UNIT 1

INFORMATION SYSTEMS

UNIT OUTCOME

Students will be able to:

- understand the concept of e-learning, e-commerce, e-government, e-banking and e-libraries.

Social and Economic Implications of ICT

Electronic technologies are playing an important role in shaping the mindset of Ethiopian citizens, and they will want that mindset reflected in social governance.

These days large business enterprises use electronic commerce to conduct their business-to-business transactions. Electronic Data Interchange (EDI) on private networks began in the 1960s and banks have been using dedicated networks for Electronic Funds Transfer (EFT) almost as long. Recently however, with the increased awareness and popularity of the Internet, electronic commerce has become very popular among individual consumers as well as businesses of all sizes.

The Internet has changed the way of conducting the business in many companies. As its influence grows and more companies use the Internet, the possibilities for conducting business-to-business commerce on the Internet will expand greatly and become more of a routine part of commerce than it is today. We have not yet reached in that position where everyone thinks of conducting business-to-business commerce on the Internet everyday, but we will.

1.1 BASICS OF E-LEARNING

Learning is the process of acquiring knowledge or skills by instruction or study. Traditionally, learning has been imparted using a static content, which does not change for the duration of a grade or a training session. However, with an increase in the use of the Internet, the focus is now shifting to Web-based Training (WBT). In WBT, content is placed on a Website and learners can gain access to it.

The world's Information and Communications Technology (ICT) education and training market is growing rapidly all over the world. The growth rates are higher in the Asian region. The ICT training markets in China, India, and Korea are expected to grow at over 25 percent each. The West African region is also coming up in this field. Adama University in Ethiopia has already instigated the first self-developed, campus-wide e-learning environment in the university.

Skilled jobs will constitute 85 percent of all jobs in the new economy. Individuals, therefore, need to continuously upgrade their skills. The average age of an e-learner is 40. So, the lifelong learning is the emerging trend in the knowledge economy. Consequently, there is a huge demand for customized learning solutions, anytime and anywhere. E-learning is emerging as the most significant response to the demands of individual learning.

• Definition of Electronic Learning

Electronic Learning or E-learning is a flexible term used to describe a means of learning through technology such as a network, browser, CD-ROM or DVD multimedia platforms.

Some other terms frequently interchanged with e-learning include:

(*i*) Online learning
(*ii*) Online education
(*iii*) Distance education
(*iv*) Distance learning
(*v*) Technology-based training
(*vi*) Web-based training
(*vii*) Computer-based training (generally thought of as learning from a CD-ROM)

Distance education provides the base for e-learning's development. E-learning can be "on demand". It overcomes timing, attendance and travel difficulties.

The e-learning is an umbrella term that describes learning done at a computer, usually connected to a network, giving the opportunity to learn almost anytime, anywhere. E-learning is efficient as it eliminates distances and subsequent travelling. Distance is eliminated because the e-learning content is designed with media that can be accessed from properly equipped computer terminals, and other means of Internet accessible technology. Brandon Hall, a noted e-learning researcher, defines e-learning as *instructional delivered electronically usually by a web browser, through the Internet or an Intranet, or through CD-ROM or DVD multimedia platforms*. (*Source:* www.namahn.com)

Today's e-learning tools go beyond computers to include MP3 players, podcasts, blogs and more.

As there is limited social interaction in an e-learning set up, students must keep themselves motivated; they must communicate with each other and the instructor frequently to accomplish their assigned tasks. Figure 1.1 shows an academic e-learning model.

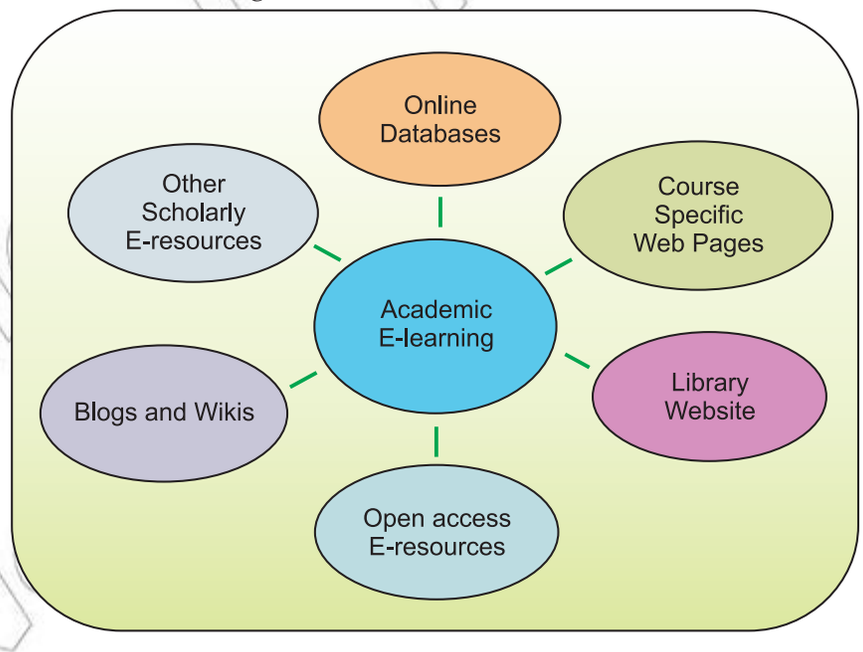

Fig. 1.1: An academic e-learning model

Levels of E-learning

E-learning falls into the following four categories, from the very basic to the very advanced.

1. **Knowledge Databases.** You have probably seen knowledge databases on software sites offering indexed explanations and guidance for software questions, along with step-by-step instructions for performing specific tasks. These are usually moderately interactive, meaning that you can either type in a key word or phrase or search the database, or make a selection from an alphabetical list.
2. **Online Support.** This is also a form of e-learning and functions in a similar manner to knowledge databases. Online support comes in the form of forums, chat rooms, online bulletin boards, e-mail, or live instant-messaging support. Slightly more interactive than knowledge databases, online support offers the opportunity for more specific questions and answers, as well as more immediate answers.
3. **Asynchronous Training.** This is e-learning in the more traditional sense of the word. It involves self-paced learning, either CD-ROM-based, network-based, Intranet-based or Internet-based. It may include access to instructors through online bulletin boards, online discussion groups and e-mail. Or, it may be totally self-contained with links to reference materials in place of a live instructor.
4. **Synchronous Training.** This is done in real-time with a live instructor facilitating the training. Everyone logs in at a set time and can communicate directly with the instructor and with each other. This type of training usually takes place via Internet Websites, audio- or video-conferencing, Internet telephony, or even two-way live broadcasts to students in a classroom.

• Advantages and Disadvantages of E-learning

Advantages

The e-learning setup, if implemented in quality way, offers many benefits to the users. The main advantages of e-learning are given below:

1. **First-in Market:** The e-learning model enables the placement of content on the Web as soon as it is ready without having to wait for printing, packaging and shipping through distribution channels. This results in cutting down the lead-time between the development of a course and its availability to learners. The early availability of content gives the learner a headstart over others.
2. **Learner Control:** You can learn at any time and at any place. All you need for e-learning is a Web connection. You can limit the duration of an e-learning session to study only the volume of content that you can fully absorb.
3. **Enhanced Retention:** Since you follow a learning style that suits you, e-learning enhances your retention. Also, the e-learning material is delivered in small logical modules known as skillets. This results in better retention and recall for a learner.
4. **Timely and Easy Access:** E-learning is available 24 hours a day, 7 days a week. Therefore, e-learning enables you to learn at the time that is convenient to you. The timely retrieval of the learning material enables you to practice what you have learned. You can gain access to the e-learning material from any location that has a computer and an Internet access.
5. **Interactive Mode:** As an e-learner, you have access to a Web tutor at all times. Experts are also available for you to resolve content-related queries.

   E-learning also allows you to chat with co-learners on different topics related to their subject and participate in discussion forums. *Chat is the typed discussion among participants who are online at the same time; it is just like telephone conversation, except that messages are typed rather than spoken.*

6. **Assessment and Feedback:** E-learning provides you with assessment exercises that test you on the course that you are learning. On-line tests are typically optional self-initiated tests. You get a dynamic set of questions to answer. Unlike tests in CBT (Computer-based Training), these tests give you a feedback comparing your performance with that of other learners who have attempted the test.
7. **Up-to-date Content:** The e-learning technology allows the dynamic updation of information on courses. Therefore, unlike CBT or books, the content in an e-learning course is updated regularly. This enables you to gain access to the latest information on the course.
8. **State-of-the-art Environment:** The future of all activities in educational and commercial spheres is on the Internet. Therefore, most of the new development in educational technologies is Web-based. Most transactions are changing from physical to virtual, and the Internet is at the core of everything. Therefore, with e-learning, you work in a state-of-the-art environment that is going to be the environment of the future.

Disadvantages

Although e-learning is very useful for the users, but it suffers from some limits that lead to its disadvantages. The disadvantages of e-learning are given below:

1. **Up-front Investment:** Up-front investment required for an e-learning solution is larger due to development costs. Budgets and cash flows will have to be negotiated.
2. **Technology Issues:** Technology issues that play a factor include whether the existing technology infrastructure can accomplish the training goals, whether the additional technology expenditures can be justified, and whether compatibility of all software and hardware can be achieved.
3. **Inappropriate Content:** Inappropriate content for e-learning may exist according to some experts, though is limited in number. Even the acquisition of skills that involve complex physical/motor or emotional components (for example, juggling or mediation) can be augmented with e-learning.
4. **Cultural Acceptance:** Cultural acceptance is an issue in organizations where student demographics and psychographics may predispose them against using computers at all, let alone for e-learning, unavailability of required technologies.
5. **Portability:** Portability of training has become a strength of e-learning with the proliferation of network linking points, notebook computers, PDAs, and mobile phones, but still does not rival that of printed workbooks or reference material.
6. **Reduced Social and Cultural Interaction:** Reduced social and cultural interaction can be a drawback. The impersonality, suppression of communication mechanisms such as body language, and elimination of peer-to-peer learning that are part of this potential disadvantage are lessening with advances in communications technologies.

• Technology Necessary for E-learning

The different types of e-learning are based on:

(*i*) Means of communication
(*ii*) Schedule
(*iii*) E-learning class structure
(*iv*) Technologies used

Technology is the most variable element in e-learning. The more advanced the technology becomes, the more options there are to further e-learning. It has increasingly limitless potential.

Information Technology

Today information technology involves more than just computer literacy; it also takes into account how computers work and how these computers can further be used not just for information processing but also for communications and problem solving tasks as well (see Fig. 1.2).

Fig. 1.2: PCs—An integral part of Information Technology

Our world today has changed a great deal using information technology. Things that were once done manually or by hand have now become computerized, which simply require a single click of a mouse to get a task completed. With the aid of IT we are not only able to streamline our business processes but we are also able to get constant information in 'real time' that is up to the minute and up-to-date.

The significance of IT can be seen from the fact that it has penetrated almost every aspect of our daily lives from business to leisure and even society. Today PCs, cell phones, fax machines, pagers, e-mail and Internet have all not only become an integral part of our culture but also play an essential role in our day-to-day activities.

Telecommunication Technology

Telecommunication is the transmission of messages over significant distances for the purpose of communication.

Telecommunications as a word has its origins in Greek. It is a combination of *tele* which means 'Far Off' and *communications* which is an 'exchange of information'. In its simplest terms "a far off exchange of information".

Other early forms of telecommunications were signal flags and lights. More modern uses were the telegraph, telephone and even data transmissions. Even radio and TV are forms of telecommunications; television even has the same root word *tele*.

The basic elements of a telecommunications system are:

1. A transmitter, this device will take the information to be communicated and produce.
2. A signal to be transported.
3. A transmission medium, this could be over a wire or over the air using the airwaves. The transmission medium, by its physical nature, is likely to modify or degrade the signal on its path from the transmitter to the receiver.
4. A receiver, this device will reverse any actions performed by the transmitter in the exact reverse order of the transmitter. The receiver can be designed to tolerate a significant degree of signal degradation.

Telecommunication can be point-to-point, from one transmitter to one receiver or point-to-multipoint which is also known as broadcasting. Figure 1.3 shows telecommunication technology helping Ethiopian people.

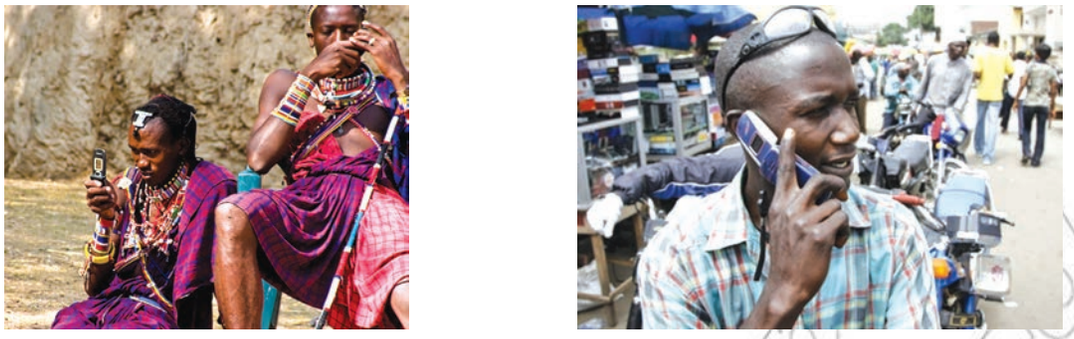

Fig. 1.3: Telecommunication Technology helping Ethiopian people

The Ethiopian Telecommunications Corporation (ETC) is the sole operator of all telecommunications related services including the provision of Internet and public phone in Ethiopia.

Internet Connection

Though our society is not quite living in space, we have made life easier with technology. Economic survival has become more dependent upon information and communications bringing forth new technology of which was never thought possible. Just a mere thirty years ago a computer occupied a whole room compared to today's palm-sized computers, which are faster and perform more functions. Cellular phones, now light and compact, were bulky just ten years ago.

The most incredible invention, the Internet, is bringing infinite amount of information to us (see Fig. 1.4). In the world of the Internet, there exists a world blind to skin colour and other physical appearances. The Internet while still young in age has grown rapidly, spreading to countries worldwide and connecting the millions of users. With its popularity, the Ethiopian people should also recognize how the Internet works and be aware of its advantages as well as disadvantages.

Fig. 1.4: Internet connection brings an infinite amount of information to us

While seemingly high tech, the Internet concept is rather simple. Computers speak to one another and send information. This is done by sending and receiving electronic impulse, and then decoding them into a message. In order to communicate with one another they are linked up in a network. They are then able to access information from thousands of other computers. The network acts like one large computer storing information in various places, rather than in one physical structure. Users tap into the Internet to access or provide information. Internet technology allows one to surf the World Wide Web or send e-mail.

• How E-learning Works?

E-Learning can be done using an Internet connection, a network, an intranet, or a storage disk. It uses a variety of media like audio, text, virtual environments, video, and animation. E-Learning, in some ways, is even better than classroom learning methods as it is a one-on-one learning method and self-paced.

Analogy

E-learning is to classroom learning as cell phones are to pay phones at the bus station.

Well, at least it is in some ways. For instance, e-learning allows you to learn anywhere and usually at any time, as long as you have a properly configured computer. Cell phones allow you to communicate anytime and usually anywhere, as long as you have a properly configured phone.

The e-learning programs feature real-world applications and use a multi-pronged approach involving interactive online Internet web casts, simulation software and self-study assignments with a mentor on call. The courses consist of a set number of modules delivered over a given time frame. Presentations and group discussions are conducted using a live, interactive software system. For each e-learning module the users generally have an initial reading assignment (which is delivered to him/her in electronic format in advance of the online presentations). Figure 1.5 shows a model of e-learning.

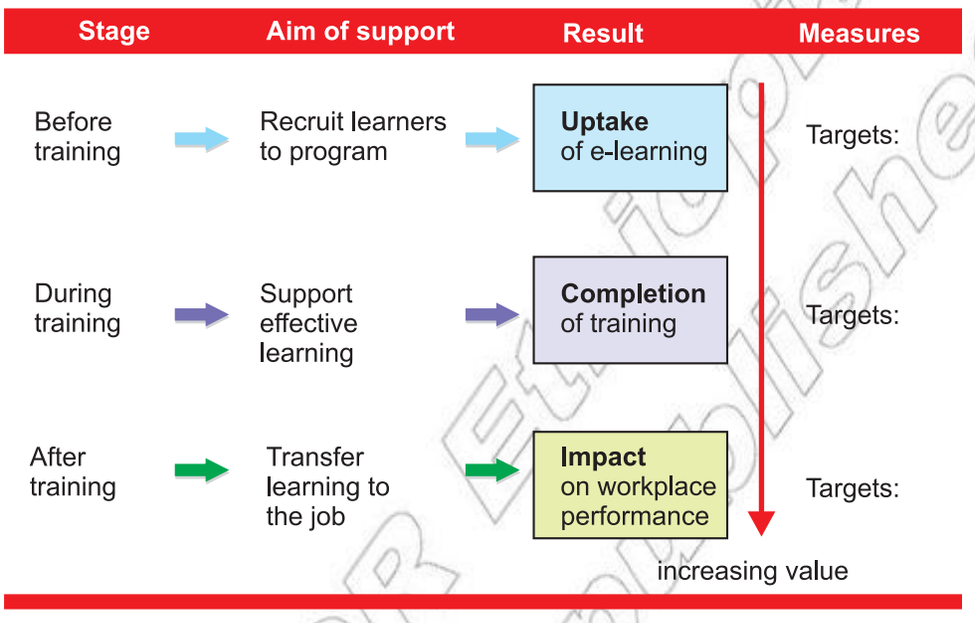

Fig. 1.5: Model of support for learners using e-learning in workplaces

There are coursework or problems to be submitted and in some cases there are practical exercises, using simulation software and remote labs that the user can easily do from his/her home or office. Users also have ongoing support from the instructors as well as course coordinators via phone, fax and e-mail.

Activity 1.1

To Discuss and Describe a Learning Management System

In groups, students will discuss and describe the Moodle Learning Management system.

Learning Management System

A Learning Management System (or LMS) is a software package that enables the management and delivery of learning content and resources to students. Most LMS systems are Web-based – to facilitate "anytime, anywhere" access to learning content and administration.

What is Moodle?

Moodle is an Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). It has become very popular among educators around the world as a tool for creating online dynamic websites for their students. To work, it needs to be installed on a web server somewhere, either on one of your own computers or one at a web hosting company. Figure 1.6 shows Moodle website.

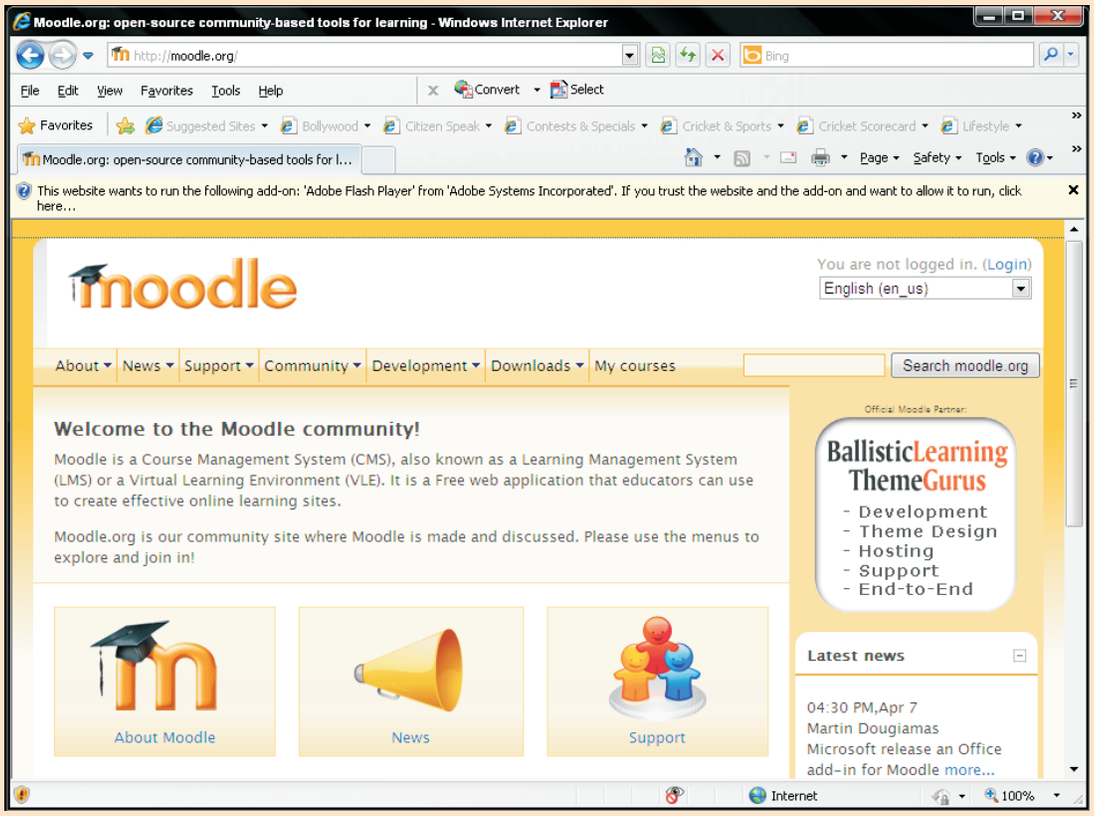

Fig. 1.6: Moodle.org website (URL: www.moodle.org)

Some Ways to Use Moodle

The focus of the *Moodle* project is always on giving educators the best tools to manage and promote learning, but there are many ways to use *Moodle*:

- Moodle has features that allow it to scale to very large deployments and hundreds of thousands of students, yet it can also be used for a primary school or an education hobbyist.
- Many institutions use it as their platform to conduct fully online courses, while some use it simply to augment face-to-face courses (known as blended learning).
- Many of Moodle users love to use the many activity modules (such as Forums, Wikis, Databases and so on) to build richly collaborative communities of learning around their subject matter (in the social constructionist tradition), while others prefer to use Moodle as a way to deliver content to students (such as standard SCORM packages) and assess learning using assignments or quizzes.

KEY CONCEPTS

- E-learning is a flexible term used to describe a means of learning through technology such as a network, browser, CD-ROM or DVD multimedia platforms.
- The main advantages of e-learning are:
  First-in market, Learner control, Enhanced retention, Timely and Easy access, Interactive Mode, Assessment and Feedback, Up-to-date content, State-of-the-art Environment.
- Technology is the most variable element in e-learning.
- Technology necessary for e-learning are:
  Information Technology, Telecommunication Technology and Internet connection.

Assessment 1.1

Fill in the Blanks

1. ..... is emerging as the most significant response to the demands of individual learning.
2. The technology necessary for e-learning are ....., ... and ..... .
3. LMS stands for ..... .
4. ..... is the transmission of messages over significant distances for the purpose of communication.

State Whether True or False

1. Moodle is a Learning Management System.
2. E-learning falls into seven categories.
3. E-learning is also known as electronic government.
4. E-learning is also termed as Web-based training.

Answer the Following

1. Define e-learning.
2. Describe the advantages and disadvantages of e-learning.
3. List the necessary technologies for e-learning.
4. Explain how e-learning works.

Suggested Activities

1. Explain the meaning of e-learning.
2. Let the teacher demonstrate the concept of e-learning with analogy to traditional face-to-face learning.

Field Trip

E-learning uses electronic links to extend school/college campuses to people who otherwise would not be able to take school/college courses. Visit any big educational organization which provides e-learning and prepare a short report on:

(*i*) basics of e-learning (*ii*) technology necessary for e-learning.

1.2 BASICS OF E-GOVERNMENT

Electronic systems now reach into all levels of government, into the workplace, and into private lives to such an extent that even people without access to these systems are affected in significant ways by them. Some examples of electronic systems are listed below:

(*i*) E-learning system
(*ii*) E-government system
(*iii*) E-banking system
(*iv*) E-libraries system
(*v*) E-commerce system

Now, let us discuss the basics of e-government:

The term "e-government" is extensive and applicable to any government entity, not only nationally but globally. E-government is the use of ICT to support government operations, engage citizens, and provide government services.

• Definition of E-government

E-government, also known as electronic government, refers to government's use of information technology to exchanging information and services with citizens, businesses, and other arms of government.

or

E-government" refers to the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing that have the ability to transform relations with citizens, businesses, and other arms of government.

These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits can be—less corruption, increased transparency, greater convenience, revenue growth, and cost reductions. Figure 1.7 shows trying e-government in Addis Ababa, Ethiopia.

Fig. 1.7: Trying e-government in Addis Ababa, Ethiopia

Traditionally, the interaction between a citizen or business and a government agency takes place in a government office. With emerging information and communication technologies it is possible to locate service centres closer to the clients. Such centers may consist of an unattended kiosk in the government agency, a service kiosk located close to the client, or the use of a personal computer in the home or office.

Features of e-governance

E-governance provides the following three major functions:

1. **e-administration:** improving government processes by cutting costs, managing performance, making strategic connections within government, and creating empowerment.
2. **e-citizens and e-services:** connecting citizens to government by talking to citizens and supporting accountability, listening to citizens and supporting democracy, and improving public services.
3. **e-society:** building interactions beyond the boundaries of government by working better with business, developing communities, building government partnerships, and building civil society.

Figure 1.8 shows e-governance model.

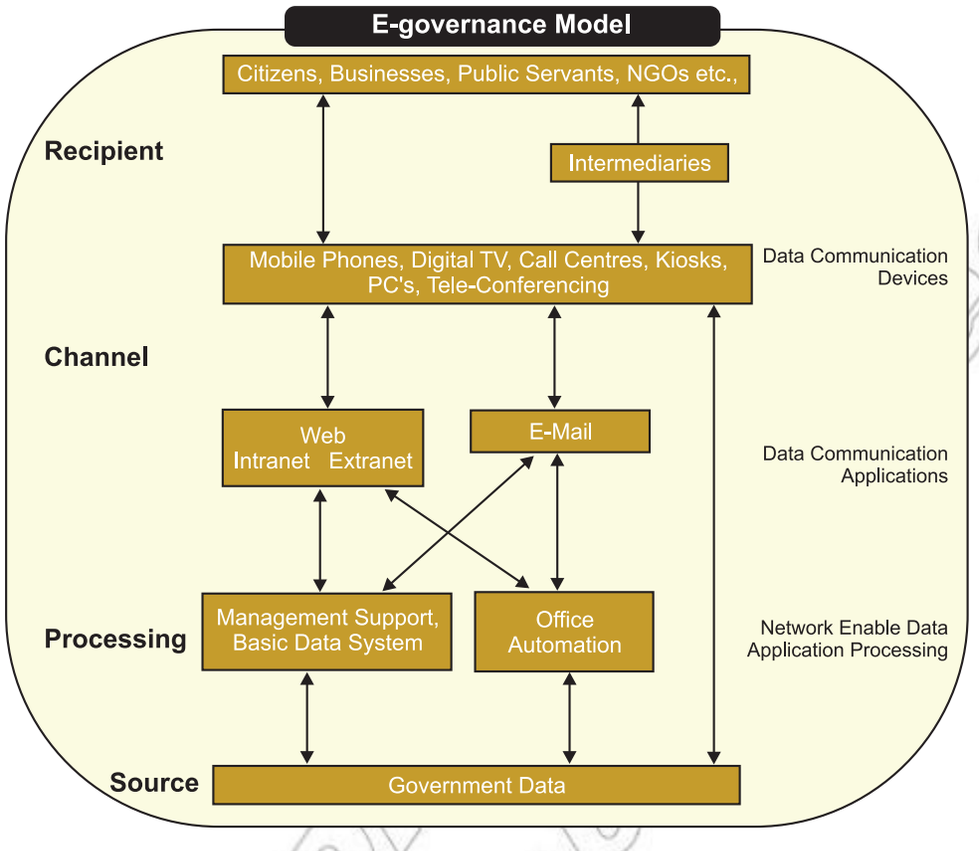

Fig. 1.8: E-governance model

• Advantages of E-government

Some advantages of implementing an electronic government are given below:

The main advantage of an electronic government is to improve the efficiency of the current government system. That would in return save money and time. The introduction would also facilitate better communications between governments and businesses. An example would be, e-procurement which facilitates Government-to-Government (G2G) and Business-to-Business (B2B) communication; this will permit smaller business to compete for government contracts as well as larger business. This will have the advantage of creating an open market and stronger economy. Business and citizens can obtain information at a faster speed and it is possible at anytime of the day.

In addition, moving away from a heavily paper based system to an electronic system would reduce the need for manpower. Thus, this would allow the process to be handled by lesser employees and therefore to reduce operations cost.

The society is moving toward the mobile connections. The ability of an e-government service to be accessible to citizens irrespective of location throughout the country brings the next and potentially biggest benefit of an e-government service. Figure 1.9 shows National Bank of Ethiopia, which is active in implementing e-governance.

Fig. 1.9: National Bank of Ethiopia is active in implementing e-governance

WoredaNet Initiative

This is a major e-government initiative that connects all 600 of Ethiopia's local councils (*woreda*s) to 11 regional capitals through Internet telephone and video-conferencing. Half the links are by cable, and half by satellite. The initiative also provides connectivity to the SchoolNet, eHealth, and the soon-to-be launched AgriNet. WoredaNet is implemented by the Ethiopia Telecommunication Agency with funding from the World Bank and the African Development Bank through the Ministry of Capacity Building.

• Application of E-government

E-government applications empower citizens and businesses to transact government business online that might otherwise require "a trip downtown". Agencies benefit, too, from reduced paperwork, improved databases, and increased efficiency.

E-government is an important innovation for enhancing good governance and strengthening a country. It can facilitate access to information, freedom of expression, greater equity, efficiency, productivity growth and social inclusion.

Introduction of ICT-based services creates an opportunity to identify flawed processes and re-engineer them, consequently improve not only the efficiency but also the quality of service to citizens. Figure 1.10 shows Internet cafe in Ethiopia.

Fig. 1.10: An Internet cafe in Ethiopia

Successful e-government initiatives offer tangible opportunities which include:

(*i*) transformation of cumbersome public administration and service delivery processes thereby increase efficiency of governments.

(*ii*) empowerment and participation of citizens, thereby contribute to strengthening democratic processes.

(*iii*) greater transparency and accountability, thereby lead to better governance and reduce opportunities for corruption.

(*iv*) stimulation of the usage of ICT applications in other development sectors (e-health, e-education), thereby opens opportunities to transform agriculture-based economies.

• Services delivered by E-government

Analogous to e-commerce, which allows businesses to transact with each other more efficiently Business-to-Business (B2B) and brings customers closer to businesses *i.e.*, Business-to-Consumer (B2C), e-government aims to make the interaction between government and citizens (G2C), government and business enterprises (G2B), and inter-agency relationships (G2G) more friendly, convenient, transparent, and inexpensive. Figure 1.11 shows four types of e-government services.

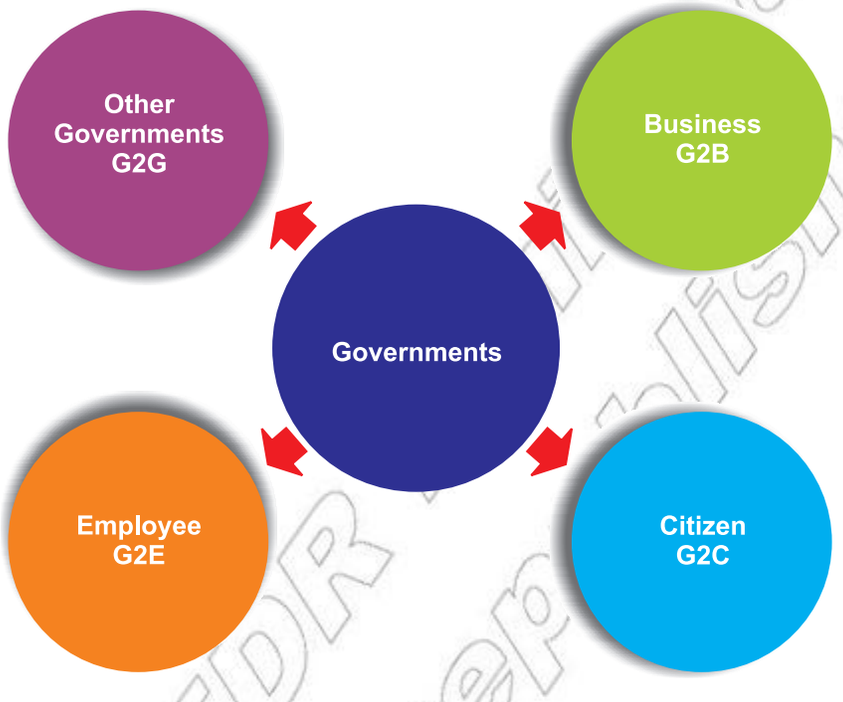

Fig. 1.11: Four types of e-government services

The four types of e-government services are discussed below:

(*i*) **Government-to-Citizen (G2C):** This includes information dissemination to the public, basic citizen services such as license renewals, ordering of birth/death/marriage certificates and filing of income taxes, as well as citizen assistance for such basic services as education, health care, hospital information, libraries, and the like.

(*ii*) **Government-to-Business (G2B):** These transactions include various services exchanged between government and the business community, including dissemination of policies, memos, rules and regulations.

(*iii*) **Government-to-Employee (G2E):** These services encompass G2C services as well as specialized services that cover only government employees, such as the provision of human resource training and development that improve the bureaucracy's day-to-day functions and dealings with citizens.

(*iv*) **Government-to-Government (G2G):** These services take place at two levels—at the local or domestic level and at the international level. G2G services are transactions between the central/national and local governments, and between department-level and attached agencies and bureaus. At the same time, G2G services are transactions between governments, and can be used as an instrument of international relations and diplomacy.

• Status of E-government in Ethiopia

A national wide-area network infrastructure is being established in Ethiopia to connect the Federal Government with Regional Governments and District level administration. The nationwide networks are being built that will link government departments, educational and healthcare institutions, and agricultural research centres.

The Ethiopian Telecommunications Corporation (ETC) has deployed an optical network infrastructure that will help transport high-quality voice, data and multimedia services to government departments, companies and the general population. This system provides videoconferencing, Internet connectivity, messaging and information exchange services, which are believed to improve communications between the various tiers of Government to facilitate and enable effective and efficient provision of services to the public.

The Ethiopian economy is based at present mainly on agriculture. Nevertheless, the Government of the country strongly believes that an innovative and technology enhanced national strategy is needed in order to improve public services and to create new long-term opportunities—both for individuals and business enterprises all over the country. A knowledge-based economy is a target providing rich development perspectives in education, health care and agriculture sectors.

The Ethiopian Government, through its Ministry of Capacity Building (MoCB), enlisted ETC to build a core multi-service network. The ICT-led projects are going on to generate large benefits for local communities.

A fibre-optic transmission network conceived by Cisco has been built around Addis Ababa, and it will transport both mobile and fixed-line analogue voice traffic. A combination of high-speed fixed and microwave links are extending existing network to other parts of the country—sometimes covering distances as far as 700 kilometres to the most remote areas of the country.

The status of e-government in Ethiopia will certainly improve in the coming years with implementation of ICTs.

KEY CONCEPTS

- E-government is also known as electronic government.
- The main advantage of e-government is to improve the efficiency of the current government system.
- E-government applications empower citizens and businesses to transact government businesses online.
- The four types of e-government services are G2C, G2B, G2E and G2G.
- The status of e-government in Ethiopia will certainly improve in the coming years with implementation of ICT.

ASSESSMENT 1.2

Fill in the Blanks

1. The implementation of ..... would improve internal efficiency, the delivery of public services and better accessibility of public services.
2. ..... improves government processes by cutting costs, managing performance etc.
3. The four types of e-government services are ....., ..., ... and ..... .

State Whether True or False

1. E-government is also known as electronic government.
2. E-governance provides an e-society.
3. The implementation of e-government would not facilitate better communications between governments and businesses.
4. E-government requires "a trip downtown".
5. The status of e-government in Ethiopia will certainly improve in the coming years.

Answer the Following

1. List some of the electronic systems.
2. Define e-government.
3. Explain the advantage of e-government.
4. Explain the different services by e-government.

Suggested Activities

1. Describe in some detail the main elements of at least some of the electronic systems.
2. Let the teacher explain the definition of e-government and its application, and students may write a small report on the same.

Field Trip

Organize a visit to one of the affrications, *e.g.,* a bank or arrange for a speaker to visit the class. Groups of 4/5 students will offer a presentation of the affrications to the rest of the class. All areas should be covered.

1.3 BASICS OF E-BANKING

To most people, electronic banking means 24-hours access to cash through an Automated Teller Machine (ATM) (see Fig. 1.12) or paychecks deposited directly into checking or savings accounts.

Fig. 1.12: An Automated Teller Machine (ATM)

Electronic banking, also known as Electronic Fund Transfer (EFT), uses computer and electronic technology as a substitute for checks and other paper transactions. EFTs are initiated through devices such as cards or codes that you use to gain access to your account. Many financial institutions use an Automated Teller Machine (ATM) card and a Personal Identification Number (PIN) for this purpose.

Advantages of Online Banking

1. **Convenience:** Online banking saves you the hassle of having to wait in a queue. You can access your account and make transactions whenever you like. This way, you do not have to wait until you

get some free time off work, or spend your weekend writing checks and queuing up at the bank to deposit them. It also saves time. Just sit down in front of your computer and open up a webpage with your account details on it. In a span of a few minutes, you can check your account details and carry out a transaction. There is no need to manually go through your cheque book. Moreover, you avoid the bother of requiring stamps and envelopes to mail cheques to different places.

2. **Organization:** Online banking simplifies your job of having to shuffle through stacks of paper every month, trying to tally receipts with bank statements. Instead, you can just create a spreadsheet on your computer and enter your expenses and account balances on it. Using simple addition, the computer can automatically tally up both of them and check to see if they match.
3. **Reduced paperwork:** With online banking, you are able to avoid the headache of dealing with the papers that tend to accumulate using a regular banking service. Since you can check your account whenever you wish, there is no need for regular bank statements to be sent to you. If you pay bills or make purchases online, you will not have to sign any receipts.
4. **Confidentiality:** You can carry out all your transactions in the privacy of your own home. This means no one is likely to find out your account number or password unless you yourself give it to them. You also do not have to worry about losing your receipts or about dishonest storekeepers acquiring your credit or debit card details.

Disadvantages of Online Banking

1. **Security Issues:** An online banking system could be targeted by miscreants. Hackers are constantly looking for ways to exploit loopholes in bank websites as well as online stores. 'Phishing' is a term that is used for the scam in which an unauthorized person creates a replica of a website and tricks people into entering their account numbers and passwords. To avoid being tricked, you should always check the security certificate of the website you are using, before you give any details out. Online banking is often targeted by those who indulge in identity theft.
2. **Lack of Documentation:** When business is conducted online, everything is done through the computer screen and no receipts are given. After you make an online transaction, you should always print out a copy of the online confirmation of your payment. Ensure that details like the amount you paid, product description, terms of delivery, etc. are clearly legible on it. Also, write the date of the transaction if it is not mentioned.
3. **System Failure:** On a rare occasion, it is possible for an online system to suffer a failure and crash. If it is serious, all your data records could be lost. Prepare for any possible mishaps by regularly backing up your data on CDs and printing out hard copies of any transactions you carry out. Also, have a good anti-virus program installed on your home computer and update it regularly. This will prevent any loss of data at your end.

• How E-banking Works?

E-banking or electronic banking involves a variety of transactional areas, ranging from direct deposit of paychecks, obtaining cash from an ATM, to using a debit card to purchase goods and services. Electronic banking and the resulting financial transactions involve the transmission of financial data and transfer of funds through various modes such as computers, phones, and other technological advanced devices. Figure 1.13 shows the dataflow diagram for bank account customer.

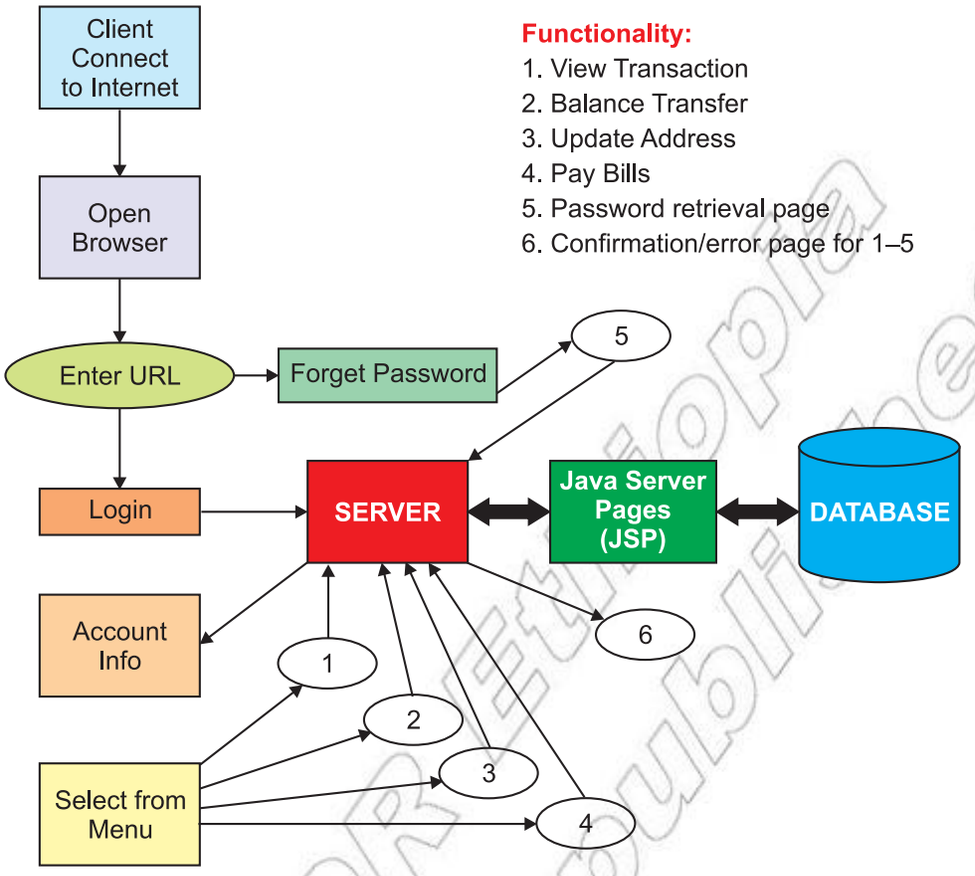

Fig. 1.13: Dataflow diagram for bank account customer

1.4 BASICS OF E-LIBRARIES

E-libraries are the physical sites and / or websites that provide 24 hours online access to digitized audio, video, and written material.

E-libraries use audio, video and text technology. Their digital "books" cover various topics of the school syllabus, ranging from social science to literature and from mathematics to ICT. Figure 1.14 shows e-libraries providing quality based service.

Fig. 1.14: E-libraries providing quality based service

Advantages of E-libraries

E-library is not confined to a particular location or a building—it is virtually distributed all over the world. The user can get his/her information on his/her own computer screen by using the Internet. Actually it is a network of multimedia system, which provides fingertip access. The spoken words or the graphical display of e-library is again having a different impact from the words that are printed. In the new environment, owing a document will not be a problem for the library because the user will pay for its uses.

1. **No physical boundary:** The user of e-library need not to go to the library physically. People from all over the world could gain access to the same information, as long as an Internet connection is available.

2. **Round the clock availability:** E-libraries can be accessed at any time, 24 hours a day and 365 days of the year.
3. **Multiple accesses:** The same resources can be used at the same time by a number of users.
4. **Structured approach:** E-library provides access to much richer content in a more structured manner, that is, we can easily move from the catalogue to a particular book, then to a particular chapter and so on.
5. **Information retrieval:** The user is able to use any search term belonging to the word or phrase of the entire collection. E-library will provide very user friendly interfaces, giving clickable access to its resources.
6. **Preservation and conservation:** An exact copy of the original can be made any number of times without any degradation in quality.
7. **Space:** Whereas traditional libraries are limited by storage space, e-libraries have the potential to store much more information, simply because digital information requires very little physical space to contain them. When a library has no space for extension, digitization is the only solution.
8. **Networking:** A particular e-library can provide the link to any other resources of other e-library very easily, thus a seamlessly integrated resource sharing can be achieved.
9. **Cost:** The cost of maintaining e-library is much lower than that of a traditional library. A traditional library must spend large sums of money paying for staff, book maintenance, rent, and additional books. E-libraries do away with these fees.

Disadvantages of E-libraries

The computer viruses, lack of standardization for digitized information, quick degrading properties of digitized material, different display standard of digital product and its associated problems, health hazard nature of the radiation from monitor etc.—all make digital libraries at times a handicap.

1. **Copyright:** Digitization violates the copyright law as the thought content of one author can be freely transferred by others without his acknowledgement. So one difficulty to overcome for e-libraries is the way to distribute information. How does e-library distribute information at will while protecting the copyright of the author.
2. **Speed of access:** As more and more computers are connected to the Internet, its speed of access is reasonably decreasing. If new technology will not evolve to solve the problem, then in near future Internet will be full of error messages.
3. **Initial cost is high:** The infrastructure cost of e-library, that is, the cost of hardware, software, leasing communication circuit is generally very high.
4. **Bandwidth:** E-library needs high bandwidth for transfer of multimedia resources, but the bandwidth is decreasing day-by-day due to its overutilization.
5. **Efficiency:** With the much larger volume of digital information, finding the right material for a specific task becomes increasingly difficult.
6. **Environment:** E-libraries cannot reproduce the environment of a traditional library. Many people also find reading printed material easier than reading material on a computer screen.
7. **Preservation:** Due to technological developments, e-library can rapidly become out-of-date and its data may become inaccessible.

• How E-libraries Works?

E-library or Digital Library or Online Library or Virtual Library refers to all the library resources that are available online through computers and databases. E-libraries are different from the open Internet, as they have restricted access.

The e-library allows a user to search, retrieve, save and reuse the library resources in real time on the World Wide Web. It is a 'virtual' library whose content is the aggregation of many independent websites, rather than a physical collection that is kept in a central repository. We call each website a 'resource'. The architectural model of a Digital Library is shown in Fig. 1.15 in terms of a data-flow diagram.

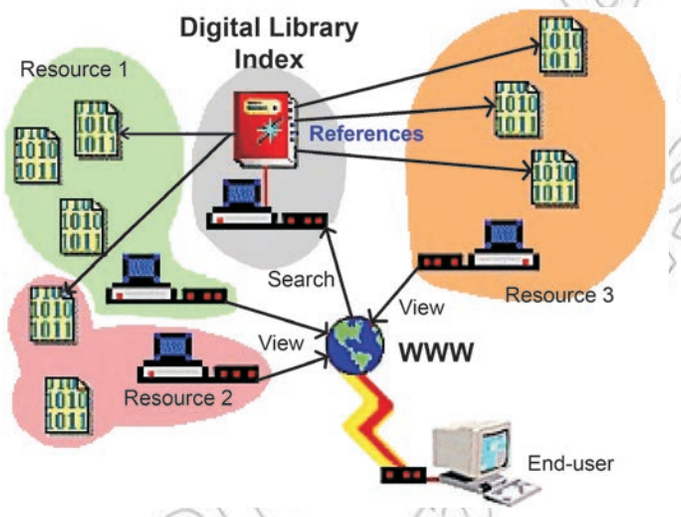

Fig. 1.15: Architectural Model for Client/Server interaction of a Digital Library

Data Flow: The Digital Library Index provides a list of resource documents, from which the end-user can make a selection; this happens in a dialog between end-user and Index server. When the end-user has selected a document of his/her interest, the *reference* to this document is passed from the Index server to the user's Web browser. The user's browser then downloads the referred-to *content* directly from a resource server for viewing.

1.5 BASICS OF E-COMMERCE

E-commerce or Electronic Commerce, a subset of *e-business*, is the purchasing, selling, and exchanging of goods and services over a computer network (such as the Internet) through which transactions or terms of sale are performed electronically. Contrary to popular belief, e-commerce is not just on the Web. In fact, e-commerce was alive and well in business to business transactions before the Web back in the 70s via EDI (Electronic Data Exchange) through VANs (Value-Added Networks). **2merkato.com** is an e-commerce website that provides business information for investors, suppliers, buyers, traders who are engaged or want to engage in business activities in Ethiopia.

E-commerce can be broken into four main categories—B2B, B2C, C2B, and C2C.

1. B2B (Business-to-Business)

Companies doing business with each other such as manufacturers selling to distributors and wholesalers selling to retailers constitute B2B type of e-commerce. Pricing is based on quantity of order and is often negotiable. Figure 1.16 shows B2B exchanges.

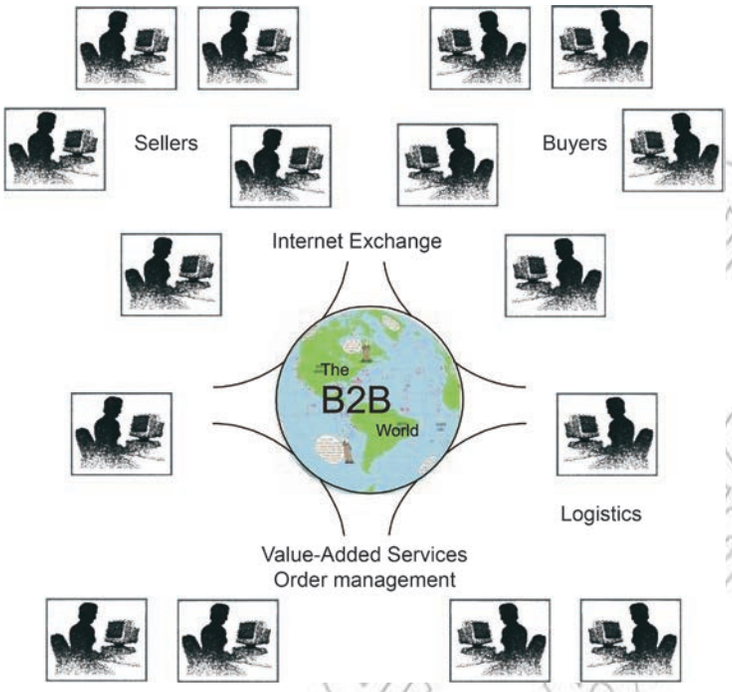

Fig. 1.16: B2B Exchanges

B2B exchanges, which draw on data from various databases, act as centralized online markets for buyers and sellers in specific fields, such as car parts or olive oil. Exchanges are expected to evolve into ''b-Webs'', or business Webs, encompassing other factors besides price.

2. B2C (Business-to-Consumer)

B2C comprises of businesses selling to the general public typically through catalogues utilizing shopping cart software. For example, having a hard time finding a book? Need to purchase a custom, high-end computer system? How about a first class, all-inclusive trip to a tropical island? With the advent of e-commerce, all three things can be purchased literally in minutes without human interaction.

3. C2B (Consumer-to-Business)

A consumer posts his/her project with a set budget online and within hours companies review the consumer's requirements and bid on the project. The consumer reviews the bids and selects the company that will complete the project. Elance empowers consumers around the world by providing the meeting ground and platform for such transactions.

4. C2C (Consumer-to-Consumer)

There are many sites offering free classifieds, auctions, and forums where individuals can buy and sell. Thanks to online payment systems like PayPal where people can send and receive money online with ease. eBay's auction service is a great example where person-to-person transactions take place everyday.

Companies using internal networks to offer their employees products and services online—not necessarily online on the Web—are engaging in B2E (Business-to-Employee) e-commerce.

G2G (Government-to-Government), G2E (Government-to-Employee), G2B (Government-to-Business), B2G (Business-to-Government), G2C (Government-to-Citizen) and C2G (Citizen-to-Government) are other forms of e-commerce that involve transactions with the government from procurement to filing taxes to

business registrations to renewing licenses. There are other categories of e-commerce out there, but they tend to be superfluous.

M-commerce (Mobile commerce) is the buying and selling of goods and services through wireless technology, that is, handheld devices such as cellular telephones and Personal Digital Assistants (PDAs).

Advantages of E-commerce

Some of the advantages of Internet and e-commerce in general are:

(*i*) Speed
(*ii*) Cost Saving
(*iii*) No Boundaries
(*iv*) Ease of Networking

Applications of E-commerce

Some of the widely used e-commerce applications are:

(*i*) Internet Bookshops
(*ii*) Grocery Supplies
(*iii*) Electronic Newspapers
(*iv*) Internet Banking
(*v*) Electronic Auctions

CASE STUDY

DYNAMIC PRICING — eBAY

What is eBay?

eBay is a website as shown in Fig. 1.17. It is a place for online auctions.

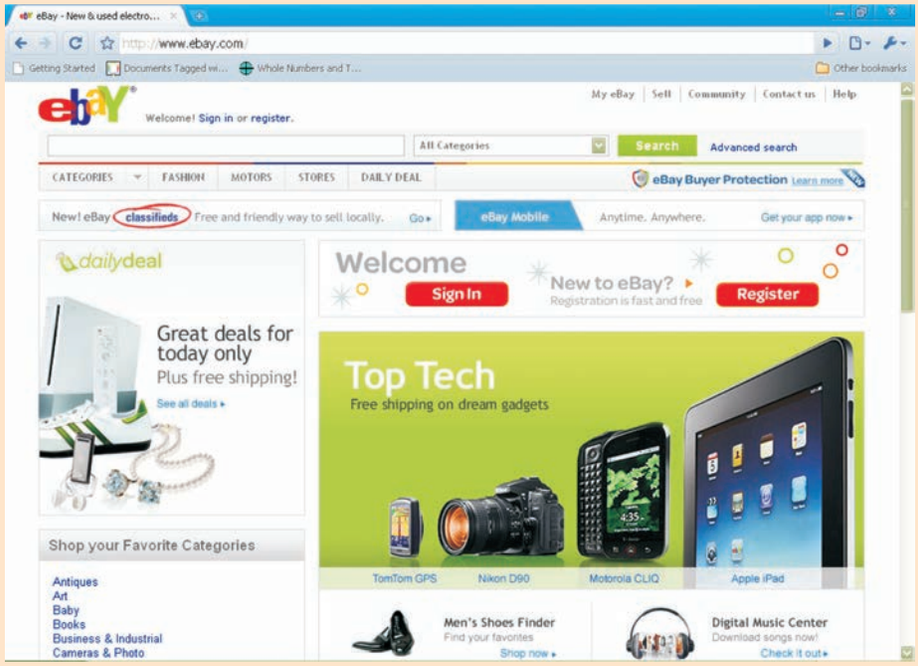

Fig. 1.17: eBay — Internet auction house (URL: www.ebay.com)

In other words, eBay is Internet auction house. Anybody can sell almost anything they want there. People can buy many things there as well.

To buy and sell items on eBay, people need to register on the site. They can transfer the money in any way they want. A lot of people use PayPal to transfer the money. PayPal is owned by the same people as eBay.

How eBay Works?

(*i*) A seller lists an item on eBay. It may be anything from antiques to cars, books to sporting goods. The seller chooses to accept only bids for the item (an auction-type listing) or to offer the **Buy It Now** option, which allows buyers to purchase the item right away at a fixed price.

(*ii*) In an online auction, the bidding opens at a price the seller specifies and remains on eBay for a certain number of days. Buyers then place bids on the item. When the listing ends, the buyer with the highest bid wins.

(*iii*) In a **Buy It Now** listing, the first buyer willing to pay the seller's price gets the item.

Trading on eBay is easy and it is fun! Best of all, you will never know what you can find!

• How E-commerce Works?

E-commerce or electronic commerce works like conventional commerce with the same process of selling and purchasing goods or services for a price. The difference is that goods and services in e-commerce are bought and sold over the Internet using a credit card. Transactions can be done globally 24 hours a day and 7 days a week, unlike conventional commerce. There are no weekly holidays or closing time as with conventional stores.

The Process

The merchant showcases the products intended to be sold on a website and specifies the price of each product. The customer logs on to the website, chooses products and adds them to a shopping cart. The customer connects to the transaction server and gives credit card details to purchase the goods. The merchant's transaction server then connects to the credit card processing server to check if the customer has the required funds to pay for the goods and services purchased.

Once the processing server approves of the transaction and reports that the customer has funds, it authorizes the transfer of funds from the customer's bank to the bank of the merchant. On receipt of the money, the merchant's server confirms the sale to the customer and the products are delivered to the customer by the merchant. Figure 1.18 illustrates the working of e-commerce:

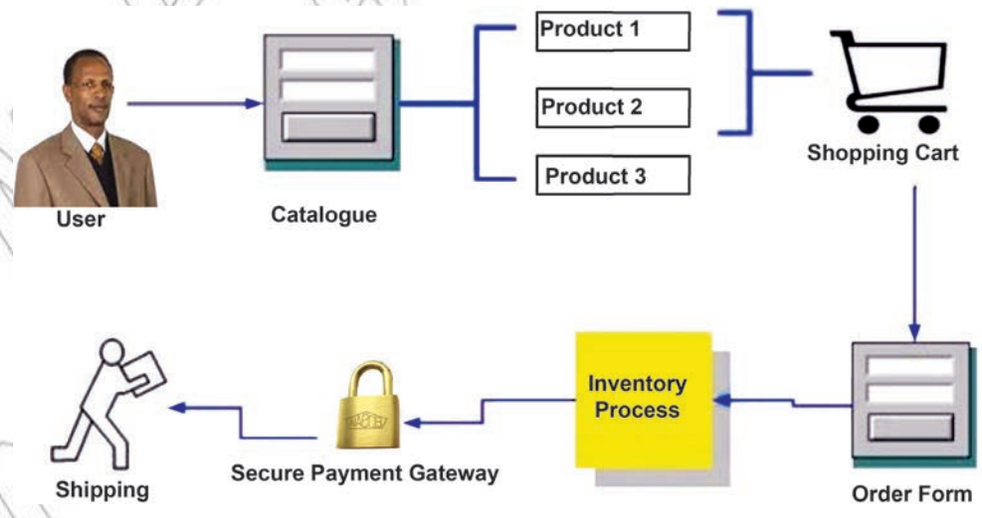

Fig. 1.18: Working of e-commerce

KEY CONCEPTS

- E-banking also known as Electronic Fund Transfer (EFT), uses computer and electronic technology as a substitute for checks and other paper transactions.
- E-libraries are the physical sites and/or websites that provide 24-hours online access to digitized audio, video, and written material.
- E-commerce is the purchasing, selling, and exchanging of goods and services over computer network through which transactions or terms of sale are performed electronically.

ASSESSMENT 1.3

Fill in the Blanks

1. ..... means 24-hours access to cash through an ATM.
2. ..... use audio, video and text technology on various topics.
3. The various categories of e-commerce are ....., ..., ... and ..... .
4. Some advantages of Internet and e-commerce are ....., ..., ... and ..... .

State Whether True or False

1. Electronic Newspapers are e-commerce application.
2. M-commerce does not require wireless technology such as PDAs these days.
3. E-commerce is not a subset of e-business.
4. E-libraries are available round the clock.
5. ATMs do not require a PIN number for transactions.

Answer the Following

1. Explain how e-banking works.
2. Explain how e-libraries works.
3. Explain how e-commerce works.

Suggested Activities

1. Additionally teacher may demonstrate some sample e-government sites from the Internet.
2. Students should explain about e-banking, e-libraries and e-commerce.
3. The students work in groups. They must choose a topic which they have studied in this unit, and design a presentation which gives full information on the topic. The presentation should be at least 15 slides long, and all students in the group must participate in making the slides and providing information.

1.6 SYSTEM ANALYSIS

A system is defined as a collection of related components that interact to perform a task in order to accomplish a goal. A system may not work very well, but it is nevertheless a system. The point of systems analysis and design is to ascertain how a system works and then take steps to make it better.

Case Study

Library System

Let us consider a system that is familiar to you: a library system (see Fig. 1.19).

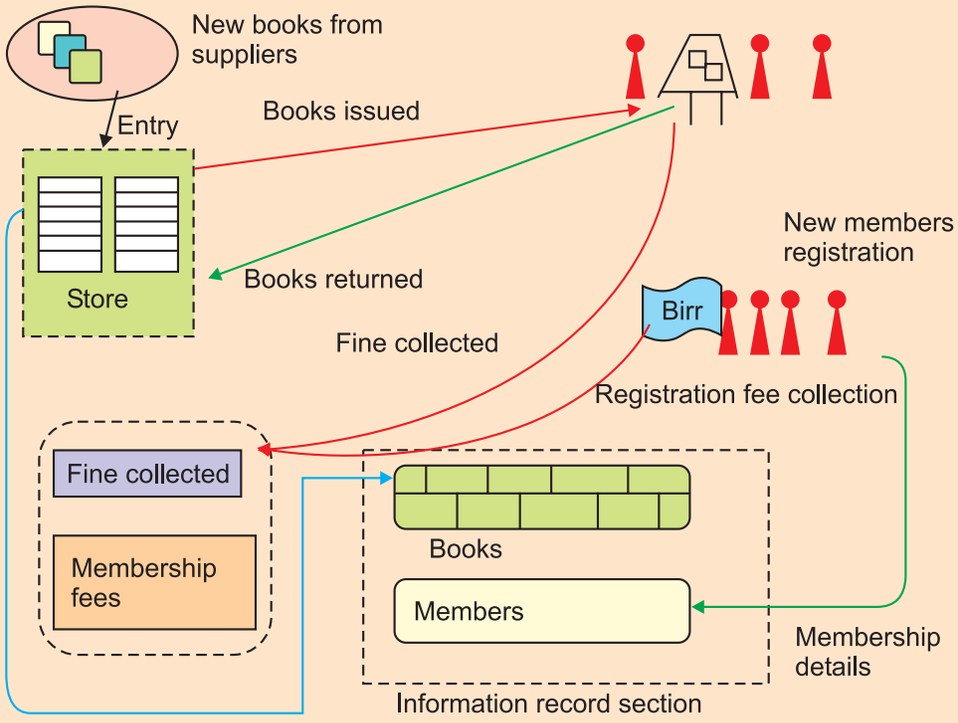

Fig. 1.19: A library as a system

How is library a system? Let us take a look at the fictional Ethiopian Public Library in Addis Ababa, Ethiopia. Every system is a set of some functional units that work together to achieve some specific objective. The main objective of library system is to provide books to its members without difficulty.

This system has many functional units. Books issue and return section, books record unit, member's record unit, accounts, and report generation units are the different functional units of the library. Each functional unit has its own task. However, each of these works independently to achieve the overall objective of the library.

Data is an important component of any system. Here, data is pertaining to the details of members, books, accounts, and suppliers. Since people can interact with the system, this system is an open system. The system is mainly concerned with the management of data, so it is an information system.

If this system were to be automated as conceived by the management, then role of the system analyst would be to study the system, its workings, and its existing problems. Also the analyst needs to provide a solution to the existing problems.

Now that the management has decided for an automated system the analyst would perform the above tasks. As the analysts did the study of the system, the following problems were identified:

(*i*) Maintaining membership cards

(*ii*) Producing reports due to large amount of data

(*iii*) Maintaining accounts

(*iv*) Keeping records for books in library and its members

(*v*) Performing searches

Now that the analyst has studied the system and identified the problems, it is the responsibility of the analysts to provide a solution system to the management of the library.

• Overview

An organization's computer-based information system consists of hardware, software, people, procedures, and data, as well as communications setups. These work together to provide people with information for running the organization.

An organization may feel the need for a system due to a variety of reasons. Some examples are:

1. A single individual who believes that something badly needs changing is all it takes to get the project rolling.
2. An employee may influence a supervisor.
3. A customer or supplier may get the attention of someone in higher management.
4. Top management may decide independently to take a look at a system that looks inefficient.
5. A steering committee may be formed to decide which of many possible projects should be worked on.

Three types of participants are there in the project as given below:

(*i*) Users (*ii*) Management (*iii*) Technical staff

Complex projects require one or several systems analysts. *A systems analyst is an information specialist who performs systems analysis, design, and implementation.* The analyst's job is to study the information and communications needs of an organization and determine what changes are required to deliver better information to people who need it. "Better" information means information that is summarized in the acronym "CART"—complete, accurate, relevant, and timely. The systems analyst achieves this goal through the problem-solving method of systems analysis and design.

Modelling tools enable a systems analyst to present graphic, or pictorial, representations of a system. An example of a modelling tool is a *Data Flow Diagram (DFD), which graphically shows the flow of data through a system*—that is, the essential processes of a system, along with inputs, outputs and files (see Fig. 1.20).

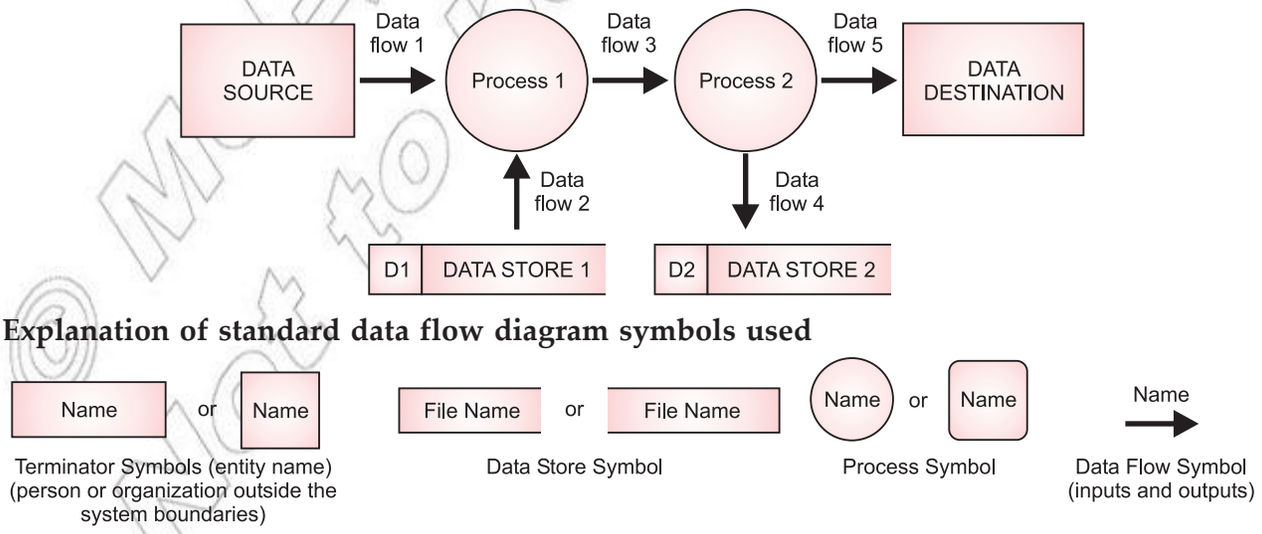

Fig. 1.20: Data flow diagram

Systems analysis and design is a six phase problem-solving procedure for examining an information system and improving it. The six phases make up what is known as the systems development life cycle. The *Systems Development Life Cycle* (*SDLC*) is a step-by-step process that many organizations follow during systems analysis and design.

Whether applied to a very big company or a three-person engineering business, the six phases in systems analysis and design are as shown in Fig. 1.21. Phases often overlap, and a new one may start before the old one is finished. After the first four phases, management must decide whether to proceed to the next phase. User input and review is a critical part of each phase.

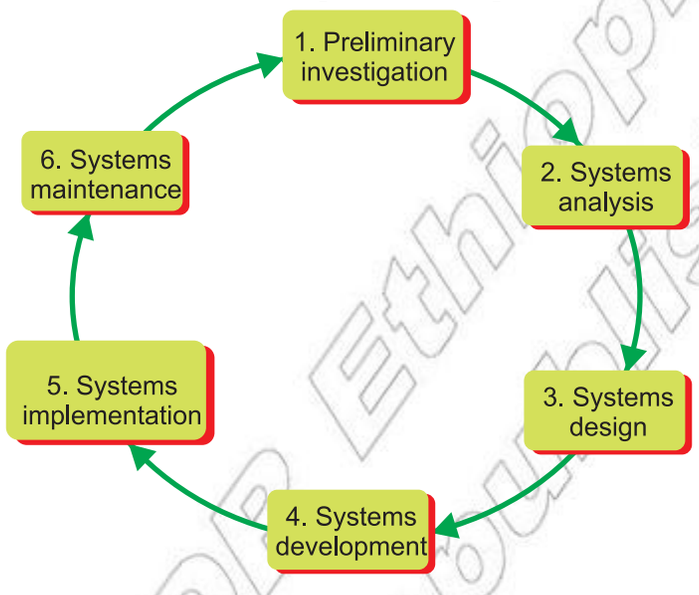

Fig. 1.21: The systems development life cycle (SDLC)

• System Problems

As mentioned earlier an existing system may not work very well. So, the system analyst must identify the system problems as discussed below.

Identifying System Problem

One must know what the problem is before it can be solved. Systems are created to solve problems. We can think of the systems approach as an organized way of dealing with a problem.

Problems may be functional—that is, the system may be incomplete, not fulfilling all the program requirements. Problems may be technical (non-functional)—for example, the system may be too slow, sized too small, or be obsolete and inefficient in terms of hardware or software. Problems may also relate to system cost or to access, limiting the ability of personnel to use system information to full potential.

System problem identification step should also include a determination of the seriousness of each problem and its effects on factors such as clients and financial considerations.

Recognize Functional and Non-functional System Requirements

The *Feasibility Study* should include an initial statement of the functional and technical (non-functional) requirements for the system. An overview of the system requirements should reflect a broad range of factors, for example:

(*i*) Functional, programmatic requirements;
(*ii*) Information needs;
(*iii*) System needs;
(*iv*) Interface and matching requirements;

(*v*) Processing and data flow needs;
(*vi*) Storage and retrieval requirements;
(*vii*) Inputs;
(*viii*) Outputs;
(*ix*) Workload, projected overtime;
(*x*) Validation and internal control needs;
(*xi*) Security/Privacy requirements;
(*xii*) Emergency response, back-up, and disaster recovery;
(*xiii*) Accessibility requirements for the disabled; and/or
(*xiv*) Space and Environment.

The requirements should be stated briefly and in functional terms, to the extent possible. Their development during the *Feasibility Study* supports the selection of suitable alternatives. These functional and non-functional requirements are greatly expanded later in the planning phase through the *Requirements Analysis*.

Preliminary Investigation

The objective of Phase 1, *preliminary investigation, is to conduct a preliminary analysis, propose alternative solutions, describe costs and benefits, and submit a preliminary plan with recommendations*. These steps are given below:

(*i*) **Conduct the preliminary analysis.** In this step, you need to find out what the organization's objectives are and the nature and scope of the problem under consideration. Even if a problem pertains only to a small segment of the organization, you cannot study it in isolation. You need to find out what the objectives of the organization itself are. Then you need to see how the problem being studied fits in with them.

(*ii*) **Propose alternative solutions.** In delving into the organization's objectives and the specific problem, you may have already discovered some solutions. Other possible solutions can come from interviewing people inside the organization, clients or customers affected by it, suppliers and consultants. You can also study what competitors are doing now a days. With this data, you then have three choices. You can leave the system as is, improve it, or develop a new system.

(*iii*) **Describe the costs and benefits.** Whichever of the three alternatives is chosen, it will have costs and benefits. In this step, you need to indicate what these are. Costs may depend on benefits, which may offer savings. A broad spectrum of benefits may be derived. A process may be speeded up, streamlined through elimination of unnecessary steps, or combined with other processes. Input errors or redundant output may be reduced. Systems and subsystems may be better integrated. Users may be happier with the system. Customers' or suppliers' interactions with the system may be more satisfactory. Security may be improved. Costs may be cut.

(*iv*) **Submit a preliminary plan.** Now you need to wrap up all your findings in a written report. The readers of this report will be the executives who are in a position to decide in which direction to proceed—make no changes, change a little, or change a lot—and how much money to allow the project. You should describe the potential solutions, costs, and benefits and mention your recommendations.

System Analysis

The objective of Phase 2, ***system analysis***, *is to gather data, analyze the data, and write a report*. In this second phase of the SDLC, you will follow the course that management has indicated after having read your Phase 1 feasibility report. We are assuming that they have ordered you to perform Phase 2—to do a careful analysis or study of the existing system in order to understand how the new system you proposed would

differ. This analysis will also consider how people's positions and tasks will have to change if the new system is put into effect. The steps are:

(*i*) **Gather data.** In gathering data, you will review written documents, interview employees and managers, develop questionnaires, and observe people and processes at their place of work.

(*ii*) **Analyze the data.** Once the data has been gathered, you need to come to grips with it and analyze it. Many analytical tools, or modelling tools, are available.

(*iii*) **Write a report.** After completion of the analysis, you need to document this phase. This report to management should have three parts:

(*a*) It should explain how the existing system works.

(*b*) It should explain the problems with the existing system.

(*c*) It should describe the requirements for the new system and make recommendations on what to do next.

At this stage, not a lot of money will have been spent on the systems analysis and design project. If the costs of going forward appear prohibitive, this is a good time for the managers reading the report to call a halt. Otherwise, you will be asked to go ahead to Phase 3.

1. The SDLC is a comprehensive tool for solving organizational problems, particularly those relating to the flow of computer–based information.
2. A systems analyst is an information specialist who performs systems analysis, design, and implementation.

We will not discuss the remaining phases as these are beyond the scope of this grade level.

KEY CONCEPTS

- A system is defined as a collection of related components that interact to perform a task in order to accomplish a goal.
- The *Systems Development Life Cycle* (*SDLC*) is a step-by-step process that many organizations follow during systems analysis and design.
- The *Feasibility Study* should include an initial statement of the functional and technical (non-functional) requirements for the system.
- The objective of *System Analysis* is to gather data, analyse the data and write a report.

REVIEW QUESTIONS

Fill in the Blanks

1. A ..... is defined as a collection of related components that interact to perform a task in order to accomplish a goal.
2. ..... tools enable a systems analyst to present graphic, or pictorial, representations of a system.
3. ..... is a six-phase problem-solving procedure for examining an information system and improving it.
4. The objective of ..... is to gather data, analyze the data, and write a report.

State Whether True or False

1. The point of systems analysis and design is to ascertain how a system works and then take steps to make it better.
2. Complex projects do not require one or several systems analysts.
3. User input and review is not a critical part of each phase of SDLC.
4. The objective of preliminary investigation is to conduct a preliminary analysis, propose alternative solutions, describe costs and benefits, and submit a preliminary plan with recommendations.

Multiple Choice Questions

1. The different types of e-learning is based on
   (*a*) Means of communication (*b*) Schedule
   (*c*) E-learning class structure (*d*) All of these
2. Which of the following is/are the major function(s) of e-governance?
   (*a*) E-administration (*b*) E-citizens and e-services
   (*c*) E-society (*d*) All of these
3. Which of the following is a category of e-commerce?
   (*a*) H2H (*b*) B2B (*c*) K2K (*d*) A2D
4. ..... is defined a collection of related components that interact to perform a task in order to accomplish a goal.
   (*a*) System (*b*) Benefit (*c*) Cost (*d*) Information

Match the Following

Column A	Column B
1. LMS	(*a*) Improves government processes by cutting costs, managing performance etc.
2. E-administration	(*b*) Use audio, video and text technology on various topics
3. E-libraries	(*c*) Enable a system analyst to present graphic, or pictorial, representations of a system
4. Modelling Tools	(*d*) Learning Management System

Answer the Following

1. Define a system. How will you identify system problems?
2. Discuss the functional and non-functional system requirements.

Suggested Activities

1. Students should identify system problem.
2. Collect facts for existing system (*e.g* , interview, observation).
3. Students should identify functional and non-functional system requirements.

Field Trip

Organize a field trip to various organizations to prepare a report on "System Analysis". Also present the report in your class.