Use and Effect of Internet in Saudi Arabia

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Summary

This report covers the work during the first six month period of AR-19-16 project. Among the objective stated in the original proposal, all tasks scheduled to be covered during this time have been accomplished. These tasks are enumerated below.

- A detailed literature review has been carried out. This work is also being continued as a part of the next period.
- Work on study of social effects of Internet on Saudi Society has been initiated. A questionairre on the web is being designed, and the associated software comprising ASP scripts is been developed.
- Work started on study of Internet and Education. Literature review pertaining to this aspect has been covered, and is continued, and questions related to this tasks are being designed to be incorporated in the next report.

The project is progressing very satisfactorily and according to the proposed schedule.

1 Introduction

This is the first report of the project, "Use and Effect of Internet in Saudi Arabia". In this document, the work carried out during the first six months of the project is presented. The report highlights the tasks completed during this time period. An extensive literature review is presented in this report. This review is used to develop survey questionnaire. The design of the survey questionnaire and work plan of the survey are also reported.

2 Literature Review

The Internet is a constantly changing and evolving international network. One good way to think of the Internet is a very large global network of networks and individual computers. This global network enables different kind of computers to communicate and share information and services without regard to geographic location. Beginning with the fledgling experiments in late 60s, Internet has evolved as a medium possessing more communication power, purchasing capability, and information dissemination means than print and electronic media.

The Internet can be seen as both a technology and a form of communication, comparable to the telephone system. Both the telephone system and the Internet are very large networks. As with the Internet, the purpose of the telephone system is communication. Both systems have hardware that you use, specifically telephones and computers, and they both have a mess of wires and other components that link them. To use the Internet or the phone system, you don't have to know very much about how they actually work. With the telephone system, the end result is that you can take the advantage of all forms of audible communication. With Internet communication, you can take advantage of all of the capabilities of computers, which includes the exchange of information in textual, graphical, audio, and video formats.

The Internet has been very successful because it works as if it were a single entity. You can access information on a remote computer as though that information was on your own computer. In most cases, nothing changes about the operation of your computer; everything works the same way, even though you may be connected through your own network to another network thousands of miles away. This ability to access information from all over the world as if it's in your very own computer is one of the features that makes the Internet such a powerful new tool for information exchange and communication. The evolution of the Word Wide Web (WWW) and the Internet networks, in a logical virtual environment, made the movement and sharing of information a seamless operation [1]. In the new Internet society, information is the most critical resource. As such, information is becoming a classifying factor of nations as well as among groups of societies within the same nation: information-havers and have-nots [2].

The new emerging society is termed the "Information Society", which supports the globalization of business, education, and culture through the Internet and user friendly graphical user interface [3]. It allows new forms of social interaction and change [4]. The information sharing is achieved through friendly graphical interface that requires minimal education and training. With these capabilities, the Internet is affecting all groups of society: individuals, businesses, schools, and governments. The new network society may profoundly change how people learn, how they work, and what they produce, but it will not change the human nature. People lacking the proper preparation for the digital world will become an increasing social burden on themselves and on the rest of the society [5].

2.1 Internet Services

2.1.1 E-mail:

Electronic mail or e-mail is a service provided on the Internet, which is commonly used to allow two or more people to communicate using the computer. It is a non-real time store-and-forward service in which message is sent to a mail server which forwards it to the inbox of receipient(s). In the early stages, there was very simple software that provided electronic mail service with a primitive facility. This facility allows a person to send a message to another across the Internet using another computer. Since then, e-mail service has grown rapidly because of its ease of use, and its capability to send, read, reply or forward a message in a fast and convenient way. Electronic mail system could provide services, which allow complex communication and interaction, such as sending a message to a group, sending a message so that a computer program will respond, and sending a message that includes text, video, and voice.

The electronic mail has several advantages over other types of communications such as telephone, mail and telegram. The first advantage is that it is cheap. It does not require written documents to be exchanged, and is easy to dispose off. It is also more reliable in the sense that if the message did not reach its destination because of congestion, server failure, or any other technical reason, it will be returned back to the source or the sender.

E-mail is one of the primary usage of the Internet. There are 110 million active e-mail users in the US and it is estimated that by 2003 this number will increase to 140 million [6]. On an average, an individual user in United States receives 15.2 e-mails per day and 106.4 per week [6]. Many users maintain several e-mail accounts. According to a study, on an average a user maintains four accounts in US. Web-based e-mails from on-line portals is the most popular mail service. Worldwide, 35 percent of the e-mail boxes are web based. The remaining mail boxes are divided as follows: 29 percent client server, 23 percent Internet Service Provider (ISP), 5 percent SMTP, 4 percent host, 3 percent LAN mail and 1 percent value added networks (VLAN) [7].

2.1.2 News:

Newsgroups, called **net news** or USENET, are worldwide popular applications of the Internet. It is an electronic bulletin board service that allows a person to participate in multiple discussion groups. With more than 20,000 newsgroups worldwide with discussion forums on some specific topic, people interested in a particular subject can subscribe to its newsgroup. The subscriber can read articles using a news user agent. User must remember to check for new articles regularly. When news reader is started, it checks a file to see which newsgroup the user subscribes to, and displays a one line summary of each unread articles. News reader allows user to subscribe or unsubscribe, post messages and ask questions. User can discard articles on an undesired subject or person. A news group can be moderated where only the moderator can post articles. Some people wish to remain totally anonymous when posting an article. So, anonymous re-mailers are used and these are servers that accept e-mail messages and change the from field, sender field and reply-to fields.

Incoming mail is stored in a single directory (news) by each site with subdirectories for newsgroups, and the news reader fetches the articles for them. News articles have the same format as e-mail (RFC 822) with some extra fields (RFC 1036) like Newsgroups, Follow-up to, Distribution, Organization, Lines and Summary. Protocol used for newsgroups is called the Network News Transfer Protocol (NNTP) as defined in RFC 977. It is similar to the SMTP where client issues commands and the server responds.

2.1.3 World Wide Web

The World Wide Web (abbreviated as WWW or Web) is the most powerful information service on the Internet. It is a system of servers that support hypertext to access several Internet application protocols through a single interface known as browser. Almost every protocol type like ftp, telnet, mail, usenet, and real-time communication is accessible on the web.

The Web was developed in 1989 by Tim Berners-Lee of the European Particle Physics Lab (CERN) in Switzerland [8]. In the early days of the Web, it was used to communicate among the global members of CERN using hypertext language. This form of communication became popular and a rapid growth ensued. In addition to hypertext, now Web incorporates graphics, video, audio, multimedia and real-time communication. Since it provides a single interface for accessing all application protocols, it is easier to use. Moreover it provides a user-friendly environment. Due to Web and browsers, it is no longer necessary to be conversant in individual application commands. Due to these reasons, web is the fastest growing component of the Internet.

Hypertext transfer protocol (HTTP) is the protocol of the Web. Hypertext is a document containing words (more specifically links) that connect to other documents. In the context of web, words or graphics may serve as links to other documents, images, audio, video etc. Hypertext for the web is accomplished by creating documents in a language called Hyper Text Markup Language (HTML) [9].

Today's World Wide Web offers multimedia, programming languages, real-time communication. The following presents a brief description of some of the more important uses of the web.

Multimedia:

The Web has become a broadcast medium. It is possible to listen to audio and video over the Web, both pre-recorded and live. There are two approaches to accessing these multimedia resources on the web. One is to down load the resource locally and then play it. However, these resources can be quite large, and it may take considerable time to down load the entire file to local computer. The problem of slow down load times has been answered by a revolutionary development in multimedia capability: streaming media. In this case, audio or video files are played as they are down-loading, or streaming, into the client computer. Real Player from Real Networks and Windows Media Player from Microsoft are two popular streaming multimedia players. Between 1999 and 2000, there has been an increase of 66 percent of home Internet users accessing streaming content in the US [10].

Shockwave presents another multimedia experience. Shockwave allows for the creation and implementation of an entire multimedia display combining graphics, animation and sound.

Live cams are another aspect of the multimedia experience available on the Web. Live cams are video cameras that send their data in real time to a Web server.

Programming Languages and Interfaces:

The use of existing and new programming languages have extended the capabilities of the Web. What follows is a basic guide to a group of the more common languages and functions in use on the Web today.

- **CGI, Active Server Pages:** CGI (Common Gateway Interface) refers to a specification by which programs can communicate with a Web server. A CGI program, or script, is any program designed to accept and return data that conforms to the CGI specification. The program can be written in any programming language, including C, Perl, and Visual Basic Script. A common use for a CGI script is to process an interactive form on a Web page.

Another type of dynamically generated Web page is called Active Server Pages (ASP). Developed by Microsoft, ASPs are HTML pages that include scripting and create interactive Web server applications. The scripts run on the server, rather than on the Web browser, to generate the HTML pages sent to browsers. Visual Basic and JScript (a subset of JavaScript) are often used for the scripting. ASPs end in the file extension .asp.

- **Java/Java Applets:** Java is the most popular of the programming languages of the Web. Java is an object-oriented programming language similar to C++, Developed by Sun Microsystems. Java can be used to write applications for both Web and non-Web use.

  Web-based Java applications are usually in the form of Java applets. These are small Java programs called from an HTML page that can be downloaded from a Web server and run on a Java-compatible Web browser.

- **JavaScript/JScript:** JavaScript is a programming language created by Netscape Communications. Small programs written in this language are embedded within an HTML page, or called externally from the page, to enhance the page functionality.

- **VRML:** VRML (Virtual Reality Modeling Language) allows for the creation of three-dimensional worlds. These may be linked from Web pages and displayed with a VRML viewer. Netscape Communicator comes with the Cosmo viewer for experiencing these three-dimensional worlds. One of the most interesting aspects of VRML is the option to "enter"the world and control your movements within the world.

- **XML:** XML (eXtensible Markup Language) is a Web page creation language that enables designers to create their own customized tags to provide functionality not available with HTML. XML is a language of data structure and exchange, and allows developers to separate form from content.

Real-Time Communication:

Text, audio and video communication can occur in real time on the Web. This capability allows people to conference and collaborate in real time. Microsoft's NetMeeting and Netscape's Conference (available with Communicator) are good examples of this. In general, the faster the Internet connection, the more successful the experience. At its simplest, chat programs allow multiple users to type to each other in real time. Internet Relay Chat and America Online's Instant Messenger are prime examples of this type of program. The development of a messenging protocols is underway. Such a protocol would allow for the expansion of this capability throughout the Internet. Real-time collaboration tools include:

1. audio: conduct a telephone conversation on the Web;
2. video: view your audience;
3. file transfer: send files back and forth among participants;
4. chat: type in real time;
5. whiteboard: draw, mark up, and save images on a shared window or board;
6. document/application sharing: view and use a program on another desktop machine; and,
7. collaborative Web browsing: visit Web pages together.

Weaknesses: The current structure of the Web has at least one serious flaw. That is the presence of many hypertext links that point to non existent documents. This happens when authors rename or delete their works from the Web. Since the system has no way of registering links to one's document, an author can not notify his readers of the reorganization [11].

2.1.4 Internet Chat

Internet Chat is a real-time communication method between individuals and groups. There are different types of chat services available on the net. One can classify them in three major categories. These are:

1. Web based chat.
2. Internet Relay Chat.
3. Instant Messenger Chat.

The web page based chat is the simplest form of the chat. This chat service requires a Java enabled web browser as a client. Many web portals like Excite, Yahoo, Lycos have free chat services. Individuals have also setup chat pages on their web sites. The web page chat is quite simple and has limited capabilities. Advanced features found in IRC chat like changing the color of text, or sending sounds to other users are now being added. However, file transfer, running of scripts or customization of the chat interface are not possible. Moreover, web chat is slower than the IRC based chat.

Internet Relay Chat is the multi-user multi-channel chat system based on a client-server or network model. It was originally written by Karkko Oikarinen in 1988 [12]. An IRC network is a collection of several servers connected together. When a user joins a network, he actually logins to one of the servers of the network. Since all the servers in a network are connected together and they maintain state information, thus the user becomes connected to all the users of the network. [13] [14]. There are many IRC networks like EFnet, IRCnet, Undernet, Dalnet etc. In order to access these networks, users have to run client softwares. Under Windows OS they can use mIRC, pIRCh, CuteChat, ViRC, XiRCON etc. For Unix there are clients like ircll and irssi.

Instant messaging (IM) provides the third form of chatting. These applications are basic form of IRC. There are many messenger services available like ICQ, AOL Instant Messenger, Yahoo Messenger and MSN Messenger. Currently these systems cannot connect or communicate due to proprietary implementations [15].

2.1.5 Wireless Internet Access: WAP and WML

The wireless devices represents extreme constrained computing environment with limited processing power (CPU), memory (RAM), limited battery life and simple user interface. Furthermore, wireless networks are constrained in terms of low bandwidth, high latency and unpredictable availability. Due to these reasons, Internet standards such as HTML, HTTP and TCP are inefficient over mobile networks. HTML content cannot be displayed on small size screens of handheld devices because HTMLs' focus is on presentation as opposed to content. HTTP and TCP are not optimized for particular characteristics of mobile networks like long latencies, intermittent coverage and limited bandwidth. Therefore, there was a need to formulate a new set of standards which will allow content delivery using binary transmission for compression and optimized for long latency and low to medium bandwidth [16]. Motorola, Nokia, Ericsson and Openwave were the initial partners that teamed up nearly four years ago in mid 1997 to develop and deploy the Wireless Application Protocol (WAP) [17]. It has more than 900 members and represents 90 percent of the global handset market. In June 2000, forum released WAP standard 1.2.1.

Wireless Application Protocol (WAP) is the defacto standard for providing Internet communications and advanced telephony services on digital mobile phones, pagers, personal digital assistants (PDA) and other wireless terminals. WAP is an open, global specification that allows mobile users with wireless devices easy access and interaction to information services. WAP is designed to work with most wireless networks such as CDPD, CDMA, GSM, PDC, PHS, TDMA, FLEX, ReFLEX, iDEN, TETRA, DECT, DataTAC, Mobitex [16]. It offers multi-vendor interoperability. WAP forum is finalizing compliance specifications and interoperability test suites.

WAP uses Wireless Markup Language (WML) to markup the data that is to be transported to wireless devices. WML is an XML application and it makes optimum use of small screens and allows easy navigation with one hand. WMLScript is the scripting language part of WAP. It is similar to JavaScript and has been optimized for use within modest handheld wireless devices. It makes minimal demands on memory and CPU usage. WAP also includes specification for security, authentication and encryption known as Wireless Transport Layer Security (WTLS). Wireless Telephony Applications (WTA) allows incoming and outgoing calls to be handled within WML and WMLScript. This permits trusted parties to deploy integrated voice calls and Internet services [16].

WAP protocol suite is evolving. Some of the future trends for WAP are [18]:

- End-to-End security.
- Smart Card interfaces.
- Connection-oriented transport protocols.
- Persistent storage.
- Push technology.
- Multi-media mobile services.
- Streaming media.

Global System for Mobile (GSM) has a Subscriber Identity Module (SIM) Toolkit standard for Value Added Services and e-commerce transactions. SIM Toolkit allows phones to be programmed directly. It is a smartcard centric method of deploying applications that applies only to GSM and Short Message Service (SMS) transports [16]. SIM toolkit and WAP are complementary technologies. SIM will be used for applications needing high degree of security like mobile banking and more static information like hotlines, company directories, and yellow pages. While WAP will be used for more dynamic services such as Internet browsing.

Demand for Wireless applications is growing. According to a survey conducted by International Data Corp (IDC) in 2001, 95 percent of the users want a visual experience, 48 percent want browsing, 42 percent want SMS and 82 percent want e-mail. 91 percent of respondents are willing to pay for unlimited access [19].

2.1.6 Instant Messaging

In this section we will cover Internet messaging application known as Instant Messaging (IM) which differ from the classical e-mail system because its primary focus is immediate end-user delivery. This technology has the immediacy of telephone, cost savings of e-mail and a potential for collaboration in real-time [15].

Currently the technology is proprietary, free and aimed at casual surfers. According to a survey, 46 percent of all Fortune 1000 companies intend to implement it by the end of 2001 [15]. Although businesses are using it but it is still far behind from a business class service. This service requires constant contact, which might be exploited by telesales and spam. Due to proprietary nature, the sender and recipient needs to be the users of the same service. There are four major players in this service category. These are America On-Line, Microsoft MSN Messenger, Yahoo!Messenger and ICQ. Media Metix reports that Yahoo!Messenger and MSN Messenger service have become the fastest growing instant-messaging services. Since it's launch in June 1999, Yahoo!Messenger gained 10.6 million US users as of Jan 2001. There are 13.0 million active US users in MSN, 21.3 million with AOL and 8.5 million with ICQ as of January 2001 [20]. Instant messaging service is popular among men, students and young people in the age group of 15 to 24 years. According to a study carried out by NetValue, 32 percent users of IM are students, 38.5 percent fall in the age group of 15 to 24 years and 55 percent users are men [21].

In order to standardize this service, Internet Engineering Task Force (IETF) has a working group developing Instant Messaging and Presence Protocol (IMPP) standards [22]. This working group will define protocols and data formats necessary to build an Internet-scale end-user presence awareness, notification and instant messaging system.

Mobile messaging is also gaining ground. Unlike Internet Messaging which is free, mobile messaging is charged service in which sender is billed per message [15]. There are three possible classes of mobile message services [23].

1. **Short Message Service:** SMS is a text-based two way store and forward paging system build into mobile phones. It supports messages of 100-200 bytes and is available in GSM and all other cellular standards. By August 2000, nine billion SMS messages were being sent each month.

2. **Enhanced Messaging Service:** EMS allows a combination of simple melodies, pictures, sounds, animations, modified text and standard text as an integrated message for transmission to an EMS compliant handset. EMS is an enhancement to SMS but is very similar to SMS in terms of using the store and forward SMS Centers, the signaling channel and the like to realize EMS. In order to achieve EMS service no new network infrastructure is needed. The first EMS compliant handsets are due by mid-2001.

3. **Multimedia Messaging Service:** MMS allows the ability to send and receive messages comprising a combination of text, sounds, images and video to MMS capable handsets. MMS uses WAP (Wireless Application Protocol), and MExE (Mobile Station Application Execution Environment, as protocols for smooth migration path for messaging applications. It is expected that MMS service will be available in 2002 onwards.

2.2 Internet Growth Statistics

In this section, we have compiled recent Internet growth and usage statistics of developed as well as developing world with prime emphasis on Middle Eastern countries. In order to measure the growth of Internet we have compiled statistics related to number of hosts, number of domains, ratio of Internet hosts to population number of personal computers and number of online users.

In early years of Internet inception, the growth was very slow and it was only used by academics and research institutions. There were around 900 operational networks on the Internet in late 80s [24]. Most of the growth has occurred in the last seven years. According to an estimate, the number of hosts on the Internet has roughly tripled in the time from January 1994 to January 1996 [25]. It has maintained the same momentum since then. In July 1999 there were 56 million hosts on the Internet, three times more than the number of hosts in July 1996 [26]. Even after seven years of explosive growth, Internet is still expanding with breakneck speed. It has become the fastest expanding electronic technology in the history, better than the electricity, telephone and television technologies [27].

Internet Software Consortium has been carrying out survey of Internet hosts [28]. They count the number of IP addresses that have been assigned a name. Their survey works by querying the domain system for the name assigned to every possible IP address.

Country or Region	Jan 1999	Jul 1999	Jan 2000	Jul 2000	Jan 2001	% Increase
Global	43230000	56218000	72398092	93047785	109574429	153
UAE	17904	11103	19718	26764	34338	91
Saudi Arabia	319	2508	2828	3167	5438	1604
Kuwait	6231	4573	4096	4594	3360	-46
Qatar	13	32	31	31	31	138
Oman	664	673	678	719	714	8
Bahrain	577	1110	1117	1119	1121	94
Lebanon	2358	2997	4729	5147	5611	138
Egypt	1908	1746	4640	5422	5848	206
Jordan	370	551	612	709	907	145

Table 1: Number of Internet Hosts World Wide and in the Middle East Region from Jan 1999 to Jan 2001.

According to their survey of January 2001, there are total of 109,574,429 Internet hosts (excluding duplicate names) all over the world. We have compiled results of their survey results for last two years for global and selected Middle Eastern countries. These results are presented in Table 1. There has been a 153% increase in the number of hosts world wide in last two years. ıIn selected middle eastern countries, the growth of Internet hosts has been more than the global rate. These countries have shown an average increase of 264%, with Saudi Arabia topping the list with a phenomenal rise of 1600%. This has been due to the fact that Internet connectivity was recently launched in Saudi Arabia and many Saudi companies previously didn't have any net presence.

During one year from 1999 to 2000, Asia-Pacific region witnessed considerable expansion in the number of top-level domains. China tops this region with a 316% increase in number of domains. Vietnam with 271% and Singapore with 121% increase were second and third respectively [28].

In order to understand and compare the penetration of Internet for individual Middle Eastern countries, we have gathered statistics related to number of Internet hosts per 1,000 inhabitants in these countries and compared them with the corresponding parameters for the developed world mainly US, Canada and Europe. The results are presented in Figure 1 and 2. These statistics are for the year 2000. In order to generate these results, we collected the population estimates for Middle Eastern countries from the World Factbook 2000 [29] and the data for number of hosts is gathered from Internet Software Consortium [28]. The values for US, Canada and OECD region are collected from an Organization for Economic Cooperation and Development (OECD) study reported by eMarketer [30]. From these results it is clear that majority of Middle Eastern countries have very low Internet hosts to population ratio except for UAE where it is 11 hosts per 1,000 inhabitants.

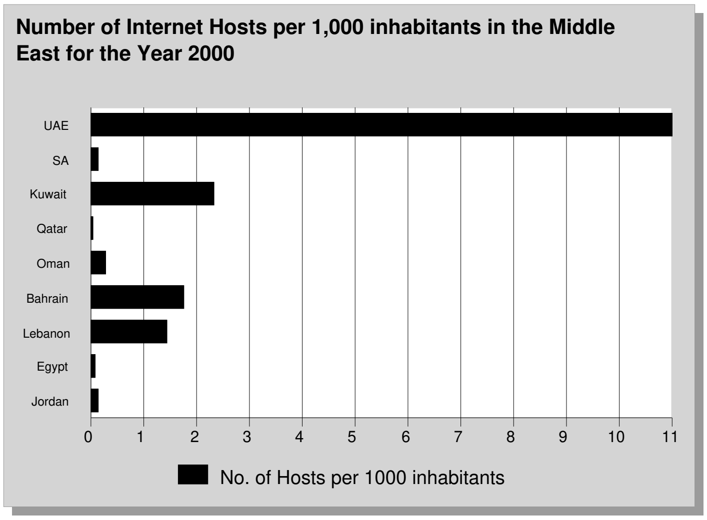

Figure 1: Number of hosts per 1,000 inhabitants for selected Middle Eastern Countries for the year 2000.

The third criteria in our comparison is ratio of personal computers to population. For

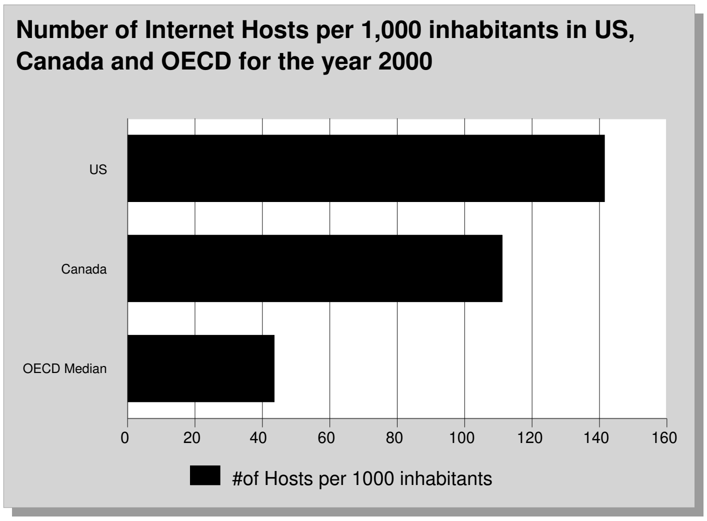

Figure 2: Number of hosts per 1,000 inhabitants in the US, Canada and OECD (median) for the year 2000.

this comparison we are using number of PCs per 100 inhabitants as the measuring scale. International Telecommunication Union (ITU) maintains the Internet indicators which also contain estimated number of personal computers per 100 inhabitants. We have compiled their results for selected regions and Middle Eastern countries for the year 1999 [31] and 2000 [32]. These results are presented in Table 2.

The Internet's information carrying capacity doubles every 100 days and web content increases 3.2 million new pages and 715,000 images every 24 hours [27]. According to an study carried out by VilaWeb and reported by eMarketer [33], two thirds (68.4 %) of the web pages are in English language. The second most used language on the net is Japanese with a share of 5.85 % of webpages. The finding of their survey are shown a pie graph in Figure 3.

The fifth criteria in our comparison is number of on-line users. We have compiled these results from number of estimates carried out by Global Reach Inc. [34]. According to their study, a total of 391 million users are on-line world wide. More than half

Country or Region	1999	2000	% Increase
US	51.05	58.52	14.63
Americas	21.34	24.26	13.68
Africa	0.88	0.94	6.82
Asia	2.52	2.9	15.08
Europe	14.63	16.81	14.90
United Arab Emirates	12.5	12.51	0.08
Saudi Arabia	5.7	5.74	0.70
Kuwait	12.1	12.13	0.25
Qatar	13.6	13.58	-0.15
Oman	2.6	2.64	1.54
Bahrain	10.5	13.98	33.14
Lebanon	4.6	4.64	0.87
Egypt	1.122	1.2	7.14
Jordan	1.4	1.39	-0.71

Table 2: Number of Personal Computers per 100 inhabitants for 1999 and 2000.

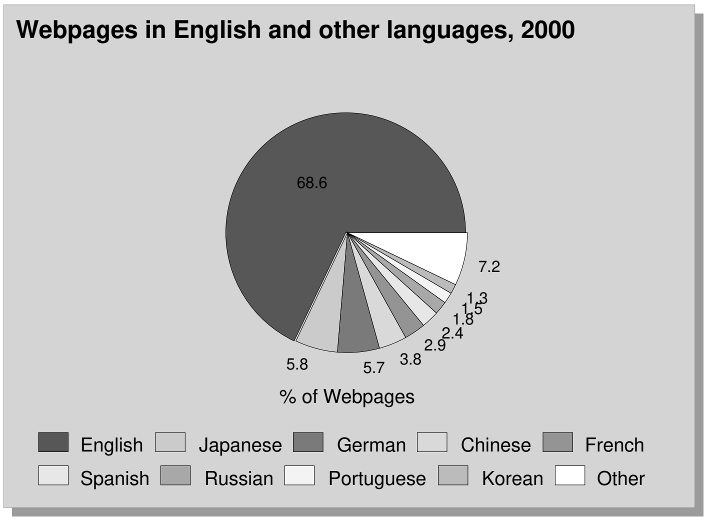

Figure 3: Webpages in English and other languages 2000.

of this on-line population (54.5%) lives in four countries i.e. US, UK, Canada and Australia. In Middle Eastern countries, on-line user population is very low. Only 0.6% of global on-line user community comes from Arabic speaking countries [34]. Table 3 compiles the results for the on-line population in the developed world and in the middle eastern countries. In this table we have given the number of on-line users in the selected countries and their percentage in respective country population. These results are for the year 2000. According to these values, it is clear that UAE has the highest percentage of on-line user community in the Middle East (16.88%), followed by Lebanon (6.36%), Qatar (6.04%) and Bahrain (5.91%). The Egypt has the highest number of on-line users. Saudi Arabia stands third in terms of on-line population after Egypt and UAE.

2.3 Primary Usage and Social Effects

Many studies and surveys have been carried out in many countries to ascertain the use of Internet and user activities. In this section we have summarized results of some

Country	On-line Users (k)	Total Inhabitants (k)	Users per 100 inhabitants
Global	391,000	6,000,000	6.52
US	169,100	270,000	62.63
UK	21,000	59,500	35.29
Canada	14,600	31,300	46.65
Australia	8,500	20,000	42.50
United Arab Emirates	400	2,369	16.88
Saudi Arabia	300	22,023	1.36
Kuwait	100	1,973	5.07
Qatar	45	744	6.04
Oman	50	2,533	1.97
Bahrain	37	634	5.91
Lebanon	227	3,578	6.36
Egypt	440	68,359	0.64
Jordan	87	4,998	1.75

Table 3: Number of on-line users and percentage of the country population on-line for the year 2000.

of the recent studies. These surveys are helpful in design of survey questionnaire and analysis of results for uses and effect of Internet in Saudi Arabia. The results reported in this section are mainly compiled from two studies: UCLA Internet Report [27] and 10^{th} WWW GVU Survey conducted by Graphic Visualization and Usability (GVU) Center of Georgia Institute of Technology [35].

This section is organized as follows. First we carry an overview of: Who is using the Internet in the developed world? Issues like user education level, age, gender and income groups are considered. After this we summarize the answers to the question: What users are doing on-line? Next we will cover the effect of experience on the Internet use. Afterwards we will see the users concerns for social issues like negative impact of Internet, privacy and security on the Internet, legal and government regulations.

2.3.1 Who is using Internet?

In general, young people are more likely to use Internet. According to the survey conducted by GVU center [35], the highest percentage of respondents were in the group of 26-30 years and three fourth of the respondents were in the age group of 21 to 50 years. Figure 4 shows the results of their findings.

The user education level also affects the use of Internet. The higher the education level of an individual, it is more likely that he/she will spend more time on-line. According to th UCLA study [27], 86.3 percent of those with either an undergraduate college degree or an higher degree use the Internet. As the education level decreases, the use of Internet also decreases. Only 31 percent of less than higher school literate people are using Internet. According to this study

- 31.2 percent of less than high school,
- 53.1 percent of high school graduates,

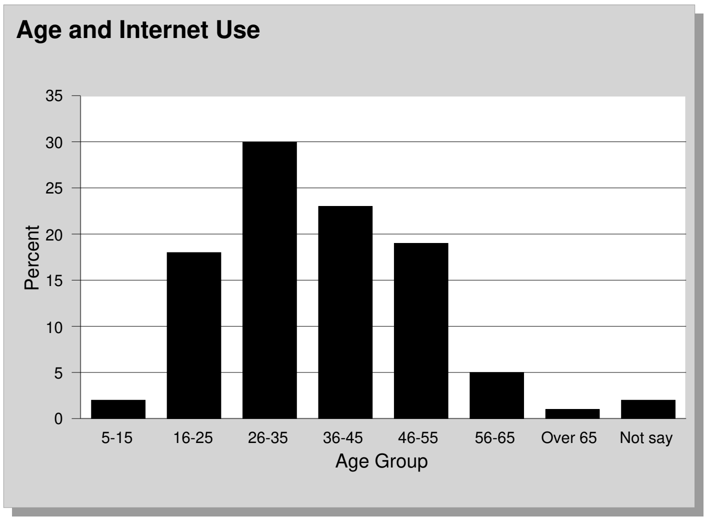

Figure 4: Percentage of respondents in different age groups

- 70.2 percent of some college and
- 86.3 percent of college/advance graduates

are using Internet.

It is assumed that Internet is the mainstay of rich and educated. In US, a sizeable number of users are less educated and are from lower income groups as well. Some 60 percent of adults with income in the range US$ 15-49k and 41 percent of adults with income less than US$ 15k are using Internet [27].

Generally men have more access and spend more time than women. According to GVU study 64.2 percent of respondents were men [35].

2.3.2 What users do?

Web surfing is the most popular activity in the US and elsewhere. E-mail comes as the second used user activity on the Internet. According to UCLA report following are the ten most popular Internet activities in the United States [27].

- Web surfing or browsing 81.7 percent.
- E-mail 81.6 percent.
- Hobby related information 57.2 percent.
- Reading News 56.6 percent.
- Entertainment 54.3 percent.
- Buying on-line 50.7 percent.
- Travel information 45.8 percent.
- Instant messaging 39.6 percent.
- Medical information 36.6 percent.
- Playing Games 33.0 percent.

2.3.3 Effect of Experience on Internet Use

The amount of online experience in a way affects the use of Internet. The most experienced Internet users spend a larger amount of time online. Users with online experience of 4 or more years spend 16.2 hours per week than those with less than one year of experience only spend 6.1 hours of week online. Moreover, experienced users spend a larger amount of time online working at home, looking for news, trading stocks and making investments. On the contrary, new users spend more time playing games and pursuing hobbies [27].

2.3.4 Social Aspects

The Internet may have positive and negative impact on the society. On the negative side, some activities that lend themselves to addictive or compulsive behavior include Internet gambling, playing computer games, being irresponsible in un-moderated newsgroups and chat rooms, surfing the web, browsing for helpful tools, breaching security for amusement, and perhaps even programming. The risks to individuals and to society include "diminution of social and intellectual skills, loss of motivation for more constructive activities, loss of jobs and livelihood". For all of us however and whether we are off-line or online, we all need to have some real lives beyond computers [36].

The following sections present discussions of the social aspects namely: ethics, privacy, and security, legal issues, government regulation and standards, moral and cultural conflict, and information overload.

Privacy and Security

Privacy issue raises the greatest concern among the Internet users. Out of 1482 respondents to GVU Survey, 77 percent prefer privacy over convenience [35]. People are also skeptical about being online they put their privacy at risk. Almost two-third of Internet users either agree or strongly agree that being online their privacy is at risk [27]. These concerns remain a barrier to online sales: 41 percent of users consider privacy issues as a barrier to their online shopping [27].

Findings of a survey lists top priority privacy issues on Internet use as follows:

- 85 percent websites that contain pornography
- 72 percent trace users' visits to websites
- 72 percent store general information on the Internet
- 71 percent reading e-mail that belongs to others

- 70 percent collecting mailing lists for marketing
- 48 percent delivery of undesired e-mail advertisements

In the previous survey, respondents in the US ranked the above issues higher than 8 in a scale of 1 to 10. The survey was published in Al-Iqtisadia newspaper, 28 November 1998.

Like privacy, security is also considered as a significant or deciding factor in doing transactions over the Internet. According to GVU survey more than 80 percent of respondents give significant importance to security issues. Similar results are also reported by UCLA study as well. Around 91 percent of users are some what or very concerned about security.

The issue of security on the Internet is not really appreciated. Hackers compromise networks not through detailed knowledge of computer science but more through "social engineering - the non-computer methodologies hackers use to get passwords or the location of unused maintenance ports". Hackers are becoming more organized and hacking is becoming much easier [37]. For example, hackers can write a file that extracts a site's password file and then runs against "password-sniffing tools" to gain access to the server. Also, hackers attack routers at Internet service provider. Other variety of attacks include "web spoofing, the Ping of Death and Domain Name Service hijacking, and social engineering". In the latter case, a hacker uses acting skills to have someone provide his username and password [38]. National security threats may stem from information accessible from the Internet on how to make bombs and may be used by children and terrorists [39]. The US government tried to block such information from being published on the Internet but it was unsuccessfully.

Legal Issues

Internet users may not be immune from legal problems. Individuals and companies using the Internet must be careful. Messages and information that are posted on the Internet should be correct and everyone should stand behind their words. Any plagiarism of trademarks or copyrights, obnoxiousness, personal attacks, vulgar language, etc. may result in punishment and fine [40].
Furthermore, the global use of Internet must lead to emphasis on international law enactment and enforcement. Currently, no organization in the world can prevent albeit take legal action against anybody from developing a home page that contains offensive information to an organization or country.

Government Regulations and Standards

The use of Internet in non-Western countries could not have its society open for the Internet without any restriction. This is because the value and ethical standards in these countries are profoundly different from those countries where the Internet evolved. For example, China's regulations for the Internet use revolves around three dimensions: manual registration of individuals who want to set an Internet account using a police file report form, blocking of websites, and requirement to use the circuits of the Ministry of Posts and Telecommunications for all international access [41].

Even in the US, several laws were enacted concerning the use of Internet. For example, in Sacramento, California, lawmakers are introducing measures designed to apply to the global WWW. The end result "may be increased freedom of censorship, prohibition, restriction, and social control" [42].

Even the US Congress, driven by social issues such as protecting the family and guarding children, is pro-regulating the Internet [43]. However, the Supreme Court ruled that the Communication Decency Act in this regard is unconstitutional and a search for technical solution to Internet social problems is still under development[44].

In the US, some agencies are developing standard for the use of the Internet. For example, several organizations are developing educational technology standards for Internet use. These organizations include IEEE, Educom - a non-profit consortium of US higher education institutions- and IEEE Computer Society Standard Activity Board [44].

Moral and Cultural Conflict

One issue of the global Internet diffusion is cultural differences in sharing information and applying standards. Country morals may clash when conflicting views are expressed over the Internet. Critics have found plenty to fear on the Internet: too many extreme political beliefs, too much sex, and too many strange religions [45].

The global village, with complete harmony among its citizens, is unachievable due to technical and social reasons. To some people living in technological societies, life is measured in seconds with a corresponding loss of long-term focus and sense of place. The conclusion is that steps must be taken to control quality of the media and the standard of content to be enacted by governments and organizations [46]. Filtered forums are now a part of the many new ideas emerging for how to better manage community content on the Internet. Participants evaluate community contents regularly to filter out the bad stuff as decided by the community [47].

The Internet attracts a certain number of people who have beliefs that might be considered outside the mainstream. Part of the reason for this attraction is the ability of the Internet to be a window on the outside world, which gives the opportunity to people to interact with others in the society. Another reason is the global and instantaneous nature of the medium [48].

Without some ethical standards for use and professional conduct on the Internet, it may become a factor in instigating cultural and moral conflict for local as well as global communities.

3 Description of Survey Questionnaire

Modern Saudi Arabian Society is represented by a marked contrast with the largely isolated and undeveloped nation scarcely 50 years ago. Oil revenues that brought affluence, also brought a challenge of how to preserve the unique cultural and religious heritage. Religious conservatism and modernization may differ in opinions of what kind of technology might be appropriately used and how to make the best use of the Kingdom's wealth. Saudi Arabia is culturally homogeneous, with tribal membership remaining a pervasive aspect of social relations. Sexual segregation, which keeps women from contact with men follows from extreme concern for female purity and family honor. The last three decades have brought far-reaching changes in the educational and employment opportunities that women enjoy. These changes have been structured in way that leaves intact the system of social relations based on sexual segregation. Conservatism and segregation are still very much respected, and opening of public access to the Internet is a step change in policy [49].

Apart from surveying the literature and other available information over the Internet, a survey questionnaire is designed to get the feedback from Internet users in Saudi Arabia. The questionnaire is designed to categorize the users according to their age, sex, job, education, etc. This will help to identify and correlate the Internet usage patterns among different groups of people. The questionnaire then tries to find the time spent, type of applications, place of usage, advantages, etc. The questionnaire also has a number of questions related to Arabic language sites and Arabic language usage on the Internet. There are some specific questions about privacy concerns, satisfaction with ISPs, use of Internet for distance learning, etc. Overall the questionnaire has been designed very carefully with the help of social science experts to cover as many areas as possible and found essential for the study.

The questionnaire has been published over the Internet and data is being collected. Mechanisms are developed to advertise the availability of the questionnaire so that more and more people participate in filling it. This is essential for a successful study. It is noted that the growth of submission data is satisfactory and is expected to grow. Once a reasonable amount of data is captured that is suitable for finding the proper patterns, the results will be made available online on the project website.

4 Work Plan and Results

This report presented details of the tasks pertaining to the first two quarters (see Table 4). An extensive literature review covering topics from Internet services to e-shopping, searching, social aspects, ethics, legal issues, privacy etc. are discussed. This task is to be continued into the next quarter. The next two tasks in this period pertaining to social behavior and education are being pursued through the design of an on-line questionnaire discussed in the previous section. Preliminary work in the area of determining the Arabic content and its growth on the Internet is in progress. A website is being put up for the project which will contain the designed questionnaire integrated to a database to store the results. This will ease study and analysis of the behavior, and other aspects, pertaining to the web. Subsequent reports will present the complete questionnaire, and its integration to the database, and the ASP scripts developed for form processing. Work will then continue in the direction of developing queries for study and analysis. The URL of the tentative website is http://kacst.ccse.kfupm.edu.sa/. Efforts are in progress to contact ISPs to advertise the website and populate the database in order to get a satisfactory sample demographically spread over the entire region of

Task	Description	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1	Literature Review	**X**	**X**	X		X		X	
2	Social Effects	**X**	**X**	X		X		X	
3	Education		**X**		X		X		X
4	Business			X		X		X	
5	Arabic Content			X		X		X	
6	Distance Learning					X	X	X	X
7	Documentation		**X**		X		X		X

Table 4: Project Plan. The completed tasks are in bold and underlined.

study. The project is progressing as per the proposed schedule. Table 4 illustrates the project tasks and their status.

5 Conclusion and Recommendation

This report summarizes the work carried out during the first six months of the project. During this period, an extensive literature review has been carried out. This literature review covers the Internet statistics, usage and effects on different societies. This literature review resulted in preparation of a survey questionnaire. The survey questionnaire provides a mechanism to measure the use and effect of Internet in Saudi Arabia. This questionnaire measures effects of Internet on social aspects, education, business, distant learning and arabic content.

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