
UNIT 20 EMERGING TRENDS IN IT

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20.1 INTRODUCTION

Information and communication are the two basic needs of modern world, which cannot be compared among them for establishing any importance of one over other, may it be a personal life or business. In fact these two are most of the time complementary and sometimes supplementary to each other to maximize the benefits drawn of information and communication systems. Therefore tools and techniques are always sought to address the issues raised while attempting to utilize these two for developing leverage.

During the late 1980s and early 1990s, the rapid growth of distributed processing and the Internet changed the telephony world. The convergence of voice and data networks enables the delivery of advanced, revenue generating services, which were not feasible in the circuit-switched environment. Today's converged network combines voice services with packet networks, using signaling as the underlying technology to provide the independent control network that connects the two.

Whenever the issue of convergence is discussed in the context of information technology it is essential to refer the convergence of information and communication systems so that devices can be unified for different application services. It is evident that the convergence of technologies will continue to be an important trend and the key to growth for various sectors within the broader technology arena. The potential of new emerging technologies will play a key role in the development of new markets for new systems and with new and innovative ideas.

E-commerce is perhaps the most widely acclaimed buzzword, which gained popularity even aftermath of so-called dot com boom and diffusion. Every business aspect was being viewed with identifying business opportunities with the active support of IT tools especially Internet.

This unit is an attempt to touch upon some of these aspects.

20.2 OBJECTIVES

After reading this unit you should be able to:

- Describe the competitiveness of information and communication technology; (ICT) with respect to modern business practices and their impact on economies;
- Describe technology issues involved in convergence with respect to software and hardware requirements and trends;
- Analyze global market penetration of ICT and prepare strategies for survival; and
- Analyze emerging scenario in e-commerce.

20.3 COMPETITIVENESS OF ICT

Information and communication technologies have been regarded as the tools for increasing efficiency levels in all spheres of operation in the postindustrial age. ICTs are also setting the foundation for new industrial order. This belief is equally shared by developed nations and most of the developing nations. For evaluating the impact of ICTs one has to go through the era known for high industrial growth i.e. latter half of the current century in which they have come into widespread use. The dramatic and continuing liberalization of world trade is indeed a central feature in global economy and the spread of ICT and goods derived using ICTs has been rapid with an accompanying emphasis on the issue of “competitiveness”. The word competitiveness is widely used to reflect the growing needs of business enterprises to evaluate their relative position with regard to their domestic competitors in international market and foreign competitors in domestic markets.

An enterprise is said to be competitive if it can cut its share in international and domestic markets from its rivals. Similarly, the term competitiveness can also be used in the context of national economy to judge whether the nation is moving ahead in building market shares in business sectors that promote economic growth, employment, and other measures of social developments. The use or production of ICT is not itself, a principal determinant of social welfare measures like growth or employment, but it does play an important role in the ability of nations to participate in economic activities where growth and employment prospects are more favorable than would be available otherwise. The use of ICTs strengthens the efforts of enterprises to achieve higher levels of competitiveness to contribute towards expansion of economic activities promoting growth, employment, and other social developments.

Historically, every major change in global economic activities has witnessed a complete transformation of industrial growth patterns involving different processes, practices and materials yielding explicit gains. In industrial nations, most of these gains had been realized by the first half of the 20th century owing to rapid industrialization. During the second half of the 20th century, the industrial growth of developing nations may have been constrained by the existence of the productive capacity of already industrialized nations. By the first half of the past century, most of the possible gains from this transformation had been realized in industrialized nations while developing nations, for many reasons, have experienced difficulties in fully entering this process. The ICTs provide an opportunity for addressing manufacturing productivity advances in developing nations, which would allow a substantial expansion of industrial output. Such output expansion, if large enough, could substantially influence the creation of employment and the creation of wealth.

Because ICTs are often labor-saving, a large increase in output is necessary to raise the derived demand for labor, through productivity improvement. Otherwise the impact of ICTs may be to reduce labor inputs, an undesirable, and alarming outcome for developing nations if there are not sufficient employment alternatives. The promise of ICTs seems to be partially supported by observed technical progress made by the developing nations. Much of this progress has been the direct result of the application of materials science to the production of modern ICTs. The earliest, and still the most important of these applications, is the use of semiconductors for the production of computers, telecommunications equipment, and related electronic devices. Technological improvement in semiconductor technology, as measured by the cost and speed of performing narrowly defined functions, has advanced at rates that were unprecedented for other manufacturing technologies such as power generation using fossil fuels or improvements in machine operating speeds through improvement in mechanical technology. The rapid advances in technical characteristics, which have also led to dramatic falls in price per unit of performance, have generated optimistic expectations about the contributions of information technology to manufacturing productivity growth.

Productivity gains from the use of information technologies involve improved control, smoother integration of production processes, and better control in the acquisition of inputs and the disposition of outputs. Communication technologies play important roles, particularly in co-ordination of functions, such as conveying timely information about inventories and scheduling throughout a distribution system. The productivity gains from ICTs are greatly realized through cost-reduction, in material inputs, labor, and capital. The relative shares of these reductions may differ across industries and over time, but labor saving is a principle source of cost-reduction. In addition, ICTs usually make it possible to produce more or higher quality with the same levels of inputs, resulting in productivity advances that are independent of changes in input use.

Growth in the use of ICTs in manufacturing appear to involve greater flexibility and changeover speeds as well as shortened and accelerated flows of materials for processing, work in process, and finished good inventories. These changes suggest a transformation in methods of organizing production systems from traditional models of mass production. The trade-off between the creation of new organizational models and the augmenting of old is essential for evaluating the issue of competitiveness.

The use of ICTs, have also made it possible to expand other economic activities, conventionally referred to as the “service sector”. The contributions of ICTs in the service area are apparent with the fact that ICTs are a major component in the predominant form of physical capital that service industries employ. It can be said without reservations that ICTs are the tools for productivity improvement in the post-industrial or information society age for achieving higher productivity gains that match or exceed those that have been historically experienced in manufacturing technologies. With such productivity gains it would be possible to indefinitely sustain the growth of economic output and productivity despite the trend towards a growing share of this output being produced in service sectors. The possibility of indefinite growth in the production and consumption of services is encouraging sign for both developed and developing economies.

For developed nations, an increasing share of output in services is consistent with increasing investments in human capital or the dispersal of industrial activities domestically and internationally to reduce localized environmental problems. For developed nations, the growth of services provide domestic growth opportunities that can absorb labor displaced by productivity improvements in agriculture and industry and that are less challenged by imports from developed or other developing nations. The corresponding problem for developing countries is to find ways to upgrade the value and quality of services so that service sector employees experience increasing

wages over time. Doing this, of course, requires improvements in the productivity of the service sector. Thus, both developed and developing nations face a common challenge in finding ways to improve service sector productivity. Again, however, it is the issue of organizational change that provides a fundamental barrier to translating the rapid technological advances of ICTs into productivity gains. Developing and implementing the organizational changes would permit ICT use to have the same productivity impact in services as previous organizational changes had in manufacturing sector. For example, in financial services, where the ICTs do support economies of scale in transactions processing they also permit the creation of many new services.

There are several reasons to believe that developing nations could benefit from productivity improvements in services. First, in developing nations, governments often absorb relatively large shares of national output and most government activities are involved in the delivery of services. Hence, improvements in productivity in government services could free resources for private investment. Second, services are often close complements to manufacturing. For example, the effectiveness of the retail and distribution sector of an economy influences the growth of manufacturing by providing more efficient market outlets for manufactured output. Third, developing nations are increasingly faced with the problems of harmonizing their production systems with the use of ICTs in developed nations so that they can serve as suppliers and sub-contractors in an increasingly global division of labor. This process of harmonization requires adoption of ICTs not only at the “service” level of the firm, such as the front office and the communication links to developed nation suppliers, but also within the production process to control quality and scheduling in ways that are consistent with customer demands. Many of these harmonization problems, nonetheless, are reflected in demands for services that, without the extensive use of ICTs, serve as barriers rather than complements to improvement in international trade and that absorb resources that could otherwise be used directly for production. Fourth, and finally, productivity improvements in both services and manufacturing are worthwhile wherever they may be achieved. Having more output using the same amount of inputs is of benefit in whichever sector it is achieved. To the extent that ICT use achieves greater productivity through releasing labor, the problem is to develop other opportunities for their employment (or remove barriers to this adjustment) rather than to lock them into employment patterns where they have low productivity.

ICT-intensive retailing activities, the systems that manufacturers employ must increasingly be compatible with the emerging new industrial models based on more intense ICT use. Examples of these developments include the growing emphasis on international quality standards with high levels of information content, the specification of product design using computer aided design and manufacturing, and the co-ordination of product delivery such as “Just in time” and “sales driven” production using high levels of ICT. Developing countries thus have an “offensive” strategic interest in adopting ICTs to maintain their competitiveness in export markets. Moreover, the liberal international trade environment that has characterized the “new world order” offers developing nations access to new markets, although developed countries maintain substantial import barriers in some areas, provided that they open their own markets to import competition. Imports from nations that employ ICTs to augment the flexibility and tighten control of the production process can offer formidable competition even with large differences in wage rates. Competition for domestic markets from exports in developing nations makes it necessary for developing country enterprises to adopt similar tools for achieving flexibility and variety that their competitors in developed and other developing nations are coming to employ. Effective use of ICTs requires knowledge from a range of disciplines and the solution of difficult problems of synthesizing technological knowledge and managerial “know how”. The absence of well-established models for effectively achieving this

synthesis suggests that the creation of substantial variety of knowledge creating and using capabilities will improve the likelihood of adaptive success in realizing the potentials from ICT use. Many of the problems of implementing the new models of organization require skilled and flexible human resources that can solve a variety of problems.

20.4 TECHNOLOGY FOR CONVERGENCE: HARDWARE AND SOFTWARE ISSUES

The public switched telephone network (PSTN) was designed to accommodate a single application voice and was not built for services such as data and video. During the late 1980s and early 1990s, the rapid growth of distributed processing and the Internet changed the telephony world. Internet congestion overloaded PSTN circuits, and carriers were forced to invest in additional PSTN capacity an expensive and cumbersome task. The characteristics and bandwidth demands of data transmission were not suited for the circuit-switched PSTN. A packet-switched network accommodates the rapid growth and bandwidth requirements of data traffic more efficiently than the circuit-switched architecture. As carriers develop a packet-based infrastructure to support the increasingly data-centric traffic, the next logical step is to carry voice traffic on that same network. The convergence of voice and data networks enables the delivery of advanced, revenue generating services, which were not feasible in the circuit-switched environment. It is these services that will create the sustainable revenue stream in the next-generation network.

Network signaling is critical to the delivery of services in converged networks. Today's standard signaling technology, Signaling System 7 (SS7), allows PSTN network nodes to communicate directly with one another and to share the information needed to process any type of call autonomously. SS7 is a reliable, self-healing network architecture and protocol that manages voice circuit functions on a separate, fully redundant packet-based network. It is widely deployed in both wire line and wireless networks worldwide. In addition to managing call set up and tear down, SS7 enables services such as toll free, and toll wire line services, and local number portability (LNP). Enhanced call features - like call forwarding, calling name delivery, and three-way calling, as well as business systems, including customer care and billing, are all enabled by SS7 signaling. Likewise, next-generation services such as Internet call waiting, prepaid calling, calling party pays, Internet roaming, and wireless web browsing requires the support of SS7 signaling. Today's converged network combines voice services with packet networks, using signaling as the underlying technology to provide the independent control network that connects the two. This common signaling architecture acts as a bridge that offers service providers and carriers the best of both worlds the existing services and reliability of the circuit-switched network coupled with the speed and innovative services of the packet-switched network.

Soft Switched-based Applications

- Internet offload
- Packet tandem
- Toll bypass for long-distance and international calls
- Packet-based local calling service and features
- IP Centrex
- PBX long distance access
- IP VPN
- Wireless tandem

The convergence of voice and data networks is today's reality. It requires the signaling technology that bridges the two networks. Using the converged network, service providers and carriers are bundling new services and applications into

competitive solutions that are revolutionizing the telecommunications marketplace. Network architecture will evolve and become more sophisticated as new features are added; creating an environment that will radically alter the way people connect. Users will have the ability to control how, when, and with whom they communicate. The new generation of services will focus on personal identity, mobility, presence management, and multimedia/multiparty communication.

Communication technologies must evolve to support the delivery of personalized, multimedia services, anywhere – anytime. The new network model encompasses multiple access technologies, media types, and carriers, which will broaden the scope and sophistication of signaling requirements. The ability to mine the signaling data to support business systems such as billing and fraud control will also be a requirement. The new signaling network will preserve and build on fundamental attributes of the PSTN, such as disaster recovery, load sharing, and distributed intelligence. These will be coupled with the scalability, speed, and economy of the packet network, which is a technology-independent, open-system paradigm. Packet telephony offers efficient and flexible transport capability by taking advantage of dynamic bandwidth sharing, and allows the quick provisioning of advanced features that increase end-user productivity, expand subscriber mobility, and enhance interactive communications. Network multimedia communications over packet-based networks require standardized protocols for call control and media mapping. These protocols will provide communication between media gateway controllers and enable media gateway to media gateway media streaming. The two main standardization initiatives include H.323 from the International Telecommunications Union (ITU) and Session Initiation Protocol from the Internet Engineering Task Force (IETF).

H.323

Established in 1997, H.323 is an umbrella recommendation from the ITU that encompasses a number of specifications that provide the means for tight control of audio and video communication over a packet based network. It incorporates signaling protocols such as Transmission Control Protocol (TCP)-based Q.931 and H.245 for call control, and registration admission status (RAS) for controlling user access and usage of the network.

Session Initiation Protocol (SIP)

SIP, a newer standard designed by the IETF, is a text-based, application-layered protocol that can be used to establish, modify, and terminate sessions in an IP network. A session can be a simple two-way telephone call or a collaborative multimedia conference. SIP supports real-time, multimedia sessions that seamlessly integrate voice, data, and video over IP. It makes a host of innovative services possible, including voice-enriched e-commerce, web page click-to-dial, instant messaging with buddy lists, and IP Centrex services. SIP can be used by intelligent end points, such as SIP phones, to participate in sessions, and also by network server elements to exchange information. When operating in a stateless manner, SIP does not keep track of the details of a session. It is a simple framework that scales, is extensible, and sits comfortably in different architectures and deployment scenarios. SIP borrows heavily from Internet protocols such as HTTP. With SIP, telephony becomes another web application and integrates easily into other Internet services. Both H.323 and SIP are designed to address the functions of signaling, which allows call information to be carried across network boundaries. Both protocols are likely to coexist in the same packet telephony network, and the signaling network should be designed to support this interoperability.

The infrastructure of the new packet-based network will require core routing intelligence. Two other IETF protocols, TRIP and ENUM, have been proposed to augment SIP and H.323, providing advanced routing capabilities. Telephony Routing

Information Protocol, or TRIP, is a core protocol for dynamic routing of packet telephony traffic. TRIP is designed to support the flexible nature of the packet environment – it interworks with many different kinds of gateways in small or large networks. TRIP communicates policies for call routing, providing the intelligence to determine which paths will be used to route calls between packet networks and multiple PSTN gateways. TRIP creates routing rules and determines optimal telephony destinations, attributes, and call paths. With TRIP, the network can automatically propagate all routing information among all routing servers.

ENUM, which stands for E164 number map, allows calls from the PSTN to be routed to destinations in an IP network. This ability can be used to provide communication solutions where telephone numbers are the only call identity. ENUM is a directory service which allows the network to map an E164 standard telephone number to a set of addresses, such as e-mail, SIP URLs for IP voice, mobile telephone numbers, and web addresses. Routing can be further enhanced to account for presence information, time of day, or other attributes. Emerging protocols and new network architectures are developing to support changing technologies and subscriber demand for new services. The standardization and adoption of new signaling protocols, such as SIP and H.323, will make possible the kinds of integrated, flexible, and innovative systems and applications that deliver the promise of tomorrow's network.

The Signaling Server

Signaling is a critical component of the new network model. It enables networks to interact and exchange data to support the delivery of multimedia services. The engine of the next-generation signaling network is the signaling server, providing a common-transport, protocol-independent routing capability for signaling messages, which in this network serves to control multimedia, multiparty sessions. In an IP network, the signaling server is responsible for name/address translation, protocol interoperability, mobility management, service discovery, call routing, and security between networks. It interoperates with soft switches and access gateways to connect off-net calls to and from the voice network. Signaling is the key to enabling transport across network boundaries.

Signaling Server Functions

- SIP proxy server; SIP redirect server; SIP location server
- SIP-transaction capabilities application part (TCAP) mediation
- SIP-ISDN user part (ISUP) mediation
- H.323 Gateway/Gatekeeper
- H.323 – SIP Interworking
- Security
- Firewall / NAT transversal

Network Planning Considerations

The coexistence of multiple technologies, the deployment requirements of new network architectures, and the impact of protocol delays must all be taken into consideration when planning the future network. The PSTN will remain robust for the foreseeable future, therefore, the impact of new technologies on the PSTN must also be considered. Network evolution and growth will borrow from the PSTN, using these high standards as a baseline, incorporating redundancy for disaster recovery and fault tolerance, switchover duration, and network healing. Additionally, service providers must continue to upgrade software functionality without impacting subscriber service. The new, open architecture network must support business systems security, billing, and customer care. The integrity of these business systems is a key component in enabling tomorrow's network.

20.5 CONVERGENCE OF IT AND CONSUMER ELECTRONICS: EMERGING TRENDS

Whenever the issue of convergence is discussed in the context of information technology it is imperative to refer the convergence of information and communication systems so that devices can be unified for different application services. The third dimension of human needs, which occupies the sphere of modern digital world with equal importance, is entertainment. The landmarks in history of the developments in communication are telephone (1870s), radio (1890s) and television (1930s) with increasing value addition for entertainment over information and communication. The personal computer (1980s) evolved primarily to address the information processing needs and it was the only device in the chain of revolutionary products developed which was digital by birth. The fast development in digital technologies paved the way of merger or hybridization of these different generation devices promoting the preferences for single device to cater information processing, communication and entertainment needs. This resulted in need driven efforts for convergence of technologies with an eye to develop innovative consumer products which can provide a common platform for handling different services and applications. The mix of research & development of technologies and innovative product development and design created a new paradigm to ever-increasing urge for value-added products. This process of value addition is creating new dimensions to existing products and setting newer trends for consumer preferences and needs well supported by convergence of technologies.

It is evident that the convergence of technologies will continue to be an important trend and the key to growth for various sectors within the broader technology arena. The potential of new emerging technologies will play a key role in the development of new markets for new systems and with new and innovative consumer electronic products. The innovations are more rapidly seen in home networking, games, DVD technologies, Blue tooth devices, digital imaging, digital entertainment platforms, wireless technologies, and digital radio receivers.

One major aspect related to the above innovative technologies to develop seamless wireless connections between small, multi-functional devices in the home. It is believed that signal-processing technology is the choice for digital audio, video, cell phones and broadband and wireless communications. To achieve this access to broadband technology must be on top of priorities, in order to move forward on this front focus on spectrum issues. This includes developing policies that promotes more efficient sharing of spectrum. The expansion of broadband and high-speed wireless networks is believed to be a key factor in the future proliferation of IT products to be used by common people in daily life. It is expected that more content made available over such networks and more engaging applications for the user will lead to the development of larger commercial markets. Most of the advances in this direction will lead to developments in consumer electronics products in which convergence of different technologies and applications will come up as natural process.

The consumer electronics industry, in short, is entering a new era based on the promise of utilizing broadband and wireless technologies to promote the more widespread use of electronic devices. Advanced in microelectronics further enhances the potential for consumer electronic devices to proliferate and be utilized well beyond what is in the market today. The personal computer led to a revolution in terms of how data could be managed and manipulated. The Internet enhanced this function by providing direct access to more data. Mobile wireless and wideband provides the consumer with all of the above in more places with greater access. The trend is leading many markets that were traditionally separate on a competitive collision course.

In an interesting development, the convergence trend is leading both hardware and software companies to become both hardware and software companies. Microsoft has unveiled its new Smart Personal Objects Technology (SPOT). Chips in the devices pick up signals from a radio network built on the under-used FM spectrum. It is part of the company's strategy to produce a wide range of software for the new devices of the future beyond a PC, as well as such common consumer electronics products as watches, clocks, and even key chains. Microsoft has already developed special software for Pocket and Tablet PCs (a derivative of laptops) in order to participate in the wireless market. Clearly, this approach appears to be a copy of what Sony and other Japanese electronics firms decided to do toward the beginning of the 1990s. Sony sought to develop seamless networks of electronic devices for the home connected through wireless systems. Sony is making serious efforts to establish the Linux operating system as the global and open standard for transferring digital entertainment from device to device in the home as the use of broadband expands. It is believed that the PC may be useful in transmitting downloaded content to the TV, or even TV could bypass the PC entirely and get its content from devices like Sony's proposed Cocoon set-top box, which has already been tested in Japan. Cocoon is a Linux-based, Internet-connected set-top box with a hard-disk drive that can transfer and play movies on devices connected to a home network.

Microsoft, along with Dell, Hewlett Packard, and Gateway, are interested in expanding into the consumer electronics business. Microsoft, which also produces products such as the Xbox, now likes to be called a consumer electronics manufacturer. Companies in the increasingly commoditized PC business are seeking to expand into consumer electronics by entering into product categories that compliment to the PC via "gateways", especially home entertainment devices. The gateways can take the shape of a PC-centric system, a set-top box, or a handheld computer containing special software that allows the user to control a variety of devices throughout the home. It should be interesting to see future competition between firms such as Microsoft that are developing proprietary standards for networked electronic appliances versus firms such as Sony that support more open standards. It is evident that firms that have specialized in producing electronic devices for the rest of the world, especially those in Japan and Asia, may benefit greatly from the aforementioned trends. Such a trend may provide an advantage to hardware makers over software companies and those that excel at branding and the farming out production to other firms.

New emerging technologies feature new, innovative products with a focus on the convergence and consumer adoption of 3G, highlighting the growth potential after the success of GSM. In developed countries wireless phone owners prefer converged wireless phone/PDA devices to two stand-alone products capable of performing the same functions. More advanced phones are made for more advanced networks. Many advances in wireless technologies are seen for next-generation wireless systems such as smart phones with high-definition screens, camera functionality and those that double for PDAs. This has resulted due to better, faster networks being setup and strong demand from consumers.

20.6 E-COMMERCE: ESSENTIAL COMPONENTS AND FUTURE ISSUES

E-commerce is perhaps the most widely acclaimed buzzword, which gained popularity even aftermath of so-called dot com boom and diffusion. Every business aspect was being viewed with identifying business opportunities with the active support of IT tools especially Internet. Though various business models evolved and still the process of finding the most suitable model for different business propositions

is continuing, the impact of e-commerce practices can be felt and acknowledged without any reservations. However this impact is varied across different nations due to their characteristic differences in economies. The trends in e-commerce practices show that it will gain the requisite volume with the pace of IT revolution as seen across the world.

This section provides a brief description of modern practices and emerging trends related to technology, design and security issues involved in e-commerce.

Wireless Internet

Major technology and business companies such as Microsoft, AOL and Amazon.com are in the lead in developing and marketing wireless communications services and products required for facilitating business through wireless internet. AOL wants to make instant messaging available to all its customers and Amazon is already selling books using palm pilots. WAP (wireless application protocol) will be developed for use for wireless pages, instead of HTML.

Portals

Portals are sites that combine a portfolio of basic content, communication, and commerce sites. For the most part, they started out as search engines. There are two different types of portals in use, broad-based portals i.e. sites that serve everyone. They include Yahoo!, AOL, MSN, Excite, Snap, Lycos, AltaVista, Look Smart, About.com, Juno, Earthlink, etc. Vertical portals are the sites that focus on a particular content category, commerce opportunity, or audience segment, with a broad set of services. Examples of such portals include CBS Sports line, Garden.com, eBay, Amazon.com, Blue Mountain Arts, CNET, etc.

Smart Cards

A smart card is basically a credit card with a built-in microprocessor and memory used for identification or financial transactions. When inserted into a reader, it transfers data to and from a central computer. It is more secure than a magnetic stripe card and can be programmed to self-destruct if the wrong password is entered too many times. As a financial transaction card, it can be loaded with digital money and used like a travelers check, except that variable amounts of money can be spent until the balance is zero.

Digital Signatures - Future Trends

The future trends in digital signatures will depend on the proper and responsible use of the technology. Even though digital signatures are remarkably secure, there is a growing concern that the keys might be stolen from the owners and they could be used fraudulently e.g. when a key stored in a system is accessed by a service agent there is very good chance that the key might be used for advantage of many outsiders. And in the future though digital signatures are set to embrace the corporate world, it is of low importance to the customer, as he is very unlikely to purchase his home, car, etc., online. However this technology can very widely be used in many other small-scale transactions online. In the near future many software applications will support the concept of digital signatures. Already Adobe Acrobat supports a feature called Self-Sign, a plug-in that can be used for signing and validating. Apart from this Verisign, Entrust and many other companies have unveiled their packages that go hand in hand with applications like Adobe Acrobat and MS Word. So this technology will surely be commonly used in the future, though it might take some time before it has been accepted as a standard.

20.7 E-COMMERCE DESIGN ISSUES

As the website of the business organization offering e-commerce services are their front offices and showcases for their customers, a good design can make a web site stand out among dozens of competing sites selling similar products. A well-thought-out presentation can boost traffic and sales. The best-designed sites keep customers coming back. Simplicity seems to be the best strategy in web design for e-commerce. E-Commerce managers and web-design staff must ensure that it's easy for users to download a page, find an item, make a purchase, and navigate through page after page without losing track of the starting point. Navigation is seen as the key; the first step to building a simple yet effective e-commerce site.

Web Standards

The web standards are very much in demand to consolidate the momentum to enable the web accessible by everyone by establishing standards, like structural languages (html, xml), presentation languages (css, xsl), object models (dom), scripting languages (javascript). Recreation of brick-and-mortar feel is one of the main concern for the retailers who are moving from brick-and-mortar to online sales, and always need to consider how they are going to transfer the "feel" of their store to the internet. It is observed that users look straight at the content and ignore the navigation areas when they scan a new page. It is suggested that navigation elements should be removed from websites and replaced with content, which is what users are really looking for.

Virtual Shopping

The biggest hurdle in online shopping faced by the customers is lack of opportunity to physically verify the suitability of the product for his or her needs. In some category of products it becomes almost impossible to make a decision based on the passive display of product. Innovations in these directions are aimed to remove this hurdle and some of the sites have shown a path to resolve this problem. For example boo.com, an international fashion and sports store allows customers to "try on" clothes and see them from all angles in 3D. The boo.com also offers miss boo, a "virtual personal shopper and futuristic fashion guru", who will help you with any question you have about products or services offered. Similarly landsend.com provides a virtual model, which can be configured to the same body type, hair color/style, and skin tone as the customer. A very interactive shopping experience is enabled by iMedium, a company that developed See! Commerce technology with products See! Catalog and See! Mail. These technologies, are direct response applications that allow merchants and retailers to offer their customers an interactive shopping experience based upon scenes, photos or pictures that contain embedded, contextual advertising and merchandising links. The approaches that allow customers to see the products in real time before they purchase are starting to be used to enhance shopping experience. Gallery Furniture Inc. and FAO Schwarz are two of the companies using this technology.

Catering websites to customers' preferences increases the depth of knowledge about customers, reduces customer-acquisition costs, and builds brand loyalty. This is known as site personalization. Personalization means presenting the site visitor with specific information based on his or her identity or behavior; it is all about making the content more relevant for the user. The tools for personalization include click stream tools, which watches the pages that the visitor browses and keeps track of time spent. Thus they know where the customer has been on the site. Others tools such as collaborative filtering tools examine data based on explicit preferences, and statistics about likely purchases come from the patterns shared with similar users in the database.

Rules-based systems build user profiles and incorporate business rules driven by the site owner (i.e. rule can instruct server to show the site in French if the visitor comes from a French domain) and also barriers which include price and privacy concerns.

Live customer service companies are responding to customers' requests for customer service throughout 24hours 7 days a week. One of the ways by which they have done this is to create a virtual assistant, like Jill at cozone.com. Jill asks questions like a real person would ask, and as a result, gets email from satisfied customers. However, sometimes customers want to talk to a real person, and it is possible now with LivePerson, Inc. E businesses are realizing that customer service is the bottom line when it comes to how successful they will be.

20.8 PRIVACY IN THE CONTEXT OF E-COMMERCE

One of the most controversial topics in e-commerce today is the privacy of customers. The most common apprehensions are like, what are they doing with our information? Why do they want it? What will they do to our so-called private lives? In order for businesses to build lasting and fulfilling relationships with customers, they need to know as much about them as possible. However, as all of us are aware, this information is being used for purposes other than to serve us. The big question for e businesses is how to collect their customers' information yet still maintain their trust. This will be an issue for some time to come. E businesses will have to learn to balance personalization with privacy issues. Companies must only gather and use data that will help their customers complete the business on their website. However, the reality is that information is routinely being sold and used for purposes other than the reason the information was originally gathered. So what are the organizations' responsibilities?

Personalization on the Web takes two basic forms: collaborative filtering and profiling. Both are the attempts to collect specific information that will be valuable to generating additional traffic, click-throughs, and revenue on Web sites. Collaborative filtering is voluntary. It takes information provided by the user and predicts what information will be of interest to him or her. It can also compare a user profile with those of other users to create common-interest groups and make recommendations based on other customer preferences. In profiling, a visitor's actions are observed and gathered through the use of a cookie, a unique identifier for that customer. Subsequent user clicks identify patterns of behavior and interests, which result in the presentation of specific information to Web sites visited. There is also the ability to allow the collection of information on an individual's cookie across multiple sites.

Open Source Model for Customer Data

CPEX (customer profile exchange) is a new standard for how customer information is gathered and used. The standard is being developed by a group of large companies, including Compaq and oracle.

Customer Service Issues

Bad customer service had a negative effect on e Businesses. Technical difficulties with shopping carts, failure of customer service representatives to respond to inquiries and frustrations about returning items are among the issues that customers often complain about.

Standard for e-commerce

A need for a standard in e-commerce has been recognized and the standard for Internet commerce was developed by global information infrastructure (GII) in association with Ziff Davis. The Commerce Standard is a codification of best practices in Internet commerce developed by a community of world-leading thinkers and practitioners; it specifies the merchant practices and policies that lead to high levels of customer satisfaction, service, security and privacy. The Standard for Internet Commerce meets five primary needs. Together these five needs make it crucial that the Commerce Standard is developed and implemented at this time. The Standard for Internet Commerce is needed:

- 1) To increase consumer satisfaction and confidence in doing business on the Internet by merchants and customers as a way to establish merchant credibility and trustworthiness,
- 2) To help merchants provide a world-class customer experience, innovate rapidly and lower their costs,
- 3) To support and enhance self-regulation of Internet commerce, and
- 4) To help merchants and customers deal with a proliferation of guidelines and symbols.

20.9 SUMMARY

Multimedia, wireless networks, convergences define the new focus of ICT. Today's converged network combines voice services with packet networks, using signaling as the underlying technology to provide the independent control network that connects the two. Whenever the issue of convergence is discussed in the context of information technology it is essential to refer the convergence of information and communication systems so that devices can be unified for different application services.

Emerging protocols and new network architectures are developing to support changing technologies and subscriber demand for new services. Major technology and business companies such as Microsoft, AOL and Amazon.com are in the lead in developing and marketing wireless communications services and products required for facilitating business through wireless internet. The ICTs provide an opportunity for addressing productivity advances in nations, which would allow a substantial expansion of industrial output.

This unit has highlighted the competitiveness of information and communication technology (ICT) with respect to modern business practices. It described the technology issues involved in convergence with respect to software and hardware requirements and trends. It highlighted the emerging trends that has arisen due to convergence of IT and consumer electronics. The unit also described modern practices and emerging trends related to technology, design and security issues involved in e-commerce.

20.10 UNIT END EXERCISES

- 1) It is said, “Information and communication are most of the time complementary and sometimes supplementary to each other”. Elaborate!
- 2) What do you understand by competitiveness of ICT? Highlight the impact of ICT for the developing nations with respect to the economic activities.
- 3) What are the hardware and software issues for the technology for convergence? Also explain what do you understand by soft switched-based applications?
- 4) What are the standardized protocols for call control and media mapping in network multimedia communications over packet-based networks? Describe them!
- 5) Write a detailed note on emerging trends in convergence of it and consumer electronics.
- 6) Briefly describe the modern practices and emerging trends related to technology, design and security issues involved in e-commerce.

20.11 REFERENCES AND SUGGESTED FURTHER READINGS

David B. Yoffie, *Competing in the Age of Digital Convergence*, Harvard Business School Press; (1997)

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Steven Shepard, *Telecom Convergence: How to Profit from the Convergence of Technologies, Services, and Companies*, McGraw-Hill Professional Publishing; 2nd Edition (2002).