + CSS- This is a substantially more powerful way to transform XML to HTML than HTML alone, but lacks the full power and flexibility of the methods listed below.

Using HTML with JavaScript- Fully general XML files of any type and complexity can be processed and displayed using a combination of HTML and JavaScript. The advantages of this approach are that any possible transformation and display can be carried out because JavaScript is a fully general purpose programming language.

DTD-DTD stands for Document Type Definition. It defines the legal building blocks of an XML document. It is used to define document structure with a list of legal elements and attributes.

Purpose of DTD- Its main purpose is to define the structure of an XML document. It contains a list of legal elements and defines the structure with the help of them.

Ways to use-

An Internal DTD Declaration- If the DTD is declared inside the XML file, it must be wrapped inside the <!DOCTYPE> definition.

XML document with an internal DTD

```
<?xml version="1.0"?>
<!DOCTYPE note [
<!ELEMENT note (to,from,heading,body)>
<!ELEMENT to (#PCDATA)>
<!ELEMENT from (#PCDATA)>
<!ELEMENT heading (#PCDATA)>
<!ELEMENT body (#PCDATA)>
]>
<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend</body>
</note>
```

An External DTD Declaration- If the DTD is declared in an external file, the <!DOCTYPE> definition must contain a reference to the DTD file:

XML document with a reference to an external DTD

```
<?xml version="1.0"?>
<!DOCTYPE note SYSTEM "note.dtd">
<note>
<to>Tove</to>
<from>Jani</from>
<heading>Reminder</heading>
<body>Don't forget me this weekend!</body>
</note>
```

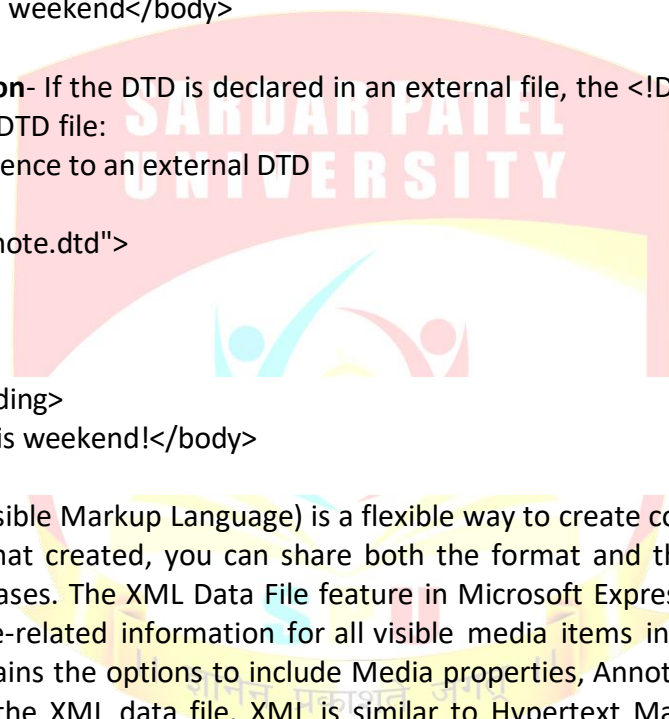
XML Data File- XML (Extensible Markup Language) is a flexible way to create common information formats. Once the information format created, you can share both the format and the data on the web or with other programs and databases. The XML Data File feature in Microsoft Expression Media exports an XML file that contains basic file-related information for all visible media items in the catalog. The XML Data File export dialog box contains the options to include Media properties, Annotations, and EXIF data (digital camera information) into the XML data file. XML is similar to Hypertext Markup Language (HTML), the language is used for web pages. Both XML and HTML contain markup tags to describe the contents of a page or file. HTML describes how to display and interact with the content of a web page. XML describes the content in terms of what data is used. An XML file can be processed purely as data by a program, stored with similar data on another computer, or, like an HTML file, interpreted and displayed.

Expression Media uses a custom Document Type Definition (DTD) to define the markup of an exported XML file. A DTD is a set of formatting instructions that identifies markup tags and can be stored either in a web document or in an accompanying file. If you include a DTD, you will be able to use another program to process the document and display or print it as intended.

The Export as XML command, on the File menu, exports all catalog text contexts and attributes as an XML file, together with folders that contain thumbnails, audio annotations, and original files. At any point, the whole XML catalog file can be imported again into Expression Media. Below is a sample section of an exported XML data.

Embedding XML into HTML documents-

XML can be used to store data inside HTML documents. XML data can be stored inside HTML pages as "Data Islands". As HTML provides a way to format and display the data, XML stores data inside the HTML documents. The data contained in an XML file is of little value unless it can be displayed, and HTML files are used for that purpose.



The simple way to insert XML code into an HTML file is to use the <xml> tag. The XML tag informs, the browser that the contents are to be parsed and interpreted using the XML parser. Like most other HTML tags, the <xml> tag has attributes. The most important attribute is the ID, which provides for the unique naming of the code. The contents of the XML tag come from one of two sources : inline XML code or an imported XML file.

If the code appears in the current location , it's said to be *inline*.

Example

Embedding XML code inside an HTML File

```
<html>
<xml Id = msg>
<message>
    <to> Visitors </to>
    <from> Author </from>
    <Subject> XML Code Islands </Subject>
    <body> In this example, XML code is embedded inside HTML code </body>
</message>
</xml>
</html>
```

The efficient way is to create a file and import it.

Data Binding- Data binding involves mapping, synchronizing, and moving data from a data source, usually on a remote server, to an end user's local system where the user can manipulate the data. Using data binding means that after a remote server transmits data, the user can perform some minor data manipulations on their own local system. The remote server does not have to perform all the data manipulations nor repeatedly transmit variations of the same data.

- Data binding involves moving data from a data source to a local system, and then manipulating the data, such as, searching, sorting, and filtering, it on the local system. When you bind data in this way, you do not have to request that the remote server manipulate the data and then retransmit the results; you can perform some data manipulation locally.
- In data binding, the data source provides the data, and the appropriate applications retrieve and synchronize the data and present it on the terminal screen.
- If the data changes, the applications are written so they can alter their presentation to reflect those changes.
- Data binding is used to reduce traffic on the network and to reduce the work of the Web server, especially for minor data manipulations.
- Binding data also separates the task of maintaining data from the tasks of developing and maintaining binding and presentation programs.

Converting XML to HTML for Display- XML concentrates on the structure of the information in a file and not its appearance. To view XML documents we need to format or style them. In practice, this often means converting the XML document to HTML. XSLT is a subset of XSL. XSLT is a language used to specify the transformation of XML documents. It takes an XML document and transforms it into another XML document. The HTML conversion is simply a special case of XML transformation

Displaying XML with XSLT

XSLT (extensible Style sheet Language Transformations) is the recommended style sheet language for XML. XSLT is far more sophisticated than CSS. With XSLT, you can add/remove elements and attributes to or from the output file. You can also rearrange and sort elements, perform tests and make decisions about which elements to hide and display, and a lot more.

XSLT uses XPath to find information in an XML document.

XSLT Example

We will use the following XML document:

```
<?xml version="1.0" encoding="UTF-8"?>
<breakfast menu>
```



```

<food>
<name>Belgian Waffles</name>
<price>$5.95</price>
<description>Two of our famous Belgian Waffles with plenty of real maple syrup</description>
<calories>650</calories>
</food>
<food>
<name>Strawberry Belgian Waffles</name>
<price>$7.95</price>
<description>Light Belgian waffles covered with strawberries and whipped cream</description>
<calories>900</calories>
</food>
<food>
<name>Berry-Berry Belgian Waffles</name>
<price>$8.95</price>
<description>Light Belgian waffles covered with an assortment of fresh berries and whipped cream</description>
<calories>900</calories>
</food>
<food>
<name>French Toast</name>
<price>$4.50</price>
<description>Thick slices made from our homemade sourdough bread</description>
<calories>600</calories>
</food>
<food>
<name>Homestyle Breakfast</name>
<price>$6.95</price>
<description>Two eggs, bacon or sausage, toast, and our ever-popular hash browns</description>
<calories>950</calories>
</food>
</breakfast_menu>

```

Rewriting HTML as XML- Another proposal more appropriate for long-term implementation (as opposed to the XML "islands" in HTML) is to re-do HTML as an XML application. That is, rewrite the HTML specification so that HTML documents must, like XML, well formed and may optionally be valid. The reasons that HTML documents not well formed today are technically dense and need not elaborated here; they are a function of HTML's history. However, the consensus of W3C members at the "Future of HTML" work shop strongly favored this option. To support HTML in applications like XML browsers, a tool to convert today's amorphous, non-rigorous HTML documents into well-formed XML documents is required. The W3C is working on such a tool right now; watch for details about it in the future.

Relationship between HTML, SGML and XML-

XML is a subset of Standard Generalized Markup Language (SGML). SGML became an ISO standard in 1986 as a way of expressing data in text-processing applications. Both XML and HTML are document formats derived from SGML. All three share certain characteristics, such as a similar syntax and the use of bracketed tags. The difference is that HTML is an application of SGML, whereas XML is a subset of SGML. Please take a look at the great diagram the W3C has developed to help clarify this relationship.

SGML is popular among organizations that have large amounts of document data to create, manage and distribute. SGML has a character set, and allows for entities (objects) to use. External data could be referenced, and extended. SGML prescribes the rules for creating a specific markup language such as HTML. HTML is a single set of tags, while SGML provides the capability for creating a desired set of tags.

XML invented because there are barriers to delivering SGML over the web. These include the lack of style sheet support, no mainstream browser support, software complexity, and obstacles to interchange of

SGML data because of varying levels of SGML compliance among SGML Software Packages. Due to the lack of SGML support in mainstream Web browsers, most applications delivering SGML information over the Web convert the SGML to HTML. This down-translation removes much of the intelligence of the original SGML information, which eliminates flexibility and poses a barrier to reuse, interchange and automation. XML will displace HTML in Web applications where high degrees of reuse, interchange, and automation are required, and will displace HTML as the preferred way to deliver SGML information over the web. Full SGML will remain the appropriate technology for creating and storing enterprise-critical documents and data. XML will become the primary means to deliver over the web the vast amount of SGML-based information that currently exists.

Web personalization- On a Web site, personalization is the process of tailoring pages to individual users' characteristics or preferences. Commonly used to enhance customer service or e-commerce sales, personalization is sometimes referred to as one-to-one marketing; because the enterprise's Web page is, target each individual consumer. Personalization is a means of meeting the customer's needs more effectively and efficiently, making interactions faster and easier and, consequently, increasing customer satisfaction and the likelihood of repeat visits. There are a number of personalization software products available, including those from Broad vision, Response Logic, and Autonomy Personalization in some ways harkens back to an earlier day, by making consumer relationships more closely tailored to the individual. Many portal sites, such as Yahoo allow site visitors to customize the page with selected news categories, local weather reports, and other features. In addition to use of the cookie, the technologies behind personalization include:

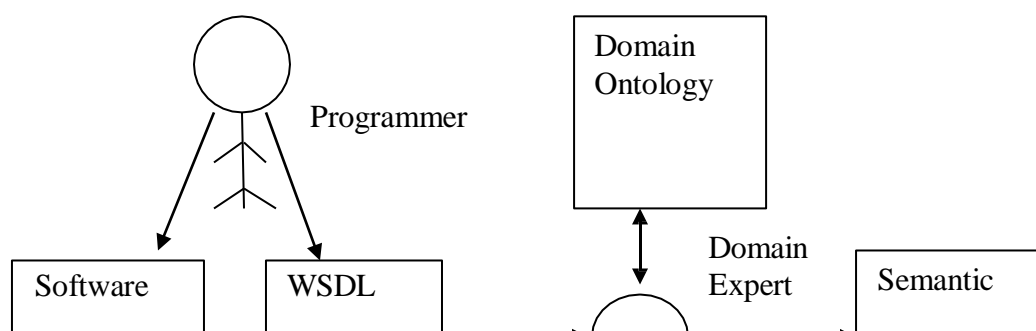
- Collaborative filtering, in which a filter is applied to information from different sites to select relevant data that may apply to the specific e-commerce experience of a customer or specific group of customers
- User profiling, using data collected from a number of different sites, which can result in the creation a personalized Web page before the user has been formally
- Data analysis tools used to predict likely future interactions

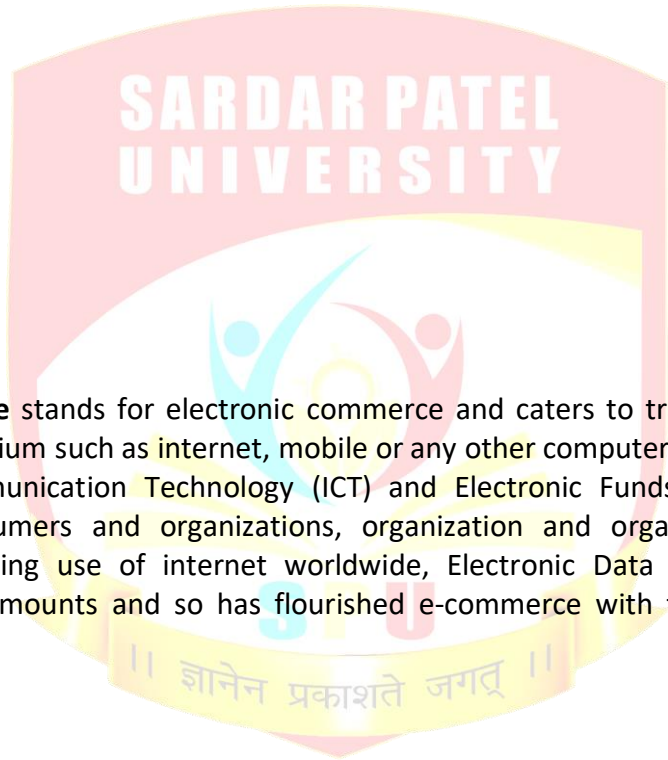
Because personalization depends on the gathering and use of personal user information, privacy issues are a major concern. The Personalization Consortium is an international advocacy group organized to promote and guide the development of responsible one-to-one marketing practices.

Semantic web- The Semantic Web is an idea of World Wide Web inventor Tim Berners-Lee that the Web as a whole can be made more intelligent and perhaps even intuitive about how to serve a user's needs. Berners-Lee observes that although search engines index much of the Web's content, they have little ability to select the pages that a user really wants or needs. He foresees a number of ways in which developers and authors, singly or in collaborations, can use self-descriptions and other techniques so that context-understanding programs can selectively find what users want.

The Semantic Annotations for Web Services Description Language (SAWSDL) Working Group at W3C is in charge of defining the specifications for the Semantic Web.

Semantic Web Services, like conventional web services, are the server end of a client– server system for machine-to-machine interaction via the World Wide Web. Semantic services are a component of the semantic web because they use markup, which makes data machine- readable in a detailed and sophisticated way (as compared with human-readable HTML, which is usually not easily "understood" by computer programs).





Unit-V

E- Commerce: E Commerce stands for electronic commerce and caters to trading in goods and services through the electronic medium such as internet, mobile or any other computer network. It involves the use of Information and Communication Technology (ICT) and Electronic Funds Transfer (EFT) in making commerce between consumers and organizations, organization and organization or consumer and consumer. With the growing use of internet worldwide, Electronic Data Interchange (EDI) has also increased in humungous amounts and so has flourished e-commerce with the prolific virtual internet

bazaar inside the digital world, which is rightly termed as e-malls. We now have access to almost every knick-knack of our daily lives at competitive prices on the internet. No matter one is educated or illiterate, an urbane or a fellow citizen, in India or in U.K; all you need is an internet connection and a green bank account. With e-commerce then, you can buy almost anything you wish for without actually touching the product physically and inquiring the salesperson n number of times before placing the final order. Here is a beautiful picture depicting how has human life evolved to adapt to the digital world and hence trading over the internet. As seen, from pizza and potted plant to pair of shoes, we have everything on sale on the internet available in tempting offers..!! Snapdeal.com, Amazon, eBay, Naaptol, Myntra, etc are some of the most popular e-commerce websites. E-Commerce or Electronics Commerce business models can generally categorized in following categories.

Business Models

- Business - to - Business (B2B)
- Business - to - Consumer (B2C)
- Consumer - to - Consumer (C2C)
- Consumer - to - Business (C2B)
- Business - to - Government (B2G)
- Government - to - Business (G2B)
- Government - to - Citizen (G2C)

Business - to - Business (B2B) - Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to final customer who comes to buy the product at wholesaler's retail outlet.

1.Features

2.E-Commerce provides following features-

3.**Non-Cash Payment** – E-Commerce enables use of credit cards, debit cards, smart cards, electronic fund transfer via bank's website and other modes of electronics payment.

4.**24x7 Service availability** – E-commerce automates business of enterprises and services provided by them to customers are available anytime, anywhere. Here 24x7 refers to 24 hours of each seven days of a week.

5.**Advertising / Marketing** – E-commerce increases the reach of advertising of products and services of businesses. It helps in better marketing management of products / services.

6.**Improved Sales** – Using E-Commerce, orders for the products can be generated anytime, anywhere without any human intervention. By this way, dependencies to buy a product reduce at large and sales increases.

7.**Support** – E-Commerce provides various ways to provide pre sales and post sales assistance to provide better services to customers.

8.**Inventory Management** – Using E-Commerce, inventory management of products becomes automated. Reports get generated instantly when required. Product inventory management becomes very efficient and easy to maintain.

9.**Communication improvement** – E-Commerce provides ways for faster, efficient, reliable communication with customers and partners.

Business - to - Business B2B

Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the product to final customer who comes to buy the product at wholesaler's retail outlet.

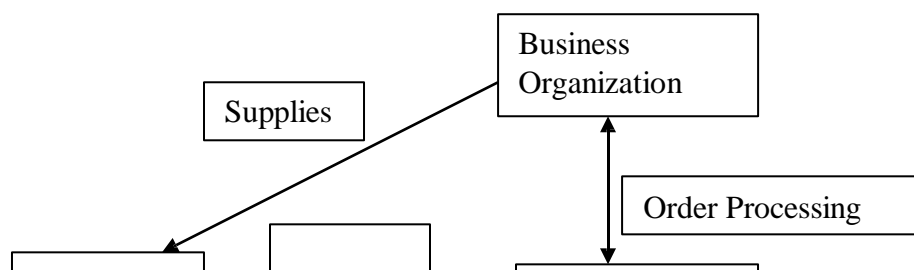


Fig-5.1

Business - to - Consumer B2C-Business-to-consumer e-commerce, or commerce between companies and consumers, involves customers gathering information; purchasing physical goods (i.e., tangibles such as books or consumer products) or information goods (or goods of electronic material or digitized content, such as software, or e-books); and, for information goods, receiving products over an electronic network. It is the second largest and the earliest form of e-commerce. B2C e-commerce is even more attractive because it saves firms from factoring in the additional cost of a physical distribution network. Moreover, for countries with a growing and robust Internet population, delivering information goods becomes increasingly feasible. Website following B2C business model sells its product directly to a customer. A customer can view products shown on the website of business organization. The customer can choose a product and order the same. Website will send a notification to the business organization via email and organization will dispatch the product/goods to the customer.



Fig-5.2

Consumer - to - Consumer C2C

Consumer-to-consumer e-commerce or C2C is simply commerce between private individuals or consumers. This type of e-commerce is characterized by the growth of electronic marketplaces and online auctions, particularly in vertical industries where firms/businesses can bid for what they want from among multiple suppliers.¹⁶ It perhaps has the greatest potential for developing new markets.

This type of e-commerce comes in at least three forms:

- auctions facilitated at a portal, such as eBay, which allows online real-time bidding on items being sold in the Web;
 - peer-to-peer systems, such as the Napster model (a protocol for sharing files between users used by chat forums similar to IRC) and other file exchange and later money exchange models; and
 - Classified ads at portal sites such as Excite Classifieds and wanted, Pakwheels.com (an interactive, online marketplace where buyers and sellers can negotiate and which features "Buyer Leads & Want Ads").
- Website following C2C business model helps consumer to sell their assets like residential property, cars, motorcycles etc. or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website.

Places advertisement



Fig-5.3

Advantages of C2C sites- Consumer to consumer e-commerce have many benefits. The primary benefit to consumers is reduction in cost. Buying ad space on other e-commerce sites is expensive. Sellers can post their items for free or with minimal charge depending on the C2C website. C2C websites form a perfect platform for buyers and sellers who wish to buy and sell related products. The ability to find related products leads to an increase in the visitor to customer conversion ratio. Business owners can cheaply maintain C2C websites and increase profits without the additional costs of distribution locations. A good example of a C2C e-commerce website is Esty, a site that allows consumers to buy and sell handmade or vintage items and supplies including art, photography, clothing, jewelry, food, bath and beauty products, quilts, knick-knacks, and toys.

Disadvantages of C2C sites- There are a couple of disadvantages to these types of sites as well. Doing transaction on these types of websites requires co-operation between the buyer and seller. It has been note many times that these two do not co-operate with each other after a transaction has made. They do not share the transaction information, which may be via credit or debit card or internet banking. This can result in online fraud since the buyer and seller is not very well verse with each other. This can lead to lawsuit being impose either on ends or also on the site if it has not mentioned the disclaimer in its terms and conditions. This may also hamper the c2c website's reputation.

Consumer - to - Business C2B- In this model, a consumer approaches website showing multiple business organizations for a particular service. Consumer places an estimate of amount he/she wants to spend for a particular service. For example, comparison of interest rates of personal loan/ car loan provided by various banks via website. Business organization that fulfils the consumer's requirement within specified budget approaches the customer and provides its services.

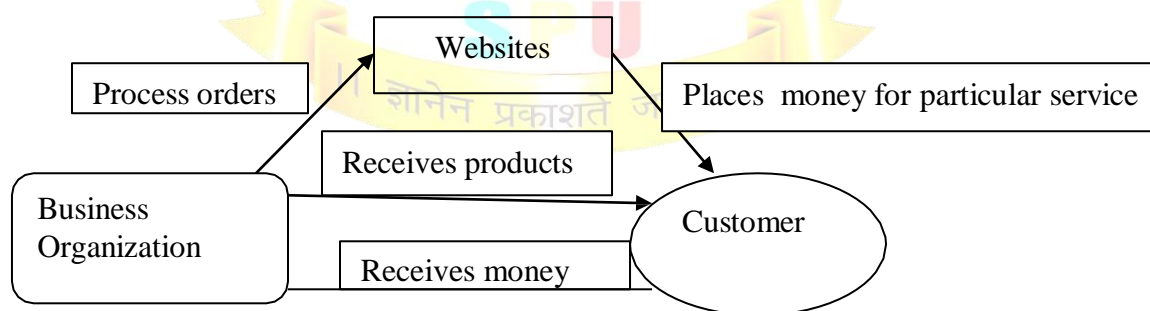


Fig-5.4

Business - to - Government B2G- Business-to-government e-commerce or B2G is generally defined as commerce between companies and the public sector. It refers to the use of the Internet for public procurement, licensing procedures, and other government-related operations. This kind of e-commerce has two features: first, the public sector assumes a pilot/leading role in establishing e-commerce; and second, it is assume that the public sector has the greatest need for making its procurement system more effective. Web-based purchasing policies increase the transparency of the procurement process (and reduce the risk of irregularities). To date, however, the size of the B2G e-commerce market, as a component of total e-commerce is insignificant, as government e-procurement, systems remain undeveloped. B2G model is a variant of B2B model. Such websites are used by government to trade and exchange information with various business organizations. Such websites are accrediting by the government and provide a medium to businesses to submit application forms to the government.



Fig-5.5

Government - to - Business G2B

Government uses B2G model website to approach business organizations. Such websites support Auctions, tenders and application submission functionalities



Fig-5.6

Government - to - Citizen G2C

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

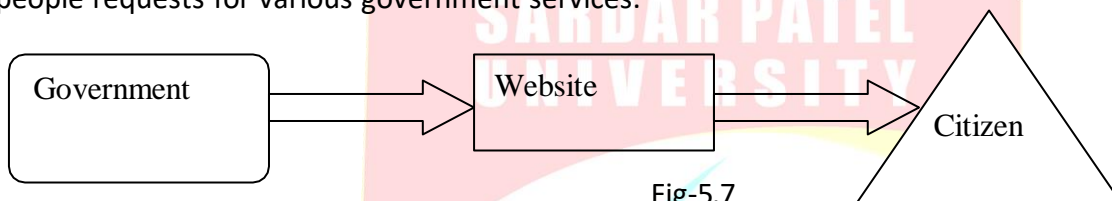


Fig-5.7

Internet relevant to e-commerce

The Internet allows people from all over the world to get connected inexpensively and reliably. As a technical infrastructure, it is a global collection of networks, connected to share information using a common set of protocols. Also, as a vast network of people and information, the Internet is an enabler for e-commerce as it allows businesses to showcase and sell their products and services online and gives potential customers, prospects, and business partners access to information about these businesses and their products and services that would lead to purchase.

Infrastructure-Every business requires an infrastructure to support its customers and operations. This includes facilities, equipment, and processes to support all the functional areas of your business. Choosing the correct infrastructure to match your business strategies enables your operations to run efficiently. Conversely, if an element of your infrastructure is uncoordinated with your strategies, you will likely feel the pain in every aspect of your business.

Here are seven important infrastructure decisions that ecommerce businesses face.

1. **Marketing** - Of all the infrastructure elements, marketing may be the most important. To succeed, your website must be found. Once visitors are on your site, you need to keep them there and compel them to buy from you. That's the job of your marketing team. Whether it's website design, social media, search marketing, merchandising, email, or other forms of advertising, it's all about marketing. To effectively manage marketing activities in-house is very challenging. Most small ecommerce businesses outsource some element of marketing.

2. **Facilities** - A key competitive advantage that ecommerce businesses have over brick-and-mortar stores is the investment in their physical offices and warehouses. In many cases, you can host your business out of a home office and your basement or garage. If you drop ship or outsource fulfilment, you may be able to do that for a long period. Even when you grow to have many employees, you can set up your offices in class B or C space, as you have no need for a fancy store in the right location. A word of advice is to keep your options flexible. Try to find an office park that has a wide variety of spaces in different sizes. You may be able to start in a smaller space and move up to a larger one without penalty, as your needs change.

3. **Customer Service** - There are many choices today for delivering high-quality customer service. You can

manage those activities in-house or outsource to a third party. Basic customer service for sales and post-sales activities can be handled using email, and by providing an 800 number for more extensive phone support. A customer-management system will make those activities easier, but for smaller companies it is not a requirement. Live chat will affect your operations, as someone needs to be available during specified hours of operation. Be sure to gauge the impact of that on your organization, if you decide to handle those activities in house.

4. Information Technology - Choosing the right ecommerce platform is one of the most important decisions you will make in your business. Do you want to build and host your own system, outsource the development and then manage the system going forward, or use a hosted, software-as-a-service platform that is more turnkey and externally managed?

If you build and host your own system, you may need more cash up front and skilled administrators and developers on your staff. By using a SaaS platform, you will not need to host or manage the system in-house, but you may still need web developers on staff. Choosing to outsource the development and hosting will reduce your staffing costs, but you will incur higher costs for any future enhancements or changes to your websites. There are pros and cons to any approach. Just be sure to think through the impacts on both your staffing and your cash flow and bottom line before you move forward.

5. Fulfilment - Another key decision is whether you will manage your own inventory or outsource those activities to a fulfilment house or through drop shipping arrangements with your suppliers.

6. Finance and Administration - As with other business operations, you will need to decide if you want to manage your finance and administration activities in-house, outsource, or a hybrid of the two. If your ecommerce platform is tightly integrated to your accounting system, you may have very little need for an in-house bookkeeper. If you use separate systems for your website, order management and accounting, you may need more help for data entry and making sure that the information is properly managed many ecommerce companies use outside services for vendor payments, payroll, and other basic accounting activities. They decide to focus on the sales, marketing, and customer service. On the administration side, you need a leadership team and provide direction to them. Good communication is important, whether

7.

8.

you have 3 or 100 employees. Whether you choose to be more authoritative or democratic in your management style is up to you. But choose a style and stay consistent. Be sure that everyone understands their roles, as well as the overall business strategies. You may need to adjust your approach as your business evolves.

9. Human Resources - Many small-business owners avoid the human resources function. Recruiting, setting up compensation, maintaining compliance and other HR activities are specialized and time consuming. You may choose to bring the resources in-house to manage those activities, but also evaluate outsourcing them. There are many individuals and agencies well equipped to take on your HR activities.

Environment and Opportunities- Electronic commerce includes all forms of business transactions, such as the purchase of goods or services, undertaken through electronic means, such as telephones, televisions, computers, and the Internet. It is believe to be the means through which most business will conduct in the future. With the growing numbers of people connecting to the Internet, electronic commerce is gaining rapid acceptance. Many people think of electronic commerce in terms of shopping on the Internet, or shopping on-line, but it is really much more than that. Electronic commerce affects our lives in more ways than we realize.

- A manufacturer-checking inventory on parts at a supplier's warehouse through the Internet in evolved in electronic commerce.
- A direct deposit transaction, such as the direct deposit of a paycheck or a tax refund into a bank account, is an electronic commerce transaction.
- A person advertising a seldom used exercise bike on-line is engaging in electronic commerce.
- Each time someone takes money out of an ATM, or uses a debit or credit card to purchase goods or services, that person is taking part in electronic commerce.
- A catalogue shopper placing an order over the telephone is also participating in electronic commerce.

business-to-business activities, business to consumer, or direct consumer to consumer contacts. Links to governments, educational institutions, libraries and not-for-profit organizations are all a part of the electronic commerce environment. Goods, services, and information are the content of electronic commerce; the whole world is its venue.

Modes & Approaches-

1. For real time e-commerce, the merchant establishes the internet merchant facility with their bank, integrates the payment gateway, and uses either a shopping cart or order form for information capture. From a security point of view the advantage of using a payment gateway means that the customer's details (name, address, credit card number) are not captured (or seen) by the merchant but rather are captured by the payment gateway provider only. Also the transfer of the customer's details from the merchant's website to the payment gateway is secure (encrypted) and cannot be intercepted.
2. Another approach is where the merchant uses a third party hosted solution such as Paypal, Worldpay or Pay mate who look after some or all of the key components of e-commerce. The advantage is the ease in which the Australian company can charge the customer in different currencies without having to establish dedicated currency bank accounts.
3. The last approach and the least preferred from a security perspective is where the merchant uses either a shopping cart or order form for information capture and then manually re-keys the credit card number into an EFTPOS facility they have leased from a bank. Essentially the website captures the order information and the transaction is process manually off-line. With this approach, the company does not require a payment gateway service because the transaction is not in real time.

Marketing & Advertising Concepts- Ecommerce marketing is the process of driving sales by raising awareness about an online store's brand and product offerings. Digital marketing for ecommerce applies traditional marketing principles to a multichannel, data-driven environment. Ecommerce marketing can divided into two general actions: driving website traffic and optimizing the user experience for conversion. Both are critical components to growing an online business — failure in one is all but sure to undermine any success in the other. Seasoned marketers can thrive in a digital landscape, starting with a solid foundation of common terms.

Ecommerce Marketing Channels

- **Pay-per-click Advertising (PPC):** Effective PPC campaigns drive users with intent to purchase, making it more efficient than many traditional advertising platforms. Businesses bid on impressions for paid listings at the top of search engine results, paying on a per-click basis. Impressions are determined by user search query, with strategy revolving around which keyword bids yield the highest ROI.
- **Search Engine Marketing (SEM):** Sometimes used a synonym for PPC, referring to paid advertising campaigns. SEM is often use to describe efforts on Google's AdWords platform and paid platforms on other search engines, such as Bing. This multifaceted term is also used by many marketer to describe all paid and organic efforts.
- **Search Engine Optimization (SEO)-** Unlike the paid media opportunities described above, SEO traffic comes from unpaid "organic" results on search engines such as Google and Yahoo.
- **Display Advertising-** Banners, sidebars and other predominantly visual advertisements that appear on other websites. Display ads are facilitating by ad networks such as Google Display Network.
- **Affiliate Marketing-** Referrals from other websites with industry or product-focused content such as reviews, comparisons, and testimonials. Successful affiliates have a loyal following or receive traffic from some of the above channels. They typically receive a set commission of referred sales, often determined on a case-by-case basis.
- **Email Marketing:** Newsletters, abandoned cart notifications and remarketing all use email to target past and potential customers.

Ecommerce Marketing terms

- **Google AdWords-** Google's advertising platform pioneers the PPC model and capitalizes on the company's majority share of the search market.
- **Search Engine Results Page (SERP):** The cumulative results from users executing a search engine query, comprising organic and paid listings. Having results on the first page of SERPs is critical to acquiring new customers.

- **Conversion Rate Optimization (CRO)**- The process of improving every aspect of a website so that more visitors purchase. Faster load times, fewer clicks to purchase and more enticing product descriptions/images make it easier for user's to evaluate your products and follow through to The most common metric for evaluating CRO efforts is conversion rate.

- **Conversion Funnel**- The steps taken by a prospect to become a customer begin with awareness and ending with a purchase. Higher-priced items generally have a longer sales cycle, while low-cost items can convert in a much shorter period.

Electronic Publishing issues- Electronic publishing is electronic commerce in digital goods and services that are intended for consumption by the human senses

It encompasses a wide range of formats, including:

- text;
- structured data;
- image, both raster/bit-map and vector;
- moving image (animation and video);
- sound; and
- Combinations of the above ('multi-media').

The following are examples of the kinds of digital goods and services that are encompassed by that definition:

- documents in electronic form, including articles and books;
- data, such as statistical tables;
- low-volatility reference information, such as dictionaries and encyclopaedias;
- high-volatility reference information, such as news, sports reports and weather forecasts;
- speeches;
- musical performances;
- cartoons;
- films and video-clips; and
- Entertainment, infotainment, edutainment and education.

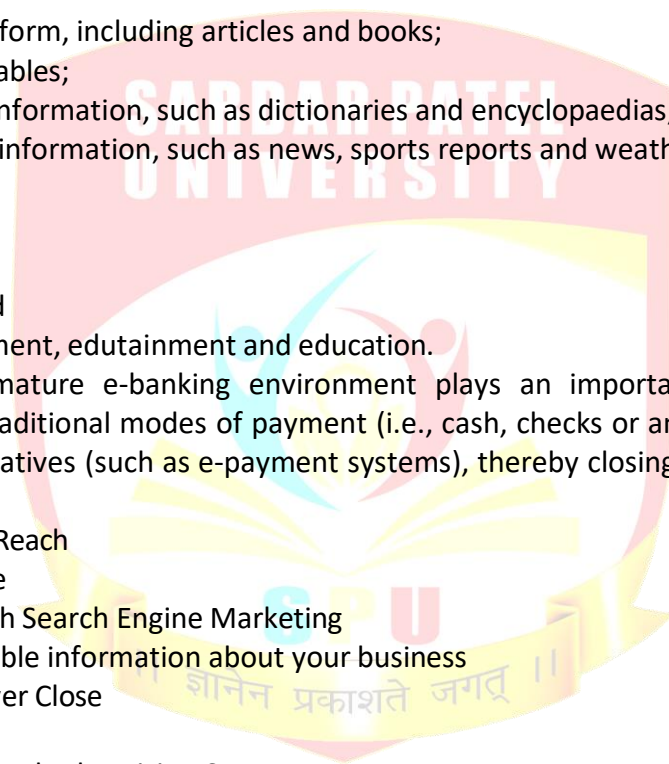
A more developed and mature e-banking environment plays an important role in e-commerce by encouraging a shift from traditional modes of payment (i.e., cash, checks or any form of paper-based legal tender) to electronic alternatives (such as e-payment systems), thereby closing the e-commerce loop.

a) Benefits of e-Commerce

- Expanded Geographical Reach
- Expanded Customer Base
- Increase Visibility through Search Engine Marketing
- Provide Customers valuable information about your business
- Available 24/7/365 - Never Close
- Build Customer Loyalty
- Reduction of Marketing and Advertising Costs
- Collection of Customer Data

b) Basic Benefits of e-Business e-Commerce

- Increase sales - this is the first thing that people consider when dealing with e-commerce
 - Decreasing costs
 - Increase profits
 - Understanding that profits is not the same as sales
- Expands the size of the market from regional to national or national to international
- Contract the market
- Reach a narrow market
 - Target market segmentation allows you to focus on a more
 - Select group of customers
 - And therefore have a competitive advantages in satisfying them



Ecommerce legalities and technologies- A technological innovation is followed by frequent incorporation of ethical standards into law. New forms of E-Commerce that enables new business practices have many advantages but also bring numerous risks.

Let us discuss about the ethical and legal issues related to e-business.

Ethical Issues-In general, many ethical and global issues of Information Technology apply to e-business. So, what are the issues particularly related to e-commerce.

Web tracking-E-businesses draw information on how visitors use a site through log files. Analysis of log file means turning log data into application service or installing software that can pluck relevant information from files in-house. Companies track individual's movement through tracking software and cookie analysis. The battle between computer end users and web trackers is always going on with a range of application programs.

Privacy-Most Electronic Payment Systems knows the identity of the buyer. Therefore, it is necessary to protect the identity of a buyer who uses Electronic Payment System. A privacy issue related to the employees of company is tracking. Monitoring systems are installed in many companies to monitor e-mail and other web activities in order to identify employees who extensively use business hours for non-business activities. The e-commerce activities performed by a buyer can be tracked by organizations. For example, reserving railway tickets for their personal journey purpose can be tracked. Many employees do not want to be under the monitoring system even while at work.

Disintermediation and Reinter mediation-Intermediation is one of the most important and interesting e-commerce issue related to loss of jobs. The services provided by intermediaries are

(i) Matching and providing information.

(ii) Value added services such as consulting.

The first type of service (matching and providing information) can be fully automated, and this service is likely to be in e-marketplaces and portals that provide free services.

Legal Issues- Internet fraud and its sophistication have grown even faster than the Internet itself. There is a chance of a crime over the internet when buyers and sellers do not know each other and cannot even see each other. During the first few years of e-commerce, the public witnessed many frauds committed over the internet. Let us discuss the legal issues specific to e-commerce.

Fraud on the Internet-E-commerce fraud popped out with the rapid increase in popularity of websites. It is a hot issue for both cyber and click-and-mortar merchants. The swindlers are active mainly in the area of stocks. The small investors are lured by the promise of false profits by the stock promoters. Auctions are also conducive to fraud, by both sellers and buyers. The availability of e-mails and pop up ads has paved the way for financial criminals to have access to many people. Other areas of potential fraud include phantom business opportunities and bogus investments.

Copyright-The copyright laws protect Intellectual property in its various forms, and cannot be used freely. It is very difficult to protect Intellectual property in E-Commerce. For example, if you buy software you have the right to use it and not the right to distribute it. The distribution rights are with the copyright holder. In addition, copying contents from the website also violates copyright laws.

Domain Names- The competition over domain names is another legal issue. Internet addresses are known as domain names and they appear in levels. A top-level name is qburst.com or microsoft.com. A second level name will be qburst.com/blog. Top-level domain names are assigned by a central non-profit organization, which also checks for conflicts or possible infringement of trademarks. Problems arise when several companies having similar names competing over the same domain name.

Secure Web document, - Non-technical Issues

1. **Security Awareness-** Most opinion surveys list "insecurity of financial transactions" and "loss of privacy" among the major impediments to electronic commerce, but in fact most users have onlyague ideas about the threats and risks, and a very limited understanding of the technical and legal options for minimizing their risk. As a result, all kinds of misperceptions exist.

For instance, the cardholder's risk in sending his or her credit card number over the Internet is typically overestimated. At least as of this writing payments over the Internet are treat like mail-order/telephone-order transactions, which means that the cardholder is not liable at all. All risk is with the merchant. On the other hand, the risks in sending sensitive data in an electronic mail are typically underestimated. Probably

most users of email know the mere facts: neither confidentiality nor integrity nor availability is guarantee. However, many users do not hesitate to send all kind of very personal and sensitive data to their friends or colleagues, unprotected. Unfortunately, developers of electronic commerce solutions are often as security unaware and ignorant as their prospective users. For instance, still many developers demand that "lower layers" must provide security in a "transparent" way. However, for instance, Secure Socket Layer (SSL) in "opaque socket integration" does not make any sense in most case. Security has to be an integral part of the architecture, design, and implementation.

2. Crypto Regulations- Several countries regulate the deployment of strong encryption technology by law. For instance, France controls the domestic use of encryption technology, in order to maintain the capability to eavesdrop on the communication of criminals. The USA prohibits the export of strong encryption products for the mass market, for the same reasons as it controls the export of munitions. Such regulations do not discriminate between "good" and "bad" applications, and limit the security of honest citizens and companies to at least the same extent as they limit the security of terrorists and organized crime. Therefore several governments, in particular the US administration, are willing to relax their crypto regulations, provided access to the encrypted information would still be possible on demand. The idea is to introduce new "Trusted Third Parties" where secret keys must either be escrowed in advance, or can be recovered afterwards. All these proposals are heavy contested, for various technical and political reasons: The Trusted Third Parties would be "single points of failure" for everybody's, i.e., new and extremely attractive targets for attacks. It is questionable whether any regulation of encryption technology can be effective in fighting organized crime: tools for strong encryption are publicly available, and steganography techniques can perfectly conceal the fact that cryptographic techniques are applied. Many types of commercial transactions require strong confidentiality, which cannot be satisfied in some countries, or across some borders. For instance, consider two large companies that prepare a merger. Clearly, their negotiations require top confidentiality. Even the fact that they are preparing the merger, i.e., that they are communicating intensively, will be extremely sensitive. This requires actually services for anonymous communication. Nevertheless using the appropriate cryptographic tools would be illegal in many countries. Political regulations are not subject to scientific research. However, we clearly see the need for an international agreement on a more liberal and consistent regulation of cryptography. Electronic commerce demands strong confidentiality, which can implement only by strong encryption schemes.

3. Legal Issues- Surveying the open legal problems in electronic commerce is beyond the scope of this article. The two most important security-related problems are the following:

- **Liability:** The financial risk of a user in a specific transaction depends on his or her liability. In principle, if a user bears no liability, there is no risk.

The main issue here is fairness: The liability of a user should correspond to the security of his or her technical equipment. For instance, if it is technically trivial to forge the digital signature of a user then this party should not held liable for his or her signatures, in general.

- **Harmonization:** The national laws that regulate electronic commerce over the Internet (like evidential value of digital signatures, consumer protection, and copyright protection) is not harmonized, and are contradictory. One side result is that there is no mutual recognition between national PKIs, even where comparable laws exist.

Technical Components of e-commerce Security- There are four components involved in Ecommerce Security: client software, server software, the server operating system, and the network transport. Each component has its own set of issues and challenges associated with securing them:

- Client software is becoming increasingly more security-focused; however, single-user desktop operating systems historically have had no security features implemented. Ecommerce software that relies on the security of the desktop operating system easily compromised without the enforcement of strict physical controls.

- Server software is constantly under test and attack by the user community. Although there have been cases of insecurities, a system administrator keeping up with the latest patches and vendor information can provide a high degree of confidence in the security of the server itself.

- Operating systems used for hosting Ecommerce servers are securable, but rarely shipped from the vendor in a default configuration that is secure. Ecommerce servers must protect the database of customer information accumulating on the server as well as provide security while the server is handling a transaction. If it is easier for a thief to compromise the server to obtain credit card numbers, why bother sniffing the network for individual credit card numbers.

Session transport between the client and server uses network protocols that may have little or no built-in security. In addition, networking protocols such as TCP/IP were not design to have confidentiality or authentication capabilities

Cryptography & Pretty Good Privacy (PGP)

1. The need for cryptography in electronic communications

Cryptography has been around for centuries; as long as there has been communication, there has been the need for privacy and safe, secure methods of transmission. Although many types of difficult problems can be classify as cryptography problems, what we are mostly concerned with today is the ability to keep transmissions private with data encryption techniques. This has become an even greater issue due to the changing nature of communications since the information revolution. More and more people rely on electronic communications for the transmission of sensitive or personal data; e-mail, e-commerce, FTP, and HTML are all examples of technology that have already filtered into the social consciousness as primary ways for disseminating and gathering information and for exchanging goods and services. While this technological shift has made communication faster, easier, and better in many ways, it has also brought along with it a whole host of difficult problems and social policy issues.

The main problem that comes with electronic communications is the ease with which transmissions can be eavesdropped or impersonated. Paper communications obviously have security problems as well: documents can be stolen, steamed open, have forged signatures or changed contents. However, if someone is trying to catch a specific transmission (or type of communication), it is much easier when dealing with an electronic medium. Also, since there can be (and often are) multiple copies of any given electronic transmission, it is difficult to know if someone has stolen a copy or somehow altered the original.

Secondly, there is an access control problem. Many electronic transmissions are made in a broadcast manner, as seen with cable or satellite television and wireless phones. People can install devices to intercept these transmissions, and senders usually have no way to either monitor or stop this. In order to prevent unwanted people from making free use of their services, senders must encrypt their outgoing transmissions. To their paying customers, they can give special devices to decrypt the information.

Finally, there is the problem of authentication: electronic communications are impersonal, and can be easily forged by impersonating IP addresses, changing "sender fields" in e-mail, "cloning" cellular phone numbers, and so forth. In order for people to want to - and, indeed, be able to - use electronic communication in the coming years, it is essential that these problems be resolved. Right now, advances in cryptography are the best way to address these issues. Data encryption not only provides privacy and access control by rendering communications illegible to unauthorized parties; it can provide effective authentication as well through the use of digital signatures and timestamps.

2. The primary forms of cryptography

There are two main forms of cryptography: secret-key (or symmetric) and public-key (or asymmetric).

Secret-key cryptography

Secret-key cryptography is the more traditional form, and has been used for all kinds of communications throughout the ages. In this method, one "key" is used to both encrypt and decrypt the data. A key can be anything from a secret-decoder ring found in a cereal box to a highly complex mathematical algorithm; keys really only differ in the ease with which they can be broken by third parties. In secret-key cryptography, the sender and receiver must have the same key in order for the transmission to work correctly.

Secret-key cryptography suffers from two overwhelming problems. First, any two people that want to communicate with each other must first agree on the key to use. This makes it more difficult to send information to people that you do not already know, and large-scale communication becomes much more difficult. The second, more fundamental, problem is that of "key management", which the system for

transmission and storage of keys is. In order to agree on a key, there must first be some sort of communication that occurs, and this communication itself can be eavesdropped. If some third party catches the key that is used, then all further communications between the two parties are no longer secure and private. In addition, the third party could easily impersonate communications because it is believed that no one else knows the key. This problem is exacerbated by the fact that the initial parties might have no way of knowing that the key was stolen. This key management issue causes a "repudiation problem": later on, either of the parties could repudiate messages that had been sent with secret-key encryption, claiming that the key had been stolen and that the messages were compromised or faked. Thus, there is always an inherent lack of security and trust in a purely secret-key environment.

Public-key cryptography

The key management problem inherent to secret-key cryptography needed to be addressed in order for large-scale, secure use of data encryption techniques. In 1976, Whitfield Diffie, a cryptographer and privacy advocate, and Martin Hellman, an electrical engineer, working together discovered the concept of public-key encryption. Instead of having one key shared between both users of an encrypted transmission, each user has his or her own public/private key pair. A user makes the public key open and available to anyone (by publishing it on-line or registering it with a public key server), and keeps the private key hidden away where (hopefully) no one can get at it. In order to send someone a message, the sender encrypts the transmission with the receiver's public key. This can then be decrypted by the receiver's private key. Thus, anyone can encrypt a message with someone else's public key, but only that person would ever be able to read it. This method solves the problems of secret-key cryptography. Because the only key information that needs to be shared is made public, there is no worry about some third party intercepting and possessing the key. This makes the users of the encryption surer that their transmissions are secure and private. It also solves the repudiation problem; because there is no third party that could ever be blamed—each individual is responsible for safeguarding his or her own private key.

The inherent weakness of the public-key method is that the two keys are linked together mathematically. If a third party figures out the exact way that an individual's private key is derived from his or her public key, the whole security of the system will be lost. The only way around this liability (so far) has been to make the derivation so incredibly complex that a brute force attempt to crack it would take a prohibitively long amount of time. It is easy to see that the quality of the method used to create keys is essential to the success of any public-key system.

Digital Signatures – The digital equivalent of a handwritten signature or stamped seal, but offering far more inherent security, a digital signature is intended to solve the problem of tampering and impersonation in digital communications. Digital signatures can provide the added assurances of evidence to origin, identity and status of an electronic document, transaction or message, as well as acknowledging informed consent by the signer.

In many countries, including the United States, digital signatures have the same legal significance as the more traditional forms of signed documents. The United States Government Printing Office publishes electronic versions of the budget, public and private laws, and congressional bills with digital signatures.

How digital signatures work

Digital signatures based on public key cryptography, also known as asymmetric cryptography. Using a public key algorithm such as RSA, one can generate two keys that are mathematically linked: one private and one public. To create a digital signature, signing software (such as an email program) creates a one-way hash of the electronic data to be signed. The private key is then used to encrypt the hash. The encrypted hash – along with other information, such as the hashing algorithm – is the digital signature. The reason for encrypting the hash instead of the entire message or document is that a hash function can convert an arbitrary input into a fixed length value, which is usually much shorter. This saves time since hashing is much faster than signing. If the two hash values match, the message has not been tampered with, and the receiver knows the message is from the sender. Most modern email programs support the use of digital signatures and digital certificates, making it easy to sign any outgoing emails and validate digitally signed incoming messages. Digital signatures are extensively used to provide proof of authenticity, data integrity and non-repudiation of communications and transactions conducted over the Internet.

FIREWALL-A firewall is a set of related programs, located at a network gateway server, that protects the resources of a private network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users have access to. Basically, a firewall, working closely with a router program, examines each network packet to determine whether to forward it toward its destination. A firewall also includes or works with a proxy server that makes network requests on behalf of workstation users. A firewall is often installed in a specially designated computer separate from the rest of the network so that no incoming request can get directly at private network resources. There are a number of firewall screening methods. A simple one is to screen requests to make sure they come from acceptable (previously identified) domain name and Internet Protocol addresses. For mobile users, firewalls allow remote access in to the private network by the use of secure logon procedures and authentication certificates. A number of companies make firewall products. Features include logging and reporting, automatic alarms at given thresholds of attack, and a graphical user interface for controlling the firewall. Computer security borrows this term from firefighting, where it originated. In firefighting, a firewall is a barrier established to prevent the spread of fire.

Cyber Crime- It could be hackers vandalizing your site, viewing confidential information, stealing trade secrets or intellectual property with the use of internet. It can also include 'denial of services' and viruses attacks preventing regular traffic from reaching your site. Cybercrimes are not limited to outsiders except in case of viruses and with respect to security, related cybercrimes that usually done by the employees of particular company who can easily access the password and data storage of the company for their benefits. Cybercrimes also includes criminal activities done with the use of computers which further perpetuates crimes i.e. financial crimes, sale of illegal articles, pornography, online gambling, intellectual property crime, e-mail, spoofing, forgery, cyber defamation, cyber stalking, unauthorized access to Computer system, theft of information contained in the electronic form, e-mail bombing, physically damaging the computer system etc.

Classifications Of Cyber Crimes: Cyber Crimes which are growing day by day, it is very difficult to find out what is actually a cybercrime and what is the conventional crime so to come out of this confusion, cybercrimes can be classified under different categories which are as follows:

1. Cyber Crimes against Persons:

There are certain offences which affect the personality of individuals can be defined as:

Harassment via E-Mails: It is very common type of harassment through sending letters, attachments of files & folders i.e. via e-mails. At present harassment is common as usage of social sites i.e. Facebook, Twitter etc. increasing day by day.

Cyber-Stalking: It means expressed or implied a physical threat that creates fear through the use to computer technology such as internet, e-mail, phones, text messages, webcam, websites or videos.

Dissemination of Obscene Material: It includes Indecent exposure/ Pornography (basically child pornography), hosting of web site containing these prohibited materials. These obscene matters may cause harm to the mind of the adolescent and tend to deprave or corrupt their mind.

Defamation: It is an act of imputing any person with intent to lower down the dignity of the person by hacking his mail account and sending some mails with using vulgar language to unknown persons mail account.

Hacking: It means unauthorized control/access over computer system and act of hacking completely destroys the whole data as well as computer programmes. Hackers usually hacks telecommunication and mobile network.

Cracking: It is amongst the gravest cybercrimes known till date. It is a dreadful feeling to know that a stranger has broken into your computer systems without your knowledge and consent and has tampered with precious confidential data and information.

E-Mail Spoofing: A spoofed e-mail may be said to be one, which misrepresents its origin. It shows its origin to be different from which actually it originates.

SMS Spoofing: Spoofing is a blocking through spam which means the unwanted uninvited messages. Here a offender steals identity of another in the form of mobile phone number and sending SMS via internet

and receiver gets the SMS from the mobile phone number of the victim. It is very serious cybercrime against any individual.

Crimes against Persons Property:

As there is rapid growth in the international trade where businesses and consumers are increasingly using computers to create, transmit and to store information in the electronic form instead of traditional paper documents. There are certain offences which affects person's properties which are as follows:

Intellectual Property Crimes: Intellectual property consists of a bundle of rights. Any unlawful act by which the owner is deprived completely or partially of his rights is an offence. The common form of IPR violation may be said to be software piracy, infringement of copyright, trademark, patents, designs and service mark violation, theft of computer source code, etc.

- **Cyber Squatting:** It means where two persons claim for the same Domain Name either by claiming that they had registered the name first on by right of using it before the other or using something similar to that previously. For example two similar names i.e. www.yahoo.com and www.yaahoo.com.
- **Cyber Vandalism:** Vandalism means deliberately destroying or damaging property of another. Thus cyber vandalism means destroying or damaging the data when a network service is stopped or disrupted. It may include within its purview any kind of physical harm done to the computer of any person. These acts may take the form of the theft of a computer, some part of a computer or a peripheral attached to the computer.
- **Hacking Computer System:** Hacktivism attacks those included Famous Twitter, blogging platform by unauthorized access/control over the computer. Due to the hacking activity there will be loss of data as well as computer. Also research especially indicates that those attacks were not mainly intended for financial gain too and to diminish the reputation of particular person or company.
- **Transmitting Virus:** Viruses are programs that attach themselves to a computer or a file and then circulate themselves to other files and to other computers on a network. They usually affect the data on a computer, either by altering or deleting it. Worm attacks plays major role in affecting the computerize system of the individuals.
- **Cyber Trespass:** It means to access someone's computer without the right authorization of the owner and does not disturb, alter, misuse, or damage data or system by using wireless internet connection.
- **Internet Time Thefts:** Basically, Internet time theft comes under hacking. It is the use by an unauthorised person, of the Internet hours paid for by another person. The person who gets access to someone else's ISP user ID and password, either by hacking or by gaining access to it by illegal means, uses it to access the Internet without the other person's knowledge. You can identify time theft if your Internet time has to be recharged often, despite infrequent usage.

3. Cybercrimes against Government: There are certain offences done by group of persons intending to threaten the international governments by using internet facilities. It includes:

- **Cyber Terrorism:** Cyber terrorism is a major burning issue in the domestic as well as global concern. The common form of these terrorist attacks on the Internet is by distributed denial of service attacks, hate websites and hate e-mails, attacks on sensitive computer networks etc. Cyber terrorism activities endanger the sovereignty and integrity of the nation.
- **Cyber Warfare:** It refers to politically motivated hacking to conduct sabotage and espionage. It is a form of information warfare sometimes seen as analogous to conventional warfare although this analogy is controversial for both its accuracy and its political motivation.
- **Distribution of pirated software:** It means distributing pirated software from one computer to another intending to destroy the data and official records of the government.
- **Possession of Unauthorized Information:** It is very easy to access any information by the terrorists with the aid of internet and to possess that information for political, religious, social, ideological objectives.

4. Cybercrimes Against Society at large:

An unlawful act done with the intention of causing harm to the cyberspace will affect large number of persons. These offences include:

- **Child Pornography:** It involves the use of computer networks to create, distribute, or access materials that sexually exploit underage children. It also includes activities concerning indecent exposure and obscenity.
- **Cyber Trafficking:** It may be trafficking in drugs, human beings, arms weapons etc. which affects large number of persons. Trafficking in the cyberspace is also a gravest crime.
- **Online Gambling:** Online fraud and cheating is one of the most lucrative businesses that are growing today in the cyber space. There are many cases that have come to light are those pertaining to credit card crimes, contractual crimes, offering jobs, etc.
- **Financial Crimes:** This type of offence is common as there is rapid growth in the users of networking sites and phone networking where culprit will try to attack by sending bogus mails or messages through internet. Ex: Using credit cards by obtaining password illegally.
- **Forgery:** It means to deceive large number of persons by sending threatening mails as online business transactions are becoming the habitual need of today's life style.

Cyber Law: information technology has spread throughout the world. The computer is used in each sector wherein cyberspace provides equal opportunities to all for economic growth and human development. As the user of cyberspace grows increasingly diverse and the range of online interaction expands, there is expansion in the cyber-crimes i.e. breach of online contracts, perpetration of online torts etc. Due to these consequences there was need to adopt a strict law by the cyber space authority to regulate criminal activities relating to cyber and to provide better administration of justice to the victim of cybercrime. In the modern cyber, technology world it is very much necessary to regulate cybercrimes and most importantly cyber law should be made stricter in the case of cyber terrorism and hackers.

IT Act. - E-commerce in recent times has been growing rapidly across the world. It is a type of business model, or segment of a larger business model, that enables a firm or individual to conduct business over an electronic network, typically the internet. Electronic commerce operates in all four of the major market segments: business-to-business, business to consumer, consumer to consumer and consumer to business. In India, there are three type of e-commerce business model are in vogue

- (i) Inventory base model of e-commerce
- (ii) Marketplace base model of e-commerce
- (iii) Hybrid model of inventory based and market place model.

Indian Information Technology Act and E-commerce: Indian Information Technology (IT) Act gives legal recognition to electronics records and electronic signature. These are the foremost steps to facilitate paper less trading. Under this Act Ministry of Electronics & Information Technology also has Information Technology Rule, 2000 for Reasonable security practices and procedures and sensitive personal data or information. Under section 72A of IT Amendment Act, 2008, punishment for disclosure of information in breach of a lawful contract is laid down.

FDI guidelines for e-commerce by DIPP: DIPP has issued guidelines for FDI in e-commerce. In India 100%, FDI is permitted in B2B e-commerce; however, No FDI is permit in B2C e-commerce earlier. As per these new guidelines on FDI in e-commerce, 100% FDI under automatic route is permit in marketplace model of e-commerce, while FDI is not permit in inventory-based model of e-commerce.

E-commerce has become an important part of many multilateral negotiations such as Regional Comprehensive Economic Partnership (RCEP), WTO, and BRICS etc. Ministry of Electronics & Information Technology is spearheading such negotiations on e-commerce from Indian side.

Electronic Cash- IT is the debit card system of the German Banking Industry Committee, the association that represents the top German financial interest groups. Usually paired with a Transaction account or Current Account, cards with an **Electronic Cash** logo are only hand out by proper credit institutions

Electronic Payment Systems:- The electronic payment system has grown increasingly over the last decades due to the growing spread of internet-based banking and shopping. As the world advances more with technology development, we can see the rise of electronic payment systems and payment processing devices. As this increase, improve, and provide ever more secure online payment transactions the percentage of check and cash transactions will decrease.

Electronic payment methods- One of the most popular payment forms online are credit and debit cards. Besides them, there are also alternative payment methods, such as bank transfers, electronic wallets, smart cards or bit coin wallet (bit coin is the most popular crypto currency).

E-payment methods could classify into two areas, credit payment systems and cash payment systems.

Credit Payment System-

Credit Card — A form of the e-payment system which requires the use of the card issued by a financial institute to the cardholder for making payments online or through an electronic device, without the use of cash.

E-wallet — A form of prepaid account that stores user's financial data, like debit and credit card information to make an online transaction easier.

Smart card — a plastic card with a microprocessor that can be loaded with funds to make transactions; also known as a chip card.

Direct debit — A financial transaction in which the account holder instructs the bank to collect a specific amount of money from his account electronically to pay for goods or services.

- **E-check** — A digital version of an old paper check. It's an electronic transfer of money from a bank account, usually checking account, without the use of the paper check.
- **E-cash** is a form of an electronic payment system, where a certain amount of money is stored on a client's device and made accessible for online transactions.
- **Stored-value card** — A card with a certain amount of money that can be used to perform the transaction in the issuer store. A typical example of stored-value cards are gift cards.

RTGS - The acronym 'RTGS' stands for Real Time Gross Settlement, which can be defined as the continuous (real-time) settlement of funds transfers individually on an order-by-order basis (without netting). 'Real Time' means the processing of instructions at the time they are received rather than at some later time; 'Gross Settlement' means the settlement of funds transfer instructions occurs individually (on an instruction-by-instruction basis). Considering that the funds settlement takes place in the books of the Reserve Bank of India, the payments are final and irrevocable.

NEFT- National Electronic Funds Transfer (NEFT) is a nation-wide payment system facilitating one-to-one funds transfer. Under this Scheme, individuals can 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 is different from National Electronics Funds Transfer System (NEFT) - NEFT is an electronic fund transfer system that operates on a Deferred Net Settlement (DNS) basis, which settles transactions in batches. In DNS, the settlement takes place with all transactions received until the particular cut-off time. These transactions are netted (payable and receivables) in NEFT whereas in RTGS the transactions are settled individually. For example, currently, NEFT operates in hourly batches. [There are twelve settlements from 8 am to 7 pm on weekdays and six settlements from 8 am to 1 pm on Saturdays.] Any transaction initiated after a designated settlement time would have to wait until the next designated settlement time. Contrary to this, in the RTGS transactions are processed continuously throughout the RTGS business hours.

Internet Banking- Online banking, also known as **internet banking, e-banking** or **virtual banking**, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking, which was the traditional way customers accessed banking services.

Digital Certificates & Signatures- A digital signature is an electronic, encrypted, stamp of authentication on digital information such as email messages, macros, or electronic documents. A signature confirms that the information originated from the signer and has not altered

Signing certificate To create a digital signature, you need a signing certificate, which proves identity. When you send a digitally signed macro or document, you also send your certificate and public key. Certificates issued by a certification authority, and like a driver's license, can revoke. A certificate is usually valid for a year, after which, the signer must renew, or get a new, signing certificate to establish identity.

Certificate authority (CA) A certificate authority is an entity similar to a notary public. It issues digital certificates, signs certificates to verify their validity and tracks, which certificates have revoked or have expired.

Digital signature assurances

The following terms and definitions show what assurances digital signatures provide.

Authenticity-The signer is confirmed as the signer

Integrity The content has not been changed or tampered with since it was digitally signed

Non-repudiation-Proves to all parties the origin of the signed content. Repudiation refers to the act of a signer denying any association with the signed content

Notarization-Signatures in Microsoft Word, Microsoft Excel, or Microsoft PowerPoint files, which are time stamped by a secure time-stamp server, under certain circumstances, have the validity of a notarization.

To make these assurances, the content creator must digitally sign the content by using a signature that satisfies the following criteria:

1. The digital signature is valid.
2. The certificate associated with the digital signature is current (not expired).
3. The signing person or organization, known as the publisher, is trusted.

Infrastructure and Security of Electronic Payment

Secure Socket Layer (SSL) - Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), are cryptographic protocols which provide secure communications on the Internet for such things as web browsing, e-mail, Internet faxing, instant messaging and other data transfers. The TLS protocol(s) allow applications to communicate across a network in a way designed to prevent eavesdropping, tampering, and message forgery. TLS provides endpoint authentication and communications privacy over the Internet using cryptography. Typically, only the server is authenticated (i.e., its identity is ensured) while the client remains unauthenticated; this means that the end user (whether an individual or an application, such as a Web browser) can be sure with whom they are communicating. The next level of security—in which both ends of the "conversation" are sure with whom they are communicating—is known as mutual authentication. Mutual authentication requires public key infrastructure (PKI) deployment to clients.

Secure Electronic Transactions (SET) - Secure Electronic Transaction (SET) is a standard protocol for securing credit card transactions over insecure networks, specifically, the Internet. SET is not itself a payment system, but rather a set of security protocols and formats that enables users to employ the existing credit card payment infrastructure on an open network in a secure fashion. SET specification lists the following business requirements for secure payment processing with credit cards over the Internet and other networks:

1. Provide confidentiality of payment and ordering information
2. Ensure the integrity of all transmitted data
3. Provide authentication that a cardholder is a legitimate user of credit card account
4. Provide authentication that a merchant can accept credit card transactions through its relationship with a financial institution
5. Ensure the use of the best security practices and system design techniques to protect all legitimate parties in an electronic commerce transaction
6. Facilitate and encourage interoperability among software and network providers

3D Secure Protocol- The 3-D Secure™ protocol was developed by Visa to improve the security of online payments. The protocol is offered with the service name Verified by Visa. MasterCard has also adapted a similar protocol called MasterCard Secure Code. Both allow authentication of cardholders by their issuers at participating merchants. The objective is to benefit all participants by providing issuers the ability to fully authenticate cardholders using a password during online purchases, cutting down the chances of credit card fraud and improving card transaction efficiency. 3-D Secure ties the financial authorization process with an online authentication. This authentication is based on a three-domain model (hence the 3-D in the name).

The three domains are:

- Acquirer domain (the merchant and the bank to which money is being paid)
- Issuer domain (the bank which issued the card being used)

- Interoperability domain (the infrastructure provided by the card scheme, credit, debit, prepaid or other type of finance card, to support the 3-D Secure protocol)

Interoperability domain includes the internet, MPI, ACS and other software providers

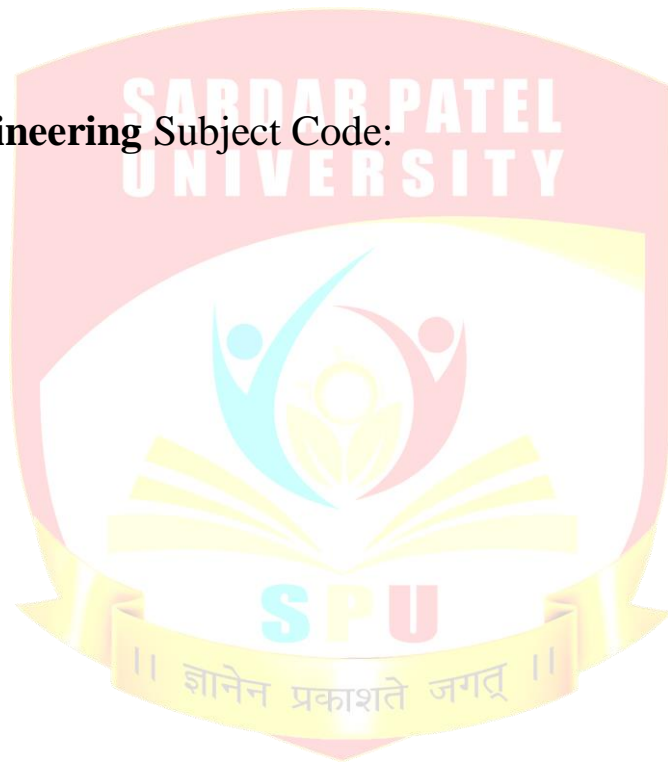
The protocol uses XML messages sent over SSL connections with client authentication (this ensures the authenticity of peers, the server and the client, using digital certificates). When you start a transaction using 3-D Secure, it initiates a redirection to the website of the card-issuing bank to authorize the transaction. This provides extra protection because correctly entering the security code during a purchase confirms that you are the authorized cardholder. If an incorrect security code is entering, the purchase will not complete. Even if someone knows your credit or debit card number, the purchase cannot be complete without your security code. The process works in a similar way to a PIN number for your card. A significant factor in adopting 3-D Secure is the reduction in disputed transactions and the handling and losses that come with those. Authenticated payment is expecting to eradicate a substantial proportion of fraud, charge-backs and customer complaints. Much harder to predict is the effect 3-D Secure is having on consumer confidence. Greater confidence should mean increased sales, so any steps your business takes to protect data will have a positive impact on your business. 3-D Secure is compatible with most online payment solutions although some high-risk accounts may require the addition of a 'message passing interface' (MPI). Benefits of integrating 3-D Secure:

- Minimal impact on merchant's interaction with consumer
- Customer confidence in your site's security
- Less risk of fraudulent transactions
- Fewer disputed transactions



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E- Commerce: E Commerce stands for electronic commerce and caters to trading in goods and services through the electronic medium such as internet, mobile or any other computer network. It involves the use of Information and Communication Technology (ICT) and Electronic Funds Transfer (EFT) in making commerce between consumers and organizations, organization and organization or consumer and consumer. With the growing use of internet worldwide, Electronic Data Interchange (EDI) has also increased in humungous amounts and so has flourished e-commerce with the prolific virtual internet



bazaar inside the digital world, which is rightly termed as e-malls. We now have access to almost every knick-knack of our daily lives at competitive prices on the internet. No matter one is educated or illiterate, an urbane or a fellow citizen, in India or in U.K; all you need is an internet connection and a green bank account. With e-commerce then, you can buy almost anything you wish for without actually touching the product physically and inquiring the salesperson n number of times before placing the final order. Here is a beautiful picture depicting how has human life evolved to adapt to the digital world and hence trading over the internet. As seen, from pizza and potted plant to pair of shoes, we have everything on sale on the internet available in tempting offers..!! Snapdeal.com, Amazon, eBay, Naaptol, Myntra, etc are some of the most popular e-commerce websites. E-Commerce or Electronics Commerce business models can generally categorized in following categories.

Business Models

- Business - to - Business (B2B)
- Business - to - Consumer (B2C)
- Consumer - to - Consumer (C2C)
- Consumer - to - Business (C2B)
- Business - to - Government (B2G)
- Government - to - Business (G2B)
- Government - to - Citizen (G2C)

Business - to - Business (B2B) - Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the end product to final customer who comes to buy the product at wholesaler's retail outlet.

1.Features

2.E-Commerce provides following features-

3.**Non-Cash Payment** – E-Commerce enables use of credit cards, debit cards, smart cards, electronic fund transfer via bank's website and other modes of electronics payment.

4.**24x7 Service availability** – E-commerce automates business of enterprises and services provided by them to customers are available anytime, anywhere. Here 24x7 refers to 24 hours of each seven days of a week.

5.**Advertising / Marketing** – E-commerce increases the reach of advertising of products and services of businesses. It helps in better marketing management of products / services.

6.**Improved Sales** – Using E-Commerce, orders for the products can be generated anytime, anywhere without any human intervention. By this way, dependencies to buy a product reduce at large and sales increases.

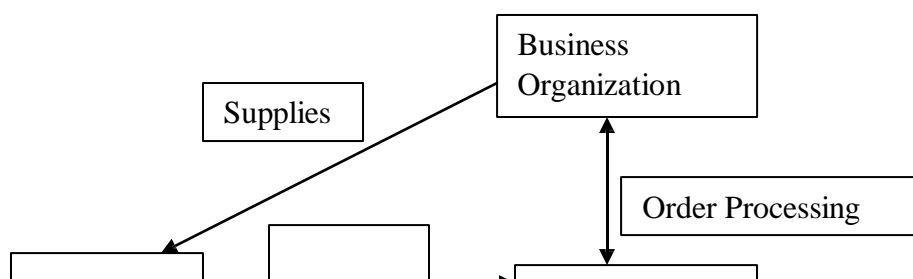
7.**Support** – E-Commerce provides various ways to provide pre sales and post sales assistance to provide better services to customers.

8.**Inventory Management** – Using E-Commerce, inventory management of products becomes automated. Reports get generated instantly when required. Product inventory management becomes very efficient and easy to maintain.

9.**Communication improvement** – E-Commerce provides ways for faster, efficient, reliable communication with customers and partners.

Business - to - Business B2B

Website following B2B business model sells its product to an intermediate buyer who then sells the product to the final customer. As an example, a wholesaler places an order from a company's website and after receiving the consignment, sells the product to final customer who comes to buy the product at wholesaler's retail outlet.



Business - to - Consumer B2C-Business-to-consumer e-commerce, or commerce between companies and consumers, involves customers gathering information; purchasing physical goods (i.e., tangibles such as books or consumer products) or information goods (or goods of electronic material or digitized content, such as software, or e-books); and, for information goods, receiving products over an electronic network. It is the second largest and the earliest form of e-commerce. B2C e-commerce is even more attractive because it saves firms from factoring in the additional cost of a physical distribution network. Moreover, for countries with a growing and robust Internet population, delivering information goods becomes increasingly feasible. Website following B2C business model sells its product directly to a customer. A customer can view products shown on the website of business organization. The customer can choose a product and order the same. Website will send a notification to the business organization via email and organization will dispatch the product/goods to the customer.

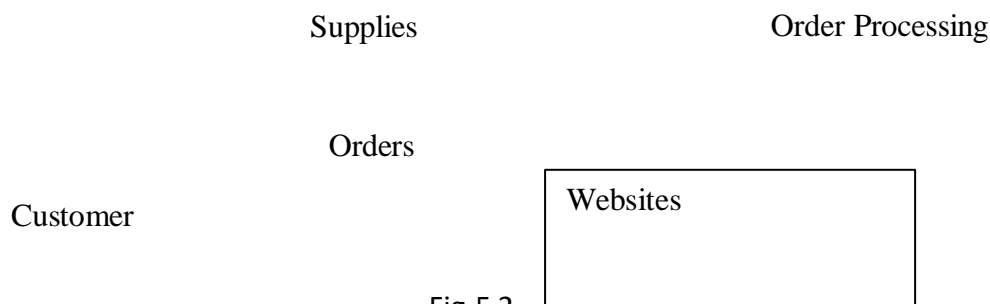


Fig-5.2

Consumer - to - Consumer C2C

Consumer-to-consumer e-commerce or C2C is simply commerce between private individuals or consumers. This type of e-commerce is characterized by the growth of electronic marketplaces and online auctions, particularly in vertical industries where firms/businesses can bid for what they want from among multiple suppliers.¹⁶ It perhaps has the greatest potential for developing new markets.

This type of e-commerce comes in at least three forms:

- auctions facilitated at a portal, such as eBay, which allows online real-time bidding on items being sold in the Web;
- peer-to-peer systems, such as the Napster model (a protocol for sharing files between users used by chat forums similar to IRC) and other file exchange and later money exchange models; and
- Classified ads at portal sites such as Excite Classifieds and wanted, Pakwheels.com (an interactive, online marketplace where buyers and sellers can negotiate and which features "Buyer Leads & Want Ads"). Website following C2C business model helps consumer to sell their assets like residential property, cars, motorcycles etc. or rent a room by publishing their information on the website. Website may or may not charge the consumer for its services. Another consumer may opt to buy the product of the first customer by viewing the post/advertisement on the website.

Places advertisement



Fig-5.3

Advantages of C2C sites- Consumer to consumer e-commerce have many benefits. The primary benefit to consumers is reduction in cost. Buying ad space on other e-commerce sites is expensive. Sellers can post their items for free or with minimal charge depending on the C2C website. C2C websites form a perfect platform for buyers and sellers who wish to buy and sell related products. The ability to find related products leads to an increase in the visitor to customer conversion ratio. Business owners can cheaply maintain C2C websites and increase profits without the additional costs of distribution locations. A good example of a C2C e-commerce website is Esty, a site that allows consumers to buy and sell handmade or vintage items and supplies including art, photography, clothing, jewelry, food, bath and beauty products, quilts, knick-knacks, and toys.

Disadvantages of C2C sites- There are a couple of disadvantages to these types of sites as well. Doing transaction on these types of websites requires co-operation between the buyer and seller. It has been note many times that these two do not co-operate with each other after a transaction has made. They do not share the transaction information, which may be via credit or debit card or internet banking. This can result in online fraud since the buyer and seller is not very well verse with each other. This can lead to lawsuit being impose either on ends or also on the site if it has not mentioned the disclaimer in its terms and conditions. This may also hamper the c2c website's reputation.

Consumer - to - Business C2B- In this model, a consumer approaches website showing multiple business organizations for a particular service. Consumer places an estimate of amount he/she wants to spend for a particular service. For example, comparison of interest rates of personal loan/ car loan provided by various banks via website. Business organization that fulfils the consumer's requirement within specified budget approaches the customer and provides its services.

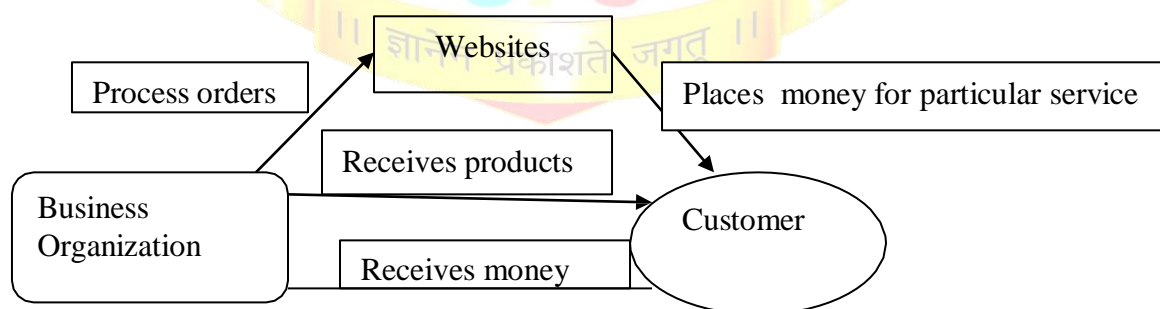


Fig-5.4

Business - to - Government B2G- Business-to-government e-commerce or B2G is generally defined as commerce between companies and the public sector. It refers to the use of the Internet for public procurement, licensing procedures, and other government-related operations. This kind of e-commerce has two features: first, the public sector assumes a pilot/leading role in establishing e-commerce; and second, it is assume that the public sector has the greatest need for making its procurement system more effective. Web-based purchasing policies increase the transparency of the procurement process (and reduce the risk of irregularities). To date, however, the size of the B2G e-commerce market, as a component of total e-commerce is insignificant, as government e-procurement, systems remain undeveloped. B2G model is a variant of B2B model. Such websites are used by government to trade and exchange information with various business organizations. Such websites are accrediting by the government and provide a medium to businesses to submit application forms to the government.



Fig-5.5

Government - to - Business G2B

Government uses B2G model website to approach business organizations. Such websites support Auctions, tenders and application submission functionalities



Fig-5.6

Government - to - Citizen G2C

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

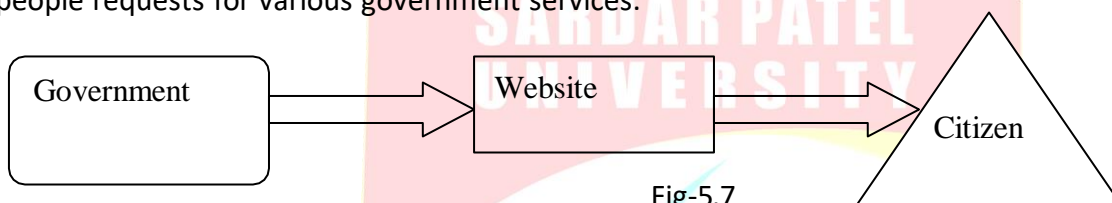


Fig-5.7

Internet relevant to e-commerce

The Internet allows people from all over the world to get connected inexpensively and reliably. As a technical infrastructure, it is a global collection of networks, connected to share information using a common set of protocols. Also, as a vast network of people and information, the Internet is an enabler for e-commerce as it allows businesses to showcase and sell their products and services online and gives potential customers, prospects, and business partners access to information about these businesses and their products and services that would lead to purchase.

Infrastructure-Every business requires an infrastructure to support its customers and operations. This includes facilities, equipment, and processes to support all the functional areas of your business. Choosing the correct infrastructure to match your business strategies enables your operations to run efficiently. Conversely, if an element of your infrastructure is uncoordinated with your strategies, you will likely feel the pain in every aspect of your business.

Here are seven important infrastructure decisions that ecommerce businesses face.

1. **Marketing** - Of all the infrastructure elements, marketing may be the most important. To succeed, your website must be found. Once visitors are on your site, you need to keep them there and compel them to buy from you. That's the job of your marketing team. Whether it's website design, social media, search marketing, merchandising, email, or other forms of advertising, it's all about marketing. To effectively manage marketing activities in-house is very challenging. Most small ecommerce businesses outsource some element of marketing.

2. **Facilities** - A key competitive advantage that ecommerce businesses have over brick-and-mortar stores is the investment in their physical offices and warehouses. In many cases, you can host your business out of a home office and your basement or garage. If you drop ship or outsource fulfilment, you may be able to do that for a long period. Even when you grow to have many employees, you can set up your offices in class B or C space, as you have no need for a fancy store in the right location. A word of advice is to keep your options flexible. Try to find an office park that has a wide variety of spaces in different sizes. You may be able to start in a smaller space and move up to a larger one without penalty, as your needs change.

3. **Customer Service** - There are many choices today for delivering high-quality customer service. You can

manage those activities in-house or outsource to a third party. Basic customer service for sales and post-sales activities can be handled using email, and by providing an 800 number for more extensive phone support. A customer-management system will make those activities easier, but for smaller companies it is not a requirement. Live chat will affect your operations, as someone needs to be available during specified hours of operation. Be sure to gauge the impact of that on your organization, if you decide to handle those activities in house.

4. Information Technology - Choosing the right ecommerce platform is one of the most important decisions you will make in your business. Do you want to build and host your own system, outsource the development and then manage the system going forward, or use a hosted, software-as-a-service platform that is more turnkey and externally managed?

If you build and host your own system, you may need more cash up front and skilled administrators and developers on your staff. By using a SaaS platform, you will not need to host or manage the system in-house, but you may still need web developers on staff. Choosing to outsource the development and hosting will reduce your staffing costs, but you will incur higher costs for any future enhancements or changes to your websites. There are pros and cons to any approach. Just be sure to think through the impacts on both your staffing and your cash flow and bottom line before you move forward.

5. Fulfilment - Another key decision is whether you will manage your own inventory or outsource those activities to a fulfilment house or through drop shipping arrangements with your suppliers.

6. Finance and Administration - As with other business operations, you will need to decide if you want to manage your finance and administration activities in-house, outsource, or a hybrid of the two. If your ecommerce platform is tightly integrated to your accounting system, you may have very little need for an in-house bookkeeper. If you use separate systems for your website, order management and accounting, you may need more help for data entry and making sure that the information is properly managed many ecommerce companies use outside services for vendor payments, payroll, and other basic accounting activities. They decide to focus on the sales, marketing, and customer service. On the administration side, you need a leadership team and provide direction to them. Good communication is important, whether you have 3 or 100 employees. Whether you choose to be more authoritative or democratic in your management style is up to you. But choose a style and stay consistent. Be sure that everyone understands their roles, as well as the overall business strategies. You may need to adjust your approach as your business evolves.

7. Human Resources - Many small-business owners avoid the human resources function. Recruiting, setting up compensation, maintaining compliance and other HR activities are specialized and time consuming. You may choose to bring the resources in-house to manage those activities, but also evaluate outsourcing them. There are many individuals and agencies well equipped to take on your HR activities.

Environment and Opportunities- Electronic commerce includes all forms of business transactions, such as the purchase of goods or services, undertaken through electronic means, such as telephones, televisions, computers, and the Internet. It is believe to be the means through which most business will conduct in the future. With the growing numbers of people connecting to the Internet, electronic commerce is gaining rapid acceptance. Many people think of electronic commerce in terms of shopping on the Internet, or shopping on-line, but it is really much more than that. Electronic commerce affects our lives in more ways than we realize.

- A manufacturer-checking inventory on parts at a supplier's warehouse through the Internet in evolved in electronic commerce.
- A direct deposit transaction, such as the direct deposit of a paycheck or a tax refund into a bank account, is an electronic commerce transaction.
- A person advertising a seldom used exercise bike on-line is engaging in electronic commerce.
- Each time someone takes money out of an ATM, or uses a debit or credit card to purchase goods or services, that person is taking part in electronic commerce.
- A catalogue shopper placing an order over the telephone is also participating in electronic commerce.

Electronic commerce may be in the form of business-to-business activities, business to consumer, or direct consumer to consumer contacts. Links to governments, educational institutions, libraries and not-for-profit organizations are all a part of the electronic commerce environment. Goods, services, and information are the content of electronic commerce; the whole world is its venue.

Modes & Approaches-

1. For real time e-commerce, the merchant establishes the internet merchant facility with their bank, integrates the payment gateway, and uses either a shopping cart or order form for information capture. From a security point of view the advantage of using a payment gateway means that the customer's details (name, address, credit card number) are not captured (or seen) by the merchant but rather are captured by the payment gateway provider only. Also the transfer of the customer's details from the merchant's website to the payment gateway is secure (encrypted) and cannot be intercepted.
2. Another approach is where the merchant uses a third party hosted solution such as Paypal, Worldpay or Pay mate who look after some or all of the key components of e-commerce. The advantage is the ease in which the Australian company can charge the customer in different currencies without having to establish dedicated currency bank accounts.
3. The last approach and the least preferred from a security perspective is where the merchant uses either a shopping cart or order form for information capture and then manually re-keys the credit card number into an EFTPOS facility they have leased from a bank. Essentially the website captures the order information and the transaction is process manually off-line. With this approach, the company does not require a payment gateway service because the transaction is not in real time.

Marketing & Advertising Concepts- Ecommerce marketing is the process of driving sales by raising awareness about an online store's brand and product offerings. Digital marketing for ecommerce applies traditional marketing principles to a multichannel, data-driven environment. Ecommerce marketing can divided into two general actions: driving website traffic and optimizing the user experience for conversion. Both are critical components to growing an online business — failure in one is all but sure to undermine any success in the other. Seasoned marketers can thrive in a digital landscape, starting with a solid foundation of common terms.

Ecommerce Marketing Channels

- **Pay-per-click Advertising (PPC):** Effective PPC campaigns drive users with intent to purchase, making it more efficient than many traditional advertising platforms. Businesses bid on impressions for paid listings at the top of search engine results, paying on a per-click basis. Impressions are determined by user search query, with strategy revolving around which keyword bids yield the highest ROI.
- **Search Engine Marketing (SEM):** Sometimes used a synonym for PPC, referring to paid advertising campaigns. SEM is often use to describe efforts on Google's AdWords platform and paid platforms on other search engines, such as Bing. This multifaceted term is also used by many marketer to describe all paid and organic efforts.
- **Search Engine Optimization (SEO)-** Unlike the paid media opportunities described above, SEO traffic comes from unpaid "organic" results on search engines such as Google and Yahoo.
- **Display Advertising-** Banners, sidebars and other predominantly visual advertisements that appear on other websites. Display ads are facilitating by ad networks such as Google Display Network.
- **Affiliate Marketing-** Referrals from other websites with industry or product-focused content such as reviews, comparisons, and testimonials. Successful affiliates have a loyal following or receive traffic from some of the above channels. They typically receive a set commission of referred sales, often determined on a case-by-case basis.
- **Email Marketing:** Newsletters, abandoned cart notifications and remarketing all use email to target past and potential customers.

Ecommerce Marketing terms

- **Google AdWords-** Google's advertising platform pioneers the PPC model and capitalizes on the company's majority share of the search market.
- **Search Engine Results Page (SERP):** The cumulative results from users executing a search engine query, comprising organic and paid listings. Having results on the first page of SERPs is critical to acquiring new customers.

- **Conversion Rate Optimization (CRO)**- The process of improving every aspect of a website so that more visitors purchase. Faster load times, fewer clicks to purchase and more enticing product descriptions/images make it easier for user's to evaluate your products and follow through to The most common metric for evaluating CRO efforts is conversion rate.

- **Conversion Funnel**- The steps taken by a prospect to become a customer begin with awareness and ending with a purchase. Higher-priced items generally have a longer sales cycle, while low-cost items can convert in a much shorter period.

Electronic Publishing issues- Electronic publishing is electronic commerce in digital goods and services that are intended for consumption by the human senses

It encompasses a wide range of formats, including:

- text;
- structured data;
- image, both raster/bit-map and vector;
- moving image (animation and video);
- sound; and
- Combinations of the above ('multi-media').

The following are examples of the kinds of digital goods and services that are encompassed by that definition:

- documents in electronic form, including articles and books;
- data, such as statistical tables;
- low-volatility reference information, such as dictionaries and encyclopaedias;
- high-volatility reference information, such as news, sports reports and weather forecasts;
- speeches;
- musical performances;
- cartoons;
- films and video-clips; and
- Entertainment, infotainment, edutainment and education.

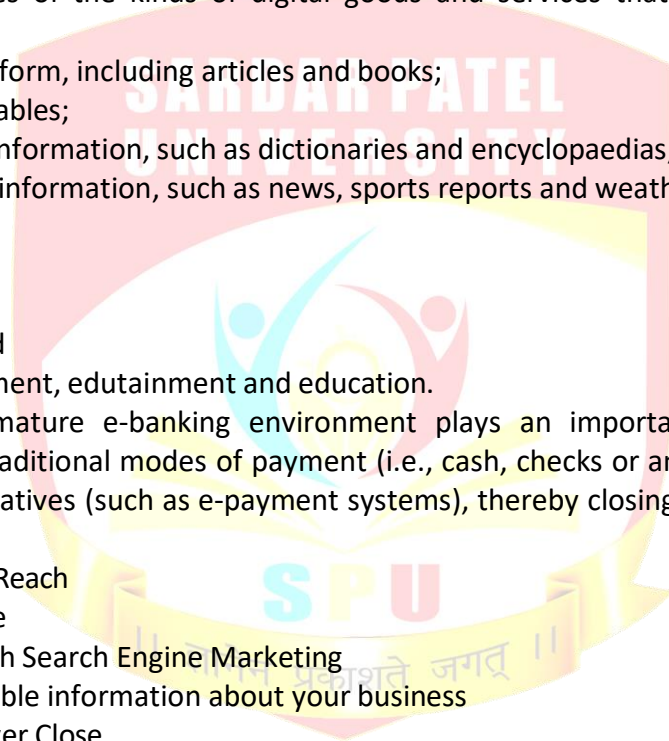
A more developed and mature e-banking environment plays an important role in e-commerce by encouraging a shift from traditional modes of payment (i.e., cash, checks or any form of paper-based legal tender) to electronic alternatives (such as e-payment systems), thereby closing the e-commerce loop.

a) Benefits of e-Commerce

- Expanded Geographical Reach
- Expanded Customer Base
- Increase Visibility through Search Engine Marketing
- Provide Customers valuable information about your business
- Available 24/7/365 - Never Close
- Build Customer Loyalty
- Reduction of Marketing and Advertising Costs
- Collection of Customer Data

b) Basic Benefits of e-Business e-Commerce

- Increase sales - this is the first thing that people consider when dealing with e-commerce
 - Decreasing costs
 - Increase profits
 - Understanding that profits is not the same as sales
 - Expands the size of the market from regional to natio national to international
 - Contract the market
 - Reach a narrow market
 - Target market segmentation allows you to focus on a more
 - Select group of customers
 - And therefore have a competitive advantages in satisfying them



Ecommerce legalities and technologies- A technological innovation is followed by frequent incorporation of ethical standards into law. New forms of E-Commerce that enables new business practices have many advantages but also bring numerous risks.

Let us discuss about the ethical and legal issues related to e-business.

Ethical Issues-In general, many ethical and global issues of Information Technology apply to e-business. So, what are the issues particularly related to e-commerce.

Web tracking-E-businesses draw information on how visitors use a site through log files. Analysis of log file means turning log data into application service or installing software that can pluck relevant information from files in-house. Companies track individual's movement through tracking software and cookie analysis. The battle between computer end users and web trackers is always going on with a range of application programs.

Privacy-Most Electronic Payment Systems knows the identity of the buyer. Therefore, it is necessary to protect the identity of a buyer who uses Electronic Payment System. A privacy issue related to the employees of company is tracking. Monitoring systems are installed in many companies to monitor e-mail and other web activities in order to identify employees who extensively use business hours for non-business activities. The e-commerce activities performed by a buyer can be tracked by organizations. For example, reserving railway tickets for their personal journey purpose can be tracked. Many employees do not want to be under the monitoring system even while at work.

Disintermediation and Reinter mediation-Intermediation is one of the most important and interesting e-commerce issue related to loss of jobs. The services provided by intermediaries are

(i) Matching and providing information.

(ii) Value added services such as consulting.

The first type of service (matching and providing information) can be fully automated, and this service is likely to be in e-marketplaces and portals that provide free services.

Legal Issues- Internet fraud and its sophistication have grown even faster than the Internet itself. There is a chance of a crime over the internet when buyers and sellers do not know each other and cannot even see each other. During the first few years of e-commerce, the public witnessed many frauds committed over the internet. Let us discuss the legal issues specific to e-commerce.

Fraud on the Internet-E-commerce fraud popped out with the rapid increase in popularity of websites. It is a hot issue for both cyber and click-and-mortar merchants. The swindlers are active mainly in the area of stocks. The small investors are lured by the promise of false profits by the stock promoters. Auctions are also conducive to fraud, by both sellers and buyers. The availability of e-mails and pop up ads has paved the way for financial criminals to have access to many people. Other areas of potential fraud include phantom business opportunities and bogus investments.

Copyright-The copyright laws protect Intellectual property in its various forms, and cannot be used freely. It is very difficult to protect Intellectual property in E-Commerce. For example, if you buy software you have the right to use it and not the right to distribute it. The distribution rights are with the copyright holder. In addition, copying contents from the website also violates copyright laws.

Domain Names- The competition over domain names is another legal issue. Internet addresses are known as domain names and they appear in levels. A top-level name is qburst.com or microsoft.com. A second level name will be qburst.com/blog. Top-level domain names are assigned by a central non-profit organization, which also checks for conflicts or possible infringement of trademarks. Problems arise when several companies having similar names competing over the same domain name.

Secure Web document, - Non-technical Issues

1. **Security Awareness-** Most opinion surveys list "insecurity of financial transactions" and "loss of privacy" among the major impediments to electronic commerce, but in fact most users have only vague ideas about the threats and risks, and a very limited understanding of the technical and legal options for minimizing their risk. As a result, all kinds of misperceptions exist.

For instance, the cardholder's risk in sending his or her credit card number over the Internet is typically overestimated. At least as of this writing payments over the Internet are treated like mail-order/telephone-order transactions, which means that the cardholder is not liable at all. All risk is with the merchant. On the other hand, the risks in sending sensitive data in an electronic mail are typically underestimated. Probably

most users of email know the mere facts: neither confidentiality nor integrity nor availability is guarantee. However, many users do not hesitate to send all kind of very personal and sensitive data to their friends or colleagues, unprotected. Unfortunately, developers of electronic commerce solutions are often as security unaware and ignorant as their prospective users. For instance, still many developers demand that "lower layers" must provide security in a "transparent" way. However, for instance, Secure Socket Layer (SSL) in "opaque socket integration" does not make any sense in most case. Security has to be an integral part of the architecture, design, and implementation.

2. Crypto Regulations- Several countries regulate the deployment of strong encryption technology by law. For instance, France controls the domestic use of encryption technology, in order to maintain the capability to eavesdrop on the communication of criminals. The USA prohibits the export of strong encryption products for the mass market, for the same reasons as it controls the export of munitions. Such regulations do not discriminate between "good" and "bad" applications, and limit the security of honest citizens and companies to at least the same extent as they limit the security of terrorists and organized crime. Therefore several governments, in particular the US administration, are willing to relax their crypto regulations, provided access to the encrypted information would still be possible on demand. The idea is to introduce new "Trusted Third Parties" where secret keys must either be escrowed in advance, or can be recovered afterwards. All these proposals are heavily contested, for various technical and political reasons: The Trusted Third Parties would be "single points of failure" for everybody's, i.e., new and extremely attractive targets for attacks. It is questionable whether any regulation of encryption technology can be effective in fighting organized crime: tools for strong encryption are publicly available, and steganography techniques can perfectly conceal the fact that cryptographic techniques are applied. Many types of commercial transactions require strong confidentiality, which cannot be satisfied in some countries, or across some borders. For instance, consider two large companies that prepare a merger. Clearly, their negotiations require top confidentiality. Even the fact that they are preparing the merger, i.e., that they are communicating intensively, will be extremely sensitive. This requires actually services for anonymous communication. Nevertheless using the appropriate cryptographic tools would be illegal in many countries. Political regulations are not subject to scientific research. However, we clearly see the need for an international agreement on a more liberal and consistent regulation of cryptography. Electronic commerce demands strong confidentiality, which can be implemented only by strong encryption schemes.

3. Legal Issues- Surveying the open legal problems in electronic commerce is beyond the scope of this article. The two most important security-related problems are the following:

- **Liability:** The financial risk of a user in a specific transaction depends on his or her liability. In principle, if a user bears no liability, there is no risk.

The main issue here is fairness: The liability of a user should correspond to the security of his or her technical equipment. For instance, if it is technically trivial to forge the digital signature of a user then this party should not be held liable for his or her signatures, in general.

- **Harmonization:** The national laws that regulate electronic commerce over the Internet (like evidential value of digital signatures, consumer protection, and copyright protection) is not harmonized, and are contradictory. One side result is that there is no mutual recognition between national PKIs, even where comparable laws exist.

Technical Components of e-commerce Security- There are four components involved in Ecommerce Security: client software, server software, the server operating system, and the network transport. Each component has its own set of issues and challenges associated with securing them:

- Client software is becoming increasingly more security-focused; however, single-user desktop operating systems historically have had no security features implemented. Ecommerce software that relies on the security of the desktop operating system is easily compromised without the enforcement of strict physical controls.

- Server software is constantly under test and attack by the user community. Although there have been cases of insecurities, a system administrator keeping up with the latest patches and vendor information can provide a high degree of confidence in the security of the server itself.

- Operating systems used for hosting Ecommerce servers are securable, but rarely shipped from the vendor in a default configuration that is secure. Ecommerce servers must protect the database of customer information accumulating on the server as well as provide security while the server is handling a transaction. If it is easier for a thief to compromise the server to obtain credit card numbers, why bother sniffing the network for individual credit card numbers.

Session transport between the client and server uses network protocols that may have little or no built-in security. In addition, networking protocols such as TCP/IP were not design to have confidentiality or authentication capabilities

Cryptography & Pretty Good Privacy (PGP)

1. The need for cryptography in electronic communications

Cryptography has been around for centuries; as long as there has been communication, there has been the need for privacy and safe, secure methods of transmission. Although many types of difficult problems can be classify as cryptography problems, what we are mostly concerned with today is the ability to keep transmissions private with data encryption techniques. This has become an even greater issue due to the changing nature of communications since the information revolution. More and more people rely on electronic communications for the transmission of sensitive or personal data; e-mail, e-commerce, FTP, and HTML are all examples of technology that have already filtered into the social consciousness as primary ways for disseminating and gathering information and for exchanging goods and services. While this technological shift has made communication faster, easier, and better in many ways, it has also brought along with it a whole host of difficult problems and social policy issues.

The main problem that comes with electronic communications is the ease with which transmissions can be eavesdropped or impersonated. Paper communications obviously have security problems as well: documents can be stolen, steamed open, have forged signatures or changed contents. However, if someone is trying to catch a specific transmission (or type of communication), it is much easier when dealing with an electronic medium. Also, since there can be (and often are) multiple copies of any given electronic transmission, it is difficult to know if someone has stolen a copy or somehow altered the original.

Secondly, there is an access control problem. Many electronic transmissions are made in a broadcast manner, as seen with cable or satellite television and wireless phones. People can install devices to intercept these transmissions, and senders usually have no way to either monitor or stop this. In order to prevent unwanted people from making free use of their services, senders must encrypt their outgoing transmissions. To their paying customers, they can give special devices to decrypt the information.

Finally, there is the problem of authentication: electronic communications are impersonal, and can be easily forged by impersonating IP addresses, changing "sender fields" in e-mail, "cloning" cellular phone numbers, and so forth. In order for people to want to - and, indeed, be able to - use electronic communication in the coming years, it is essential that these problems be resolved. Right now, advances in cryptography are the best way to address these issues. Data encryption not only provides privacy and access control by rendering communications illegible to unauthorized parties; it can provide effective authentication as well through the use of digital signatures and timestamps.

2. The primary forms of cryptography

There are two main forms of cryptography: secret-key (or symmetric) and public-key (or asymmetric).

Secret-key cryptography

Secret-key cryptography is the more traditional form, and has been used for all kinds of communications throughout the ages. In this method, one "key" is used to both encrypt and decrypt the data. A key can be anything from a secret-decoder ring found in a cereal box to a highly complex mathematical algorithm; keys really only differ in the ease with which they can be broken by third parties. In secret-key cryptography, the sender and receiver must have the same key in order for the transmission to work correctly.

Secret-key cryptography suffers from two overwhelming problems. First, any two people that want to communicate with each other must first agree on the key to use. This makes it more difficult to send information to people that you do not already know, and large-scale communication becomes much more difficult. The second, more fundamental, problem is that of "key management", which the system for

transmission and storage of keys is. In order to agree on a key, there must first be some sort of communication that occurs, and this communication itself can be eavesdropped. If some third party catches the key that is used, then all further communications between the two parties are no longer secure and private. In addition, the third party could easily impersonate communications because it is believed that no one else knows the key. This problem is exacerbated by the fact that the initial parties might have no way of knowing that the key was stolen. This key management issue causes a "repudiation problem": later on, either of the parties could repudiate messages that had been sent with secret-key encryption, claiming that the key had been stolen and that the messages were compromised or faked. Thus, there is always an inherent lack of security and trust in a purely secret-key environment.

Public-key cryptography

The key management problem inherent to secret-key cryptography needed to be addressed in order for large-scale, secure use of data encryption techniques. In 1976, Whitfield Diffie, a cryptographer and privacy advocate, and Martin Hellman, an electrical engineer, working together discovered the concept of public-key encryption. Instead of having one key shared between both users of an encrypted transmission, each user has his or her own public/private key pair. A user makes the public key open and available to anyone (by publishing it on-line or registering it with a public key server), and keeps the private key hidden away where (hopefully) no one can get at it. In order to send someone a message, the sender encrypts the transmission with the receiver's public key. This can then be decrypted by the receiver's private key. Thus, anyone can encrypt a message with someone else's public key, but only that person would ever be able to read it. This method solves the problems of secret-key cryptography. Because the only key information that needs to be shared is made public, there is no worry about some third party intercepting and possessing the key. This makes the users of the encryption surer that their transmissions are secure and private. It also solves the repudiation problem; because there is no third party that could ever be blamed—each individual is responsible for safeguarding his or her own private key.

The inherent weakness of the public-key method is that the two keys are linked together mathematically. If a third party figures out the exact way that an individual's private key is derived from his or her public key, the whole security of the system will be lost. The only way around this liability (so far) has been to make the derivation so incredibly complex that a brute force attempt to crack it would take a prohibitively long amount of time. It is easy to see that the quality of the method used to create keys is essential to the success of any public-key system.

Digital Signatures – The digital equivalent of a handwritten signature or stamped seal, but offering far more inherent security, a digital signature is intended to solve the problem of tampering and impersonation in digital communications. Digital signatures can provide the added assurances of evidence to origin, identity and status of an electronic document, transaction or message, as well as acknowledging informed consent by the signer.

In many countries, including the United States, digital signatures have the same legal significance as the more traditional forms of signed documents. The United States Government Printing Office publishes electronic versions of the budget, public and private laws, and congressional bills with digital signatures.

How digital signatures work

Digital signatures based on public key cryptography, also known as asymmetric cryptography. Using a public key algorithm such as RSA, one can generate two keys that are mathematically linked: one private and one public. To create a digital signature, signing software (such as an email program) creates a one-way hash of the electronic data to be signed. The private key is then used to encrypt the hash. The encrypted hash – along with other information, such as the hashing algorithm – is the digital signature. The reason for encrypting the hash instead of the entire message or document is that a hash function can convert an arbitrary input into a fixed length value, which is usually much shorter. This saves time since hashing is much faster than signing. If the two hash values match, the message has not been tampered with, and the receiver knows the message is from the sender. Most modern email programs support the use of digital signatures and digital certificates, making it easy to sign any outgoing emails and validate digitally signed incoming messages. Digital signatures are extensively used to provide proof of authenticity, data integrity and non-repudiation of communications and transactions conducted over the Internet.

FIREWALL-A firewall is a set of related programs, located at a network gateway server, that protects the resources of a private network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users have access to. Basically, a firewall, working closely with a router program, examines each network packet to determine whether to forward it toward its destination. A firewall also includes or works with a proxy server that makes network requests on behalf of workstation users. A firewall is often installed in a specially designated computer separate from the rest of the network so that no incoming request can get directly at private network resources. There are a number of firewall screening methods. A simple one is to screen requests to make sure they come from acceptable (previously identified) domain name and Internet Protocol addresses. For mobile users, firewalls allow remote access in to the private network by the use of secure logon procedures and authentication certificates. A number of companies make firewall products. Features include logging and reporting, automatic alarms at given thresholds of attack, and a graphical user interface for controlling the firewall. Computer security borrows this term from firefighting, where it originated. In firefighting, a firewall is a barrier established to prevent the spread of fire.

Cyber Crime- It could be hackers vandalizing your site, viewing confidential information, stealing trade secrets or intellectual property with the use of internet. It can also include 'denial of services' and viruses attacks preventing regular traffic from reaching your site. Cybercrimes are not limited to outsiders except in case of viruses and with respect to security, related cybercrimes that usually done by the employees of particular company who can easily access the password and data storage of the company for their benefits. Cybercrimes also includes criminal activities done with the use of computers which further perpetuates crimes i.e. financial crimes, sale of illegal articles, pornography, online gambling, intellectual property crime, e-mail, spoofing, forgery, cyber defamation, cyber stalking, unauthorized access to Computer system, theft of information contained in the electronic form, e-mail bombing, physically damaging the computer system etc.

Classifications Of Cyber Crimes: Cyber Crimes which are growing day by day, it is very difficult to find out what is actually a cybercrime and what is the conventional crime so to come out of this confusion, cybercrimes can be classified under different categories which are as follows:

1. Cyber Crimes against Persons:

There are certain offences which affect the personality of individuals can be defined as:

Harassment via E-Mails: It is very common type of harassment through sending letters, attachments of files & folders i.e. via e-mails. At present harassment is common as usage of social sites i.e. Facebook, Twitter etc. increasing day by day.

Cyber-Stalking: It means expressed or implied a physical threat that creates fear through the use to computer technology such as internet, e-mail, phones, text messages, webcam, websites or videos.

Dissemination of Obscene Material: It includes Indecent exposure/ Pornography (basically child pornography), hosting of web site containing these prohibited materials. These obscene matters may cause harm to the mind of the adolescent and tend to deprave or corrupt their mind.

Defamation: It is an act of imputing any person with intent to lower down the dignity of the person by hacking his mail account and sending some mails with using vulgar language to unknown persons mail account.

Hacking: It means unauthorized control/access over computer system and act of hacking completely destroys the whole data as well as computer programmes. Hackers usually hacks telecommunication and mobile network.

Cracking: It is amongst the gravest cybercrimes known till date. It is a dreadful feeling to know that a stranger has broken into your computer systems without your knowledge and consent and has tampered with precious confidential data and information.

E-Mail Spoofing: A spoofed e-mail may be said to be one, which misrepresents its origin. It shows its origin to be different from which actually it originates.

SMS Spoofing: Spoofing is a blocking through spam which means the unwanted uninvited messages. Here a offender steals identity of another in the form of mobile phone number and sending SMS via internet

and receiver gets the SMS from the mobile phone number of the victim. It is very serious cybercrime against any individual.

Crimes against Persons Property:

As there is rapid growth in the international trade where businesses and consumers are increasingly using computers to create, transmit and to store information in the electronic form instead of traditional paper documents. There are certain offences which affects person's properties which are as follows:

Intellectual Property Crimes: Intellectual property consists of a bundle of rights. Any unlawful act by which the owner is deprived completely or partially of his rights is an offence. The common form of IPR violation may be said to be software piracy, infringement of copyright, trademark, patents, designs and service mark violation, theft of computer source code, etc.

- **Cyber Squatting:** It means where two persons claim for the same Domain Name either by claiming that they had registered the name first on by right of using it before the other or using something similar to that previously. For example two similar names i.e. www.yahoo.com and www.yaahoo.com.
- **Cyber Vandalism:** Vandalism means deliberately destroying or damaging property of another. Thus cyber vandalism means destroying or damaging the data when a network service is stopped or disrupted. It may include within its purview any kind of physical harm done to the computer of any person. These acts may take the form of the theft of a computer, some part of a computer or a peripheral attached to the computer.
- **Hacking Computer System:** Hacktivism attacks those included Famous Twitter, blogging platform by unauthorized access/control over the computer. Due to the hacking activity there will be loss of data as well as computer. Also research especially indicates that those attacks were not mainly intended for financial gain too and to diminish the reputation of particular person or company.
- **Transmitting Virus:** Viruses are programs that attach themselves to a computer or a file and then circulate themselves to other files and to other computers on a network. They usually affect the data on a computer, either by altering or deleting it. Worm attacks plays major role in affecting the computerize system of the individuals.
- **Cyber Trespass:** It means to access someone's computer without the right authorization of the owner and does not disturb, alter, misuse, or damage data or system by using wireless internet connection.
- **Internet Time Thefts:** Basically, Internet time theft comes under hacking. It is the use by an unauthorised person, of the Internet hours paid for by another person. The person who gets access to someone else's ISP user ID and password, either by hacking or by gaining access to it by illegal means, uses it to access the Internet without the other person's knowledge. You can identify time theft if your Internet time has to be recharged often, despite infrequent usage.

3. Cybercrimes against Government: There are certain offences done by group of persons intending to threaten the international governments by using internet facilities. It includes:

- **Cyber Terrorism:** Cyber terrorism is a major burning issue in the domestic as well as global concern. The common form of these terrorist attacks on the Internet is by distributed denial of service attacks, hate websites and hate e-mails, attacks on sensitive computer networks etc. Cyber terrorism activities endanger the sovereignty and integrity of the nation.
- **Cyber Warfare:** It refers to politically motivated hacking to conduct sabotage and espionage. It is a form of information warfare sometimes seen as analogous to conventional warfare although this analogy is controversial for both its accuracy and its political motivation.
- **Distribution of pirated software:** It means distributing pirated software from one computer to another intending to destroy the data and official records of the government.
- **Possession of Unauthorized Information:** It is very easy to access any information by the terrorists with the aid of internet and to possess that information for political, religious, social, ideological objectives.

4. Cybercrimes Against Society at large:

An unlawful act done with the intention of causing harm to the cyberspace will affect large number of persons. These offences include:

- **Child Pornography:** It involves the use of computer networks to create, distribute, or access materials that sexually exploit underage children. It also includes activities concerning indecent exposure and obscenity.
- **Cyber Trafficking:** It may be trafficking in drugs, human beings, arms weapons etc. which affects large number of persons. Trafficking in the cyberspace is also a gravest crime.
- **Online Gambling:** Online fraud and cheating is one of the most lucrative businesses that are growing today in the cyber space. There are many cases that have come to light are those pertaining to credit card crimes, contractual crimes, offering jobs, etc.
- **Financial Crimes:** This type of offence is common as there is rapid growth in the users of networking sites and phone networking where culprit will try to attack by sending bogus mails or messages through internet. Ex: Using credit cards by obtaining password illegally.
- **Forgery:** It means to deceive large number of persons by sending threatening mails as online business transactions are becoming the habitual need of today's life style.

Cyber Law: information technology has spread throughout the world. The computer is used in each sector wherein cyberspace provides equal opportunities to all for economic growth and human development. As the user of cyberspace grows increasingly diverse and the range of online interaction expands, there is expansion in the cyber-crimes i.e. breach of online contracts, perpetration of online torts etc. Due to these consequences there was need to adopt a strict law by the cyber space authority to regulate criminal activities relating to cyber and to provide better administration of justice to the victim of cybercrime. In the modern cyber, technology world it is very much necessary to regulate cybercrimes and most importantly cyber law should be made stricter in the case of cyber terrorism and hackers.

IT Act. - E-commerce in recent times has been growing rapidly across the world. It is a type of business model, or segment of a larger business model, that enables a firm or individual to conduct business over an electronic network, typically the internet. Electronic commerce operates in all four of the major market segments: business-to-business, business to consumer, consumer to consumer and consumer to business. In India, there are three type of e-commerce business model are in vogue

- (i) Inventory base model of e-commerce
- (ii) Marketplace base model of e-commerce
- (iii) Hybrid model of inventory based and market place model.

Indian Information Technology Act and E-commerce: Indian Information Technology (IT) Act gives legal recognition to electronics records and electronic signature. These are the foremost steps to facilitate paper less trading. Under this Act Ministry of Electronics & Information Technology also has Information Technology Rule, 2000 for Reasonable security practices and procedures and sensitive personal data or information. Under section 72A of IT Amendment Act, 2008, punishment for disclosure of information in breach of a lawful contract is laid down.

FDI guidelines for e-commerce by DIPP: DIPP has issued guidelines for FDI in e-commerce. In India 100%, FDI is permitted in B2B e-commerce; however, No FDI is permit in B2C e-commerce earlier. As per these new guidelines on FDI in e-commerce, 100% FDI under automatic route is permit in marketplace model of e-commerce, while FDI is not permit in inventory-based model of e-commerce.

E-commerce has become an important part of many multilateral negotiations such as Regional Comprehensive Economic Partnership (RCEP), WTO, and BRICS etc. Ministry of Electronics & Information Technology is spearheading such negotiations on e-commerce from Indian side.

Electronic Cash- IT is the debit card system of the German Banking Industry Committee, the association that represents the top German financial interest groups. Usually paired with a Transaction account or Current Account, cards with an **Electronic Cash** logo are only hand out by proper credit institutions

Electronic Payment Systems:- The electronic payment system has grown increasingly over the last decades due to the growing spread of internet-based banking and shopping. As the world advances more with technology development, we can see the rise of electronic payment systems and payment processing devices. As this increase, improve, and provide ever more secure online payment transactions the percentage of check and cash transactions will decrease.

Electronic payment methods- One of the most popular payment forms online are credit and debit cards. Besides them, there are also alternative payment methods, such as bank transfers, electronic wallets, smart cards or bit coin wallet (bit coin is the most popular crypto currency).

E-payment methods could classify into two areas, credit payment systems and cash payment systems.

Credit Payment System-

Credit Card — A form of the e-payment system which requires the use of the card issued by a financial institute to the cardholder for making payments online or through an electronic device, without the use of cash.

E-wallet — A form of prepaid account that stores user's financial data, like debit and credit card information to make an online transaction easier.

Smart card — a plastic card with a microprocessor that can be loaded with funds to make transactions; also known as a chip card.

Direct debit — A financial transaction in which the account holder instructs the bank to collect a specific amount of money from his account electronically to pay for goods or services.

- **E-check** — A digital version of an old paper check. It's an electronic transfer of money from a bank account, usually checking account, without the use of the paper check.
- **E-cash** is a form of an electronic payment system, where a certain amount of money is stored on a client's device and made accessible for online transactions.
- **Stored-value card** — A card with a certain amount of money that can be used to perform the transaction in the issuer store. A typical example of stored-value cards are gift cards.

RTGS - The acronym 'RTGS' stands for Real Time Gross Settlement, which can be defined as the continuous (real-time) settlement of funds transfers individually on an order-by-order basis (without netting). 'Real Time' means the processing of instructions at the time they are received rather than at some later time; 'Gross Settlement' means the settlement of funds transfer instructions occurs individually (on an instruction-by-instruction basis). Considering that the funds settlement takes place in the books of the Reserve Bank of India, the payments are final and irrevocable.

NEFT- National Electronic Funds Transfer (NEFT) is a nation-wide payment system facilitating one-to-one funds transfer. Under this Scheme, individuals can 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 is different from National Electronics Funds Transfer System (NEFT) - NEFT is an electronic fund transfer system that operates on a Deferred Net Settlement (DNS) basis, which settles transactions in batches. In DNS, the settlement takes place with all transactions received until the particular cut-off time. These transactions are netted (payable and receivables) in NEFT whereas in RTGS the transactions are settled individually. For example, currently, NEFT operates in hourly batches. [There are twelve settlements from 8 am to 7 pm on weekdays and six settlements from 8 am to 1 pm on Saturdays.] Any transaction initiated after a designated settlement time would have to wait until the next designated settlement time. Contrary to this, in the RTGS transactions are processed continuously throughout the RTGS business hours.

Internet Banking- Online banking, also known as **internet banking, e-banking** or **virtual banking**, is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking, which was the traditional way customers accessed banking services.

Digital Certificates & Signatures- A digital signature is an electronic, encrypted, stamp of authentication on digital information such as email messages, macros, or electronic documents. A signature confirms that the information originated from the signer and has not altered

Signing certificate To create a digital signature, you need a signing certificate, which proves identity. When you send a digitally signed macro or document, you also send your certificate and public key. Certificates issued by a certification authority, and like a driver's license, can revoke. A certificate is usually valid for a year, after which, the signer must renew, or get a new, signing certificate to establish identity.

Certificate authority (CA) A certificate authority is an entity similar to a notary public. It issues digital certificates, signs certificates to verify their validity and tracks, which certificates have revoked or have expired.

Digital signature assurances

The following terms and definitions show what assurances digital signatures provide.

Authenticity-The signer is confirmed as the signer

Integrity The content has not been changed or tampered with since it was digitally signed

Non-repudiation-Proves to all parties the origin of the signed content. Repudiation refers to the act of a signer denying any association with the signed content

Notarization-Signatures in Microsoft Word, Microsoft Excel, or Microsoft PowerPoint files, which are time stamped by a secure time-stamp server, under certain circumstances, have the validity of a notarization.

To make these assurances, the content creator must digitally sign the content by using a signature that satisfies the following criteria:

1. The digital signature is valid.
2. The certificate associated with the digital signature is current (not expired).
3. The signing person or organization, known as the publisher, is trusted.

Infrastructure and Security of Electronic Payment

Secure Socket Layer (SSL) - Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), are cryptographic protocols which provide secure communications on the Internet for such things as web browsing, e-mail, Internet faxing, instant messaging and other data transfers. The TLS protocol(s) allow applications to communicate across a network in a way designed to prevent eavesdropping, tampering, and message forgery. TLS provides endpoint authentication and communications privacy over the Internet using cryptography. Typically, only the server is authenticated (i.e., its identity is ensured) while the client remains unauthenticated; this means that the end user (whether an individual or an application, such as a Web browser) can be sure with whom they are communicating. The next level of security—in which both ends of the "conversation" are sure with whom they are communicating—is known as mutual authentication. Mutual authentication requires public key infrastructure (PKI) deployment to clients.

Secure Electronic Transactions (SET) - Secure Electronic Transaction (SET) is a standard protocol for securing credit card transactions over insecure networks, specifically, the Internet. SET is not itself a payment system, but rather a set of security protocols and formats that enables users to employ the existing credit card payment infrastructure on an open network in a secure fashion. SET specification lists the following business requirements for secure payment processing with credit cards over the Internet and other networks:

1. Provide confidentiality of payment and ordering information
2. Ensure the integrity of all transmitted data
3. Provide authentication that a cardholder is a legitimate user of credit card account
4. Provide authentication that a merchant can accept credit card transactions through its relationship with a financial institution
5. Ensure the use of the best security practices and system design techniques to protect all legitimate parties in an electronic commerce transaction
6. Facilitate and encourage interoperability among software and network providers

3D Secure Protocol- The 3-D Secure™ protocol was developed by Visa to improve the security of online payments. The protocol is offered with the service name Verified by Visa. MasterCard has also adapted a similar protocol called MasterCard Secure Code. Both allow authentication of cardholders by their issuers at participating merchants. The objective is to benefit all participants by providing issuers the ability to fully authenticate cardholders using a password during online purchases, cutting down the chances of credit card fraud and improving card transaction efficiency. 3-D Secure ties the financial authorization process with an online authentication. This authentication is based on a three-domain model (hence the 3-D in the name).

The three domains are:

- Acquirer domain (the merchant and the bank to which money is being paid)
- Issuer domain (the bank which issued the card being used)

- Interoperability domain (the infrastructure provided by the card scheme, credit, debit, prepaid or other type of finance card, to support the 3-D Secure protocol)

Interoperability domain includes the internet, MPI, ACS and other software providers

The protocol uses XML messages sent over SSL connections with client authentication (this ensures the authenticity of peers, the server and the client, using digital certificates). When you start a transaction using 3-D Secure, it initiates a redirection to the website of the card-issuing bank to authorize the transaction. This provides extra protection because correctly entering the security code during a purchase confirms that you are the authorized cardholder. If an incorrect security code is entering, the purchase will not complete. Even if someone knows your credit or debit card number, the purchase cannot be complete without your security code. The process works in a similar way to a PIN number for your card. A significant factor in adopting 3-D Secure is the reduction in disputed transactions and the handling and losses that come with those. Authenticated payment is expecting to eradicate a substantial proportion of fraud, charge-backs and customer complaints. Much harder to predict is the effect 3-D Secure is having on consumer confidence. Greater confidence should mean increased sales, so any steps your business takes to protect data will have a positive impact on your business. 3-D Secure is compatible with most online payment solutions although some high-risk accounts may require the addition of a 'message passing interface' (MPI). Benefits of integrating 3-D Secure:

- Minimal impact on merchant's interaction with consumer
 - Customer confidence in your site's security
 - Less risk of fraudulent transactions
- Fewer disputed transactions

