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Humanities and Arts: Sharing Center Stage on the Internet

Status of this Memo

This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

Abstract

This document is designed primarily for individuals who have limited knowledge of, or experience with, the Internet.

The purpose of this document is to provide members of the Arts and Humanities communities with an introduction to the Internet as a valuable tool, resource, and medium for the creation, presentation, and preservation of Arts and Humanities-based content.

The intended audience is practicing artists, scholars, related professionals, and others whose knowledge, expertise and support is important to ensuring that the Arts and Humanities are well-placed in the global information infrastructure.

Table of Contents

1.	Introduction.....	3
1.1	Definition of Arts and Humanities.....	3
2.	What does the Internet mean to the "Artist?".....	4
2.1	Access to the Global Community.....	5
2.2	Sharing Your Work and Collaborating with Others.....	6
2.3	Freely Available Software, and Other Information.....	8
3.	What is the Internet?.....	8
3.1	What is the World Wide Web?.....	9
4.	How does the Internet Work?.....	10
4.1	Internet Addresses.....	11
4.1.1	Computer Addresses and Hostnames.....	12
4.1.2	Addresses of People on the Internet.....	12
4.1.3	Information Addresses, Locators, URLs.....	13
4.2	How Does the World Wide Web Work?.....	14

4.3	Other, Higher Level Protocols on the Internet.....	15
5.	Forums.....	16
5.1	Message Based Communications.....	16
5.1.1	Electronic Mail - email.....	17
5.1.2	Newsgroups.....	17
5.1.3	Electronic Bulletin Board System - BBS	18
5.2	Real-Time Communications.....	19
5.2.1	Chat - IRC.....	19
5.2.2	Multicasting.....	20
5.2.3	MUD - Multi-User Dungeon.....	20
5.2.4	Audio/Video Conferencing.....	21
5.3	Archives.....	22
5.3.1	Searching.....	22
6.	Accessing the Internet.....	25
6.1	Internet Service Providers.....	26
6.2	Computer Hardware and Software Tools.....	26
6.3	Multimedia.....	31
7.	Creating Content.....	32
7.1	Getting Help.....	33
7.2	About File Formats.....	34
7.3	Creating Text and Hypertext Documents.....	35
7.4	Creating Graphic and Moving Images.....	35
7.4.1	Bitmap Image Formats.....	36
7.4.2	Vector Image Formats.....	37
7.4.3	Video Formats.....	37
7.5	Creating Music and Sound Files.....	38
7.6	Content Design Issues.....	40
7.7	Publicizing Your Work.....	41
8.	Issues and Challenges.....	42
8.1	Security Issues.....	43
8.2	Viruses.....	44
8.3	The Standard Disclaimer.....	44
8.4	Copyrights and Intellectual Property Issues.....	45
8.4.1	Copyright.....	45
8.4.2	Trademark.....	46
8.4.3	Privacy.....	47
8.4.4	Seek Professional Advice.....	47
8.5	Conducting Business over the Internet.....	47
8.6	Netiquette.....	48
9.	Glossary.....	49
10.	Resources, References, etc.....	51
10.1	RFCs and Internet-Drafts.....	51

10.2	Internet Documents.....	52
10.3	Other Sources.....	53
10.4	Freely Available Web Browser Software.....	54
10.5	The Internet Assigned Numbers Authority.....	54
11.	Security Considerations.....	55
11.1	Formulate a security policy.....	55
11.1.1	Talk to your Internet Service Provider.....	56
11.1.2	Make sure your systems are up to date.....	56
11.1.3	Use the tools available.....	56
12.	Acknowledgments.....	57
13.	Authors' Addresses.....	57
Appendix A.	Internet Projects of Interest to the Arts and Humanities Communities.....	58
Appendix B.	Starting Points; A brief list of related sites.....	60
Appendix C.	Examples for using the RFC server RFC-INFO@ISI.EDU..	62

1. Introduction

This document has been structured to provide information about, and examples of, the wide range of functions and capabilities available on the Internet today. It is intended to illustrate the potential of current networking technologies for personal and cultural growth.

Some basic functions of the Internet are described, along with their applications and forums for building online communities of interest, such as the World Wide Web, Email, and Network News.

This is followed by discussion and examples of hardware and software being used to support the creation and presentation of artistic and literary works, along with examples of how Arts and Humanities content is being represented, stored, and retrieved on the Internet.

In addition to illustrating the great potential of the Internet, this document provides a brief introduction to the issues and challenges that affect the development and presentation of Arts and Humanities content online, such as privacy and property rights.

Included is a brief Glossary, and a number of Appedices which provide pointers to other sources of information about the Internet.

1.1 Definitions of Arts and Humanities

For purposes of this document the term "Arts" includes, but is not limited to, dance, design arts, folk arts, literary arts, media and film arts, music, theater, and visual arts.

The term "Humanities" includes, but is not limited to, the study of the following: language, both modern and classical; linguistics; literature; history; jurisprudence philosophy; archaeology; comparative religion; ethics; the history, criticism and theory of the arts; those aspects of social sciences which have humanistic content and employ humanistic methods; and the study and application of the humanities to the human environment.

For purposes of simplicity this document will use the word "Artist" to mean both Artist and Humanist: "all practitioners who work in the fields of the visual, performance, and literary arts, as well as museum curators, librarians, and others who are involved in the research, restoration, and presentation of that which comprises our cultural heritage."

2. What does the Internet mean to the Artist?

The Internet is exerting a profound influence on our society. Even now in its infancy, the effects of the Internet can be easily seen in popular media as well as in the way we do business. But the most dramatic influences are in the children who are now growing up with the net. Many parents are aware of the influence television has over their children. With the advent of WEB-TV, the Internet has begun to assimilate Television, transforming it into something more powerful. This coming integration of information, communication and entertainment will play a major role in teaching and shaping the minds of those who live and grow up with it.

Because of this power, it is critical that the best parts of human culture are represented on the Internet. If we raise the Internet right, it will return the favor by nurturing a generation that may well grow up wiser than ourselves.

This is where artists are needed. Because the net is primarily built and run by Scientists and Engineers who are creatures of mind, it is the heart and soul of the Internet that is weak. Artists are the heart and soul of human culture, and must bring the fruits of their efforts to the net to give the net culture, and future generations their essence of humanity.

If that does not convince you, we will also introduce you to some of the many tools artists may use to exploit the net for their own personal gain. As the online culture becomes a more balanced representation of humanity, the net will become an essential tool for collaboration, communication, and distribution of art and humanities content. The day is coming where those who are not on the net will be greatly handicapped in the expression and distribution of their works.

The net is the new frontier for the growth of humanity. Can you afford not to be involved?

2.1 Access to the Global Community

In the past, artist's audiences and collaborators were limited to the people around them. Improvements in transportation and communication have allowed these associations to expand, but even today few members of the artistic community have gone global. The Internet changes all this by allowing anyone access to a global community.

A great many arts institutions and organizations have now established sites on the World Wide Web and a significant number of online discussion groups focus on the arts and humanities. Consortiums of museums and libraries are now using networking technologies to support research and projects involving more effective ways to collect, store, and disseminate objects of antiquity and other non-textual primary sources, as well as textual sources.

Sites are also created by individuals and for institutions, organizations, and businesses for reasons ranging from commerce to simple self-expression. The Internet connects hundreds of countries, thousands of cities, and countless groups and individuals around the globe.

On the Internet today you can find information on topics ranging from art and music to guns and ammunition; among which are astronomy, news, astrology, agriculture, acupuncture, botany, biology, zoology, food, psychology, medicine, space exploration, genetics, media, chemistry, microbreweries, aeronautics, scuba diving, meteorology, neurology, artificial intelligence, mathematics, literature, wine tasting, law, painting, photography, dance, history, social sciences, politics, crafts, clothing, economics, genealogy, pets, sports, languages, dictionaries, encyclopedias, technical manuals, schools, shops, entertainment, furniture, flowers, software, hardware, computers and the Internet, just to name a few. Whatever your work requires, whatever your whim desires, you can find it on the net.

People all around the world will be looking for what they want on the net, and if you have what they want, then through the magic of the Internet, you are their next door neighbor.

With access to the Internet, the world is at your fingertips. Bring your questions on health, the environment, government, and religion, and look through volumes of documentation on your concerns, or discuss your questions with others electronically. Once you get used to it, you will even be downloading more information and tools to assist you further.

The Internet provides a forum in which diverse cultures can merge, and allows people to visit faraway places from the privacy and safety of their own computer. The Internet explorer will also find that many sites are multilingual.

Once you have the basic tools for using the Internet you will begin to understand how easy, helpful, informative, and exciting it can be. With a few quick strokes you have accessed a great library, museum, or gallery, toured a faraway city, or looked up an old friend. You might find an out of print book you have always wanted, then either read it on your computer screen, or print it out on your printer. If you do not have a printer, simply save it to your floppy disk and bring that to a printshop or friend with a printer. It really is that easy.

You could spend the afternoon at the Smithsonian, or the Louvre without ever leaving your chair. For a more athletic adventure, you could put your computer in front of your treadmill, and jog through the online Olympics site.

When you are ready, you can explore deeper. Follow other links to smaller sites, lesser known writers, artists, poets, and thinkers, and discover the emerging world they are creating. With the proper tools you can even view moving pictures, and listen to music and other audio.

Perhaps you would like to locate a rare album, or debate one musician's merit over another's. Perhaps you prefer to discuss and compare the works of others with producers, collectors, gallery owners or other professionals in your field, or related fields. You might want to find out who's hot and why. You could also find out where, and when shows, showings, benefits, conferences, releases, signings, and performances are taking place, or announce your own.

They say that for every artist, there is a critic, and you could meet one, or be one, on the Internet.

2.2 Sharing Your Work and Collaborating with Others

Artists often want to share their work with other artists so that they can get peer comments and recognition. The Internet is a great place to explore new ideas with other artists as well.

Perhaps you are a painter who has developed a method for keeping acrylics moist during long sessions, or a photographer who has discovered a new lighting technique. You could make the information available over the Internet to enlighten others, or to get their feedback.

Perhaps you've had difficulty in some aspect of your work, and you'd like to talk to others who have had similar experiences to find out how they solved them.

There are many types of content that artists can share. Including:

- text: stories, poetry, historic accounts, transcripts, etc.
- images of their visual work: paintings, photographs, sculpture, etc.
- images of themselves: photographs, self-portraits, etc.
- sound files of their audio works or voice presentations of their works: books on tape, speeches, tutorials, music, etc.
- moving pictures: video arts, performance arts, etc.
- a description of their art process and works of art
- resumes and biographical data
- contact information in the form of electronic mail address, postal mail address, phone, etc. Electronic mail is most popular because it allows people to respond spontaneously.

After you've met some of the global critics, and compared your work with others, you may feel so bold as to share your work with others. Perhaps emailing a manuscript to a publisher, or putting up scans of your art will entice a buyer. Perhaps it will entice a critic to say wonderful things about your work.

Perhaps putting your work on the Internet will bring fortune and fame, or perhaps it will encourage others to put their work up. Increasing the cultural content of the Internet will have profound results in all areas of the Arts.

There are many ways of collaborating over the Internet. As mentioned in previous sections it is easy to see how to communicate and exchange work with other artists from anywhere in the world. In addition, there are art and literature projects which explore the Internet by asking people to submit their feelings, thoughts, and ideas through the Internet. Some of these projects will allow interested people to come to them, others may be distributed in various ways to actively seek out people interested in participation.

There are also games which are played over the Internet, by players all over the planet. These types of games, which are described in greater detail in Section 5, can be both entertaining and educational. Some games offer players the opportunity to alter the environment, so that ideas and information contained in the game evolve over time into a jointly constructed experience.

2.3 Freely Available Software, and Other Information

There is a world of useful software available to you via the Internet. Known as Shareware, Public Domain, or Freely Copyable, you can find many software programs you may download and use on your own machine, often completely free, occasionally for a small and/or optional fee which helps the author to afford to create more software for general use. There are also libraries, stores, and news groups you can peruse in search of just the tool or information you want.

As you explore the Internet, you will begin to find information that is beyond your reach without the right tools for viewing, listening, etc. For example, someone may have put up a sound file using a format which cannot be recognized by the software you have installed. In these cases, that person will often have included a pointer to the exact tool necessary to recognize their format, or convert the format, and you can download, install, and use this tool right away. More information on file formats is provided throughout the document.

Using the basic tools acquired to access the Internet, you can begin to add to your collection software tools, both for accessing the information already on the Internet, and for creating your own content. After reading this document you will have the tools necessary to find and use this information.

Appendix B provides a list of Internet sites, where communication about the arts, and freely copyable software tools and art, among other things, can be found.

There are many people both like, and unlike, yourself with whom you can meet, communicate, and share ideas. Some like to just talk, you can listen if you like. Others like to just listen, so you and others can talk.

There are also many forms that communication can take, from private electronic mail, to group video conferencing, to moderated newsgroups, to public bulletin boards. See Section 5 for additional information on Electronic Forums.

3. What is the Internet?

As new users, the first question that probably comes to mind is: "What is the Internet?" A good answer is: "People, computers and information electronically linked around the world by a common protocol for communicating with each other."

The Advanced Research Projects Agency (ARPA) was founded in the late 1960s. Among its many projects, ARPA created a network of computers called the ARPANET. As other networks were created, most were connected to the ARPANET, and the resulting network that interconnected many networks was named, "The Internet". At last count, this "Information Superhighway" connects several million computers and over 40 million users from all over the world.

The Internet should not be confused with America OnLine (AOL), CompuServe, Prodigy, and other type service providers, which may use their own, often proprietary protocols and are sites unto themselves but may also have connections to the Internet. The Internet should also not be confused with the World Wide Web which is the topic of the next section.

3.1 What is the World Wide Web?

The World Wide Web, generally referred to as simply, The Web, is comprised of a subset of the computers on the Internet.

You can visualize the World Wide Web as a giant magazine stand with a vast web of strings connecting various words pictures and ideas. Like a magazine rack, you may quickly select a chosen magazine, or you may browse, following the strings from magazine to magazine.

More formally, the Web is vast multimedia "document" distributed among a large number of the computers on the Internet.

There is no central hierarchy that organizes the Web. Instead, the information is distributed among many "Web Sites" created and used by the many people on the Internet. Each Web Site is much like a magazine in that it has a Cover Page, called the Home Page, and other pages of related information that can be connected in whatever way the author wishes. This "document" is in a format called "hypertext" which allows information in the web to be linked by words or pictures viewed on the computer.

The Web is broken up into a large set of pages, called "Web Pages", of information connected by hypertext "links" which let you click on a highlighted word or picture to call up a page of related information. This is what differentiates hyper-text from "normal" text. In "normal" text, each idea, sentence or paragraph is connected in a sequence or "train of thought", from beginning to end. In hypertext however, tracks of ideas branch out through "Links", so that each idea may be connected to many different "trains of thought". This ability to follow an idea to many different destinations allows you to read hypertext documents in a way more naturally resembling human thought.

For example, you might create a "Cool Music" Web Page and place it on a "Web Server", which is any computer somewhere on the Internet running the software needed to provide access to the resident Web Pages. Anyone on the Internet could then use a piece of software called a "Web Browser" to ask the Web Server to view your Home Page.

This Home Page could be a striking artwork featuring a list of your favorite albums and a few labeled buttons. While your music plays from their speakers they might choose to click on any album that catches their eye, or go to lists of information sorted by Artist, Label, or Genre. Once they get to the page for a particular album, they might see the artwork, a song list, and other links to follow. Clicking on a song might pull up the song lyrics, or perhaps even download the song. Or they could follow a link you provided from your page to the HomePage of the artists record company, or to a magazine interview of the band. If the information is out there, your page could link to it.

At last check there were hundreds of thousands of web sites, home pages, and hosts on the Web. The contents of those sites are almost as varied. Some pages are personal pages containing photos of family members, lists of hobbies, or the sharing of collections such as song lyrics. Some pages are strictly business, selling everything from abalone to zymoscopes. Still other pages provide services such as information searches, and weather reports.

Human culture is based on communication, and the widespread availability of information and the thought-like constructions of hypertext are the most powerful new ideas in communication since the invention of writing. A glance back at history will easily show how written language has shaped our societies. These results are only a foreshadowing of the things to come.

4. How Does the Internet Work?

While it is not necessary to understand how the Internet works in order to use it, a brief technical overview will introduce you to some concepts and terms that will be used in the sections ahead.

As we go into more detail here, we are assuming that you, the reader, have at least a passing familiarity with computers. Section 6.2 provides more information on computer hardware and software.

On one level, networks are built out of wires, phone lines, and other pieces of hardware, and the Internet is indeed built of all these things. The essence of the Internet however is built out of an idea called the Internet Protocol.

There are many different kinds of computers. Most of them work by encoding information into ones and zeroes, which they can manipulate at incredible speeds. Unfortunately, there are many different ways of encoding information. Computers that use different methods can be said to speak different languages. In order for computers to talk to each other there must be a thing called a "Communication Protocol" that provides a set of procedures for talking and a common language to use.

The Internet Protocol, or IP, is the Communication Protocol that all computers on the Internet must use and understand. It allows computers to find each other, and to send packages, or "packets", of information back and forth. Much like the Postal service reads your country code, city code, etc., but not the contents of your letter, the Internet Protocol does not care what is inside most of these packets of information. This is a great thing because it means that other, higher level protocols may transmit any possible kind of information simply by stuffing it into a packet and handing it off to the software responsible for speaking IP.

Another important protocol upon which the Internet is built is the Transmission Control Protocol, or TCP. IP by itself provides a way of sending a message to another computer, but no guarantee that it will get through. Since reliable communication is a necessity, the TCP protocol was invented which uses IP to send packets and guarantees their delivery by requiring the receiver to acknowledge the information received. TCP and IP form the heart of a group of protocols aptly named the TCP/IP protocol suite. This suite of protocols provides most of the functionality of the Internet.

We will be mentioning these protocols throughout the rest of the document. Information on IP and other Internet Protocols can be obtained through the resources referenced in Section 10.

4.1 Internet Addresses

There are many things we would like to be able to find on the net, including people, information, and the computers themselves. An important part of IP and other protocols is the way they label things so that the computers can find and identify them. The U.S. Post Office finds people by their Postal Address, which is just a label containing information about who you are, and where you live. Likewise, the various protocols of the Internet have given computers, people, and information, addresses which can be used to find them. The following sections will describe several different kinds of addresses.

4.1.1 Computer Addresses and Hostnames

When speaking IP, computers locate each other using a thing called their IP Address. Each computer on the Internet must have a unique IP Address. Some programs allow or require you to use the IP Address directly, if so, it will appear as four groups of numbers separated by dots. (i.e., 123.123.123.123) Most of the time though, you will not need to worry about the actual IP Address number, because all computers have a "Host Name" to which the number is mapped.

A computers hostname also comes in parts, separated by dots. The first part is the name of the machine, and the second part is the name of the "domain" in which that computer is registered.

For example, if I had a machine named "foo" registered in the commercial domain known as "com", my machine's hostname would be "foo.com". When speaking out loud, this machine's address would be spoken as "foo dot com".

A domain is just an abstract category to which machines and networks may be registered into in order to organize them. Domains are organized in a hierarchy of top level domains and their subdomains. Top Level Domains include,

- .edu for educational institutions
- .gov for government sites
- .com for commercial companies
- .org for other organizations
- .net for network infrastructure sites
- .us for sites in the United States
- .ca for sites in Canada
- .nl for sites in the Netherlands
- .jp for sites in Japan

to name a few. Domain names may be further subdivided by inserting one or more subdomain names before the top level domain, still separating everything with dots. For example, "law.harvard.edu", for the Law School at Harvard University, and "la.ca.us" for computers in Los Angeles, California in the United States.

More information about the Domain Naming System can be found in the documents referenced in Section 10.

4.1.2 Addresses of People on the Internet

Every human being has a given name, or full name with which we address them. When you begin to use a computer, you will be introduced to your "username". Your username, sometimes called your

user i.d., may be your initials, your last name and first initial, your nickname, a number, or anything else that is just normal letter or number characters. (Your username usually cannot contain "special" characters such as "&", or "%".) Sometimes you get to choose your own username, and sometimes your service provider or system administrator will choose one for you.

Your username is used when you connect to other computers, and to identify you in electronic mail. Your electronic mail, or Email Address, will consist of your username followed by the symbol "@", followed by your computers hostname.

So, for Joe Cool, who has the username "jcool", and gets his Internet service from Dirigible Online, his email address might be "jcool@dirigible.com". When spoken out loud, the "@" symbol is pronounced simply "at" so this would typically be spoken as "jcool at dirigible dot com".

Email is moved around on the Internet using the Simple Mail Transfer Protocol, SMTP, over IP. Information on SMTP can be found in the documents listed in Section 10.

4.1.3 Information Addresses, Uniform Resource Locators, or URLs.

In order to retrieve information from the Internet, you need to be able to find it and know how to ask for it. This is the job of the Uniform Resource Locator, or URL which functions as an address for information. Every file or document intended to be accessible through the Internet has a URL.

URLs (or simplified versions of them) are now appearing frequently in TV, billboard, and magazine advertising as a company's Internet Address; basically the hostname of their web site.

In previous sections we've identified IP Addresses, hostnames and email addresses; a URL contains more information. Not only does it tell you what the information is, and where to find it, it also tells you precisely which protocol you need to use to retrieve it.

A URL is a machine readable, and hence somewhat cryptic, text string, in a form such as "http://www.something.com/location/filename.ext". This string can be broken down into the following pieces.

http is the name of the communications protocol which can be used to access the information. In this case, it identifies the HyperText Transfer Protocol, which is used in the World Wide Web, and will be described later. Other protocols are described in Section 4.3.

: separates the protocol from the hostname

// indicates that what is to follow is the hostname

www.something.com is the hostname of the computer on which the document resides. In this case, the "www" indicates that it is a machine named for the fact that it is running a World Wide Web server. "something.com" is the domain in which that server is registered. Typically the "something" part is the name of the organization running the server.

/ separates the hostname from directory on the machine in which the information resides.

location is the location of the information on the machine something.com.

filename is the first part of the file name of the information you are retrieving.

. a dot separates the filename from its extension

ext the extension, or file "type" actually says a great deal about the file, how to handle it, and how to present it.

The URLs you see will usually be simpler than this. The people at something.com assume you are going to use a modern web browser to access the information, so they may leave off the protocol information, "http://", because this is probably your web browsers default protocol. Also, if they configure their server to have a default homepage to display, they can leave off everything after the hostname part of the URL. This puts it into the form that is most commonly seen, www.something.com.

URLs can specify any file and most protocols. In this example, the URL is using the protocol for moving HyperText, the HyperText Transfer Protocol, HTTP, over IP. More information on HyperText and HTTP can be found in the next section, and in the Resources section.

4.2 How Does the World Wide Web Work?

Web pages are computer files written in a format called HTML, the HyperText Markup Language. HTML is the protocol for putting specific strings of letters and symbols (such as parentheses) into an ordinary

text document which can specify that words link to other pages, or be viewed in a particular type font, or display images, or many other things when viewed with the appropriate software. The appropriate software would generally be a web browser. More information about software tools is provided in Section 6.2.

HTML is simple enough that most people can learn to use it, but rich enough in possibility that there will always be a thriving community of people making web pages for others.

Links within a hypertext documented are implemented using references to the URL of the information to be linked to.

In order to download information from distant places in the web, your computer will typically be using a protocol called HTTP, the HyperText Transfer Protocol. HTTP was designed to allow web browser software to connect to web server software on other machines and request the transmission of a web page in the form of an HTML document and any associated images, audio, video, etc. The latest version of the HTTP can actually tell what type of browser is connecting and the server is now able to better customize its default homepage to its audience.

More information on HTML, HTTP, and hypertext can be found in Section 7.3, and through the references listed in the Resources section.

4.3 Other Higher Level Protocols on the Internet.

There are many other higher level protocols built on top of IP. We've provide examples throughout the document, but we'll mention a few here to make you more familiar with them.

telnet: a protocol for providing remote terminal service. Telnet software allows you to log in to remote computers across the net by giving you a virtual terminal on that computer.

ftp: the File Transfer Protocol. FTP allows diverse machines to send simple files back and forth. FTP is usually used by archive sites to allow multiple users to download files simultaneously.

smtp: the Simple Mail Transfer Protocol. The SMTP specification allows electronic mail to be sent, stored, and forwarded, around the Internet. SMTP does not specify how a mail "reader" operates, just the transmission of email.

nntp: the Network News Transfer Protocol. NNTP specifies how Internet News is passed, stored and forwarded around the Internet.

gopher: the Gopher protocol creates linkages, much like the web, which is called, "gopherspace". The specification allows a gopher server to serve files in a text rather than graphic format.

Many other protocols function on the Internet, and are specified in technical documents, such as are referenced in the Resources section.

5. Forums

Websters defines a forum as "A public meeting place for open discussion." In the world that could be a park or an auditorium. In the Internet, a forum will be electronic, but it may still feel like a roomful of people.

Many forums exist on the Internet. There are interactive forums where you can share information in real-time and carry on discussions with others. There are message-based forums where you send or receive a message and others involved in that forum can respond later, and there are archived forums where information is stored, and may be retrieved by anyone but modified only by its owner.

While we have attempted to list and describe a few of the more popular forums, we have not created an exhaustive, complete, or up-to-the-minute list here. You can find information on forums, lists and sites in many magazines and books today.

5.1 Message-based Communications

In Message-based communication, a message is sent by one user, and can be received by one or many. For example, you might send a dinner invitation to an individual, a couple, or a group. In the same way, you send electronic messages to individuals or groups. Just like a postal service for physical mail, there are electronic mail servers for electronic mail. Just like you have a physical address to which your physical mail is sent, there is an electronic mail address to which your electronic mail is sent.

Message-based Communications includes electronic mail, newsgroups, and bulletin boards.

5.1.1 Email

Electronic mail, called EMAIL, is a system whereby a computer user can exchange messages with other computer users, or groups of users via a communications network. This can be the Internet, or a smaller internal office network.

Typical use of email consists of downloading messages as received from a mailbox or mail server, then reading and replying to them solely electronically using a mail program which behaves much like a word processor for the most part. The user can send mail to, or receive mail from, any other user with Internet access. Electronic mail is much like paper mail, in that it is sent, delivered, and contains information. That information is usually textual, but new innovations allow for graphics, and even sound to be sent in email.

Email is superior to paper mail in that it can arrive at its destination within minutes of being sent, and it can be replied to, appended to, forwarded, formatted, saved, or deleted just as quickly.

Some sites on the Internet run a type of file server which can respond with a file automatically, for those who have email but not web or ftp access.

An email address consists of a username, and the address of the machine to which the mail should be delivered for that user.

Reviewing Section 4.1.2, email addresses take the form "username"@site".domain" For example, if your name is Joe Cool and you get your Internet service from Dirigible Online, where you login as "jcool", your email address might be "jcool@dirigible.com".

You will usually get your Email address from your System Administrator, in a work or school environment, or from your Internet Service Provider. Section 6 provides more information on Internet Service Providers.

5.1.2 Newsgroups

Someday everyone will be able to get their news electronically, saving paper, money, time, and the environment.

A Newsgroup is an electronic bulletin board system created originally by the Unix community and which is accessible via the Internet. Usenet News forms a discussion forum accessible by millions of users in almost every country in the world. Usenet News consists of thousands of topics arranged in a hierarchical form. Major topics include "comp" for computer topics, "rec" for recreational topics,

"soc" for social topics, "sci" for science topics, and there are many others we will not list here. Within the major topics are subtopics, such as "rec.music" for general music content, and "rec.music.classical" for classical music, or "sci.med.physics" for discussions relating to the physics of medical science.

If you have access to newsgroups, it would be wise to read any postings on the newsgroup "news.announce.newusers" first. This newsgroup provides detailed information on newsgroups, such as finding the right place to post, and information on newsgroup writing style.

Local newsgroups are those that are accessible through your organization or company which contain news that is relevant only to your organization. For example, NASA's Goddard Space Flight Center, GSFC, has many internal newsgroups that are of interest only to GSFC employees and none of the other NASA centers. Therefore, newsgroups have been formed to provide internal information to NASA GSFC employees only and no one else. Some examples are: gsfc.carpool, gsfc.dialup or gsfc.220.civil.servants.

Another example of a local newsgroup is news that is posted regarding your community or the vicinity in which you live. For example, if you lived in the Washington D.C. area some of the local newsgroups might be: dc.biking, dc.jobs or dc.smithsonian.

Many newsreaders are available, and many web browsers now also support news. The URL to use for a newsgroup will have the protocol news: followed by the group name, as in news:dc.smithsonian. A domain address is not necessary, as the browser would be configured to know which host you will get news from.

5.1.3 Electronic Bulletin Board System - BBS

An Electronic Bulletin Board System, or BBS, consists of a computer, and associated software, typically providing electronic messaging services, archives of files, and any other services or activities of interest to the bulletin board systems' operator.

Typically a BBS user must dial into the BBS via their modem and telephone line, and select from a hierarchy of lists, files, subdirectories, or other data maintained by the operator. Once connected, the user can often send messages to other BBS users within the system.

Although BBSs have traditionally been the domain of hobbyists, an increasing number of BBSs are connected directly to the Internet, and many BBSs are currently operated by government, educational, research, and commercial institutions.

BBSs usually advertise their services in the backs of magazines and newspapers and by word of mouth. Many companies now offer a BBS via which their customers can retrieve their latest technical support documents and product literature.

5.2 Real-Time Communications

The communications methods described in Section 5.1 involve delays between when you send a message and when you receive a response, with the result that both parties are not involved simultaneously. The net can also be used to communicate in "Real-Time" by making the sure the delays are short enough that both parties can be involved simultaneously in a "conversation".

Typically this is done in a text based format where each user has two special regions on their screen: One that they type in, and another that the other users type is displayed in. The delay between when one user types and the other sees it on their screen is called "net-lag" and usually ranges from "too short to be aware of" to about 30 seconds. Lag can occur due to network congestion or a variety of bottlenecks including link speed, processor speed, and typing speed.

Although it is still rather expensive, it is also possible to use both audio and video in "Real-Time". However the reasons for it's expense are temporary, and you should expect to see more and more of this in the future.

Forums which communicate in real-time are the Internet Relay Chat (IRC), the Multi-User Dungeon (MUD), Audio-Video Conferencing (AVC), and WhiteBoard Systems (WBS).

5.2.1 IRC - Internet Relay Chat, WebChat

Internet Relay Chat, or IRC, provides a text-based mechanism for communication with multiple participants. IRC is an interactive forum set up in virtual rooms that you can move between, and where others can virtually "hang out". Chat rooms can be used to discuss common ideas or topics, or as part of a collaborative process. The connection method used will be specific to each IRC site. IRC sites can be found using search tools, as outlined in Section 5.3.1.

Web chat is like IRC but it is done via a web browser, and it is not a text only forum. Section 6.2 provides more information on web browser software.

Many webchat sites require the user to register before being able to participate in the activity. If any additional software is needed based on your particular software and PC configuration the site will point you in the right direction so you can download the necessary software.

Some sites will provide you with chat etiquette guidelines. Please be sure to read the directions before you participate in the chat session.

Once you begin to chat you may find that there are some abbreviations used with which you are not familiar. These abbreviations are for various actions or phrases. Some very common ones are: by the way (btw), in my humble/honest opinion (imho), and ta ta for now (ttfn).

Appendix B provides a few Chat sites to start you off.

5.2.2 Multicasting

Multicasting is a technical term that means that you can send pieces of data, called "packets", to multiple sites simultaneously. How big a packet is depends on the protocols involved and it may range from a few bytes to a few thousand. The usual way of moving information around the Internet is by using unicast protocols, which send packets to one site at a time.

You can think of multicasting as the Internet's version of broadcasting. A site that multicasts information is similar in many ways to a television station that broadcasts its signal. The signal originates from one source, but it can reach everyone in the station's signal area. The signal takes up some of the finite available bandwidth, and anyone who has the right equipment can tune it in. The information passes on by those who don't want to catch the signal or don't have the right equipment.

5.2.3 MUD - Multi-User Dungeon

A MUD is an interactive game environment where both real other players and virtual other players exist and with whom you can communicate to share ideas or solve puzzles, etc.

The word "Dungeon" refers to the setting of many of the original games of this sort, in which you, our hero, must escape from a dungeon-like environment where evil goblins, demons, and other "bad-

guys" are wandering around ready to kill you. Generally the goal, in order to win the game, is to find and retrieve some treasure, or reach some hidden place, and find the way out.

MUDs have applications in education, as for problem solving and leadership skills, as well as in building teamwork to share ideas and to enhance creativity. Having a virtual world in which people from diverse backgrounds and cultures can come, again and again, to work on a common project, allows ideas to accrue and cultures to grow over time.

For more information on MUDs, and other collaborative environments, explore the references in the appendices.

5.2.4 Audio Video Conferencing

Audio Video Conferencing has many applications in the arts as well as in business. Using the Internet, teachers can reach students who cannot get to their schools, doctors can give medical consultations from around the world, and artists can perform in front an audience they would never have otherwise.

CU-SeeMe is a freeware desktop videoconferencing software tool. CU-SeeMe allows Macintosh and Windows users with an Internet connection and a desktop camera (some go for as little as \$100) to see, hear and speak with other CU-SeeMe users across the world. This program was developed at Cornell University in Ithaca, New York, USA and is freely available.

CU-SeeMe allows the user to have a one-to-one communication. It is also possible to have a one-to-many or many-to-many communication by installing a reflector on another machine running the appropriate software. The reflector software must be installed on a Unix machine. The software can be obtained from Cornell University's CU-SeeMe page listed in Appendix B.

Whiteboard systems also enhance audio visual conferencing. A Whiteboard, which is analogous to a chalkboard, is physically quite similar. Using a write-on wipe-off style of whiteboard, which has been electronically enhanced, allows people on the Internet to share text, drawings, and other graphic information which is being written in real-time.

Software exists which allows connections between two sites, or hundreds, over the Internet, the Web, or your telephone.

5.3 Archives

Archive is defined in Webster's New World Dictionary as:

n. 1 a) a place where public records, documents, etc. are kept b) a place where material having documentary interest, as private papers, institutional records, memorabilia, or photographs, is kept.

Archives on the Internet are pretty much the exact same thing. The motivation and much of the content is the same, but the media changes (from paper files, to electronic files), and as such allows for a much greater diversity of content.

Archives on the Internet also allow many people access to their files simultaneously, and from all over the world. Many archives on the Internet still reside on Anonymous FTP Servers, which allow users to log in without a user i.d. or password. When connecting to these servers the protocol used is "ftp" the File Transfer Protocol, as mentioned previously in Section 4.3.

Any and all information that people want to make available on the Internet can be. This means there is a truly vast amount of information out there, with more being added every day. In fact there is so much information that it is sometimes difficult and confusing to find the information you want. This is the topic of our next section.

Some anonymous ftp sites are provided in Appendix B.

5.3.1 Searching

One of the great challenges facing the Internet is how to organize the vast amounts of information in ways that allow most people to find what they want. In theory, there may be a "perfect" organization, but in practice, we will never achieve it. This means that finding the information you want on the net may require some skill on your part. Fortunately there are many tools and strategies that may be helpful.

One of the all time great ideas for finding the information you want is a thing called a search engine. A search engine is a computer program usually living on a remote computer that spends its time downloading information from other computers and building an index of what lives where. This behavior has given them the nickname of Web Crawlers. What this means to you, is that you can call up the Search

Engine's home page, and enter in a subject, name, title, or random string pattern, which is then used to search the engines index for stuff out on the net that seems related. This can lead to both a large volume of information, and some rather startling discoveries of information from unsuspected sources.

Some of the available Searchers and Indices on the Internet include:

Yahoo - Index of WWW sites, with search capabilities
<http://www.yahoo.com/>

DejaNews - USENET (news groups) search engine
<http://www.dejanews.com/>

WebCrawler - <http://query.webcrawler.com/>

Lycos - <http://www.lycos.com/>

AltaVista - WWW and USENET search engine
<http://www.altavista.digital.com/>

Magellan - Index of reviewed and rated Internet sites, with search capabilities
<http://www.mckinley.com/>

Yahoo, for example, has a high-level category called "Arts", which has a multitude of subcategories below it, most of which have further subdivision, each of which can contain lists of lists.

For example, to find information on Modern Dance, from a starting point of <http://www.yahoo.com/>, you can follow the links to <http://www.yahoo.com/Recreation/Dance/Modern/Groups> or simply type "Modern Dance" into the search field and choose from a list of selections returned.

On a typical attempt on March 25, 1997, Yahoo returned 4 major categories of Modern Dance, and offered 82 other links to related pages around the web. Statistics, however, can be changing by the moment.

There are many other Searchers and Indices on the Internet, and a good way to find them, is to do a search for them in one of the services above, or others you encounter in your travels. The resources in Appendix B may also be helpful.

After experimenting with the available search engines, it quickly becomes clear that searching on a broad category can result in too much information. For example, a recent search at AltaVista for the subject "Rembrandt" matched over 8500 individual items, including information on the famous artist (Rembrandt von Rijn (1606-1669)), His Self-Portrait, a hotel in Thailand (Rembrandt Hotel and Plaza, Bangkok), and a pizza restaurant in California. (The URLs for these sites are listed under Rembrandt in Appendix B.)

To be more particular in what you find, all of the available search engines allow you to do compound searches, in which multiple keywords are used, possibly in combination with Boolean logic operators such as AND, OR, and NOT. For example, to focus in on Rembrandt the artist, at the exclusion of pizza cafes, try the following advanced search in Magellan:

Rembrandt AND artist AND portrait NOT pizza

Note that the method of entering search items differs slightly from service to service. When trying a new service, check the available help topic before searching. And as with any new skill, practice, practice, practice!

Test of search scope:

Lycos:	rembrandt.	1837 relevant documents
Lycos:	rembrandt and artist and portrait	6 relevant documents
Yahoo:	rembrandt	2 Category and 39 site matches
Yahoo:	rembrandt and artist	2 Category and 11 site matches
AltaVista:	rembrandt	about "10000" documents
AltaVista:	rembrandt +artist +museum	about "100" documents
WebCrawler:	rembrandt.	347 matching "rembrandt"
WebCrawler:	rembrandt and artist and portrait	21 matching documents
Magellan:	rembrandt	666 results
Magellan:	rembrandt and artist and portrait	39379 results

You will notice, in the above statistics, that the numbers for Magellan are quite different from the others. This is because different search engines may function differently. When you do a this+that search on Magellan, it looks for all instances of This AND all instances of That rather than the standard response of Only documents which contain both This AND That. On almost all the sites I have explored, there is an explanation of how the search process works on that site. You should read that explanation if you are having trouble or need further information.

You will also begin to see patterns in the way people name, or file, their information, which will help you find more information. Some may list their links to ART, while others list their links to PAINTINGS. Also many people put links to related pages in their pages, so one page you find that does not have what you are looking for, may have a pointer to another page that does have what you are looking for. Searching is an iterative process, keep going from one search key to another, and continue down multiple levels to see what is out there. Its known as Exploring, or Surfing the Net, and it is a major part of the joy of the Internet.

6. Accessing the Internet

Having decided to explore the Internet, you will need some tools and information to get you started.

Accessing the Internet in terms of simply receiving, downloading, and viewing files, uses most of the same tools (software and hardware) needed to create files and make them available on the Internet. Sections 6 and 7 overlap a great deal in the areas of basic hardware and software.

The Internet can be accessed in many comfortable ways: at school, at home, at work, and even at trendy CyberCoffeeHouses. Accessing the Internet is not synonymous with publishing and displaying on the Internet, however. You may need different equipment for creating content, then you need for retrieving content. Section 6 focuses on the specific needs of those who wish to create content and publish on the Internet.

If you live near a major metropolitan area you may have already begun to see advertising for Internet access from your local telephone company, or cable TV provider. Contact them to get information on equipment needed, services provided, access restrictions and costs involved.

Local libraries and schools may now offer both Internet Access, and instruction on Internet related subjects, including getting connected. Check the Internet sections of your bookstore and magazine stands.

Do not be dissuaded if you find limited access. The Internet will soon be everywhere, but if you do not want to wait, then you might consider taking matters into your own hands as these enterprising youths did...

When several students from large universities returned home to Taos, NM, a few summers ago, they left behind their Internet connections. Missing their connectivity, they approached the owner of a local bakery and suggested he start an Internet room where he could charge people by the hour to use the Internet. The entrepreneurial baker applied for a government grant and received a few computers with high speed modems.

You may be able to find a place like this, often called a CyberCafe, rather than having to create one. Try your local magazine stand for the latest periodicals, or your public library or bookstore for pointers to other people who will know more.

Once you have some Internet access, you can find out more about Cybercafes, InternetCafes, and other physical Internet access points, by searching as described in Section 5.3.1. and in the newsgroup alt.cybercafes.

6.1 Internet Service Providers

Being an Internet Service Provider (ISP) these days is pretty easy and can be financially worthwhile, so there are a lot of them, and they are starting and failing every day. In addition to the information and pointers you will find in this document, many organizations exist to help you locate, and choose a service provider.

As with any service, be sure to get references, and get their features and terms in writing. Some ISPs provide access only to their site, others may provide email only, or provide access to the web but charge by the minute for access. Have some idea of what you want to do and what the vendor provides before making any deals.

Many Internet Service Providers offer free instruction to get you started in accessing the Internet as well as creating content. With the competition of Internet providers, you should be able to find one or two that offer the instruction you need.

Some organizations exist solely to recommend those who pay them. Most Internet related magazines these days will contain extensive advertising by ISPs in your area.

As discussed in Section 4.1, every machine on the Internet needs an address by which it is accessed. Even machines which are only browsing need an address to which the browsed information is returned. This is actually called your IP address. The address is the number with which your hostname is associated. Usually you will get your IP address from your work, school, or ISP when you get your configuration information for your Internet connection. If you were trying to get an IP Address on your own, you would go to the Internet Assigned Numbers Authority (IANA).

More information about IANA, IP addresses, and domain names can be found in the information referenced in the Resources section.

6.2 Computer Hardware and Software Tools

A basic computer system consists of a box containing a Central Processor Unit (CPU), main controller (motherboard), and Floppy

Drive. It will also come with a keyboard, and you will need a Hard Drive, Memory, and a Video Monitor. How much memory, how large a hard drive, and how fabulous a monitor, will vary with your needs and experience. To connect to an ISP you will usually also need a modem.

This is simply an overview to familiarize you with some basic terms. There are many current magazines devoted to computer and Internet related subjects now available in most bookstores and magazine stands which provide much better and more timely information on computers, operating systems, software, and peripherals.

There are many types of computers available including Personal Computers (PCs), Apple Macintosh Computers (Macs), and various Unix based Workstations. The most affordable systems are generally PCs and Macs.

You may also need to choose an Operating System (OS) for the machine you choose. PCs can run a version of "DOS", anything from Microsoft (Windows, NT, Windows95, etc.), or a version of Unix (BSDI, FreeBSD, Linux, etc.) Macs can run the common Mac Windows, or Apples version of Unix. Workstations generally run a Unix derived OS, but there are also quite a few machines available which run their own proprietary OS.

Each type of system has its features, functions, and drawbacks, as well as its proponents and opponents. Each system has different costs associated with it. You will need to understand much of this before you are ready to buy your first computer. Much of the free software available on the Internet, for example, was written for the Unix operating system because that has been the main OS of the Internet for many years. That, of course, doesn't mean there isn't alot of free software available for other OSs, Windows software, for example, is becoming quite popular. The system of choice for most musicians is the Mac because of the variety and quality of the music software available for them. Windows users will need a pc to run their software. Now, actually, there are many operating systems available for personal computers.

Common operating systems come in two basic types; single tasking and multi-tasking. This is a reference to how many different things or "tasks" the computer "seems" to be doing at once. The earliest computers were single tasking. They did only one thing at a time, and could be used by only one person at a time. DOS is a modern example of a single tasking operating system. Since people rarely do more than a few things every second, this often left the computer simply waiting around for the next keystroke.

Even back then, computers could do all the work needed to listen to a human in a few milliseconds every second, so time-slicing was invented to get more use out of computers.

A time-slicing operating system is said to be Multi-tasking. It executes programs in little slices of time, typically shorter than 25 milliseconds (or 1/40 of a second) and switches to another task for each new slice. If you remember that most video runs at 25 or 30 discrete frames per second, and yet humans perceive it as continuous, you can see how time-slicing can provide a convincing illusion of doing many things at the same time.

Multi-tasking operating systems have the option of being set up as single-user or Multi-user machines. Windows 95 and the MacOS are modern examples of multi-tasking operating systems that were designed to be used by a single user most of the time. Other operating systems, such as UNIX, VMS, NT, and others are more prepared to be set up as multiuser machines. Multiuser machines are typically connected to a network, or a network of terminals, so that more than one person can use the processor and other peripherals at the same time.

Some operating systems can also take advantage of Parallel Processing hardware that actually does more than one thing at a time. However as of this writing, this hardware is somewhat rare and expensive, so we won't go into the details here.

Different OSs also have different File Systems. The File System is the way in which your programs and other computer files are stored and displayed. Different Operating Systems also have different "User Interface"s. The User Interface is the way in which you interact with the computers OS. Some use "Text" interfaces, which require the user to type all commands using a keyboard. Others use a "Graphical" user interface, which provides graphical images of buttons and icons which the user "clicks" on to start programs and perform save and delete functions among other things.

In order for the software to run on the computer, the software must be written specifically for the operating system. Just like Internet traffic must use the Internet Protocol, software must speak the OS language of the computer on which it wants to run. Translation programs exist, but there are still problems.

One of the problems is with file"names". The DOS Operating System, for example, supports names that consist of an 8-character filename, and a 3-character "extension", separated by a ".". For example "foo.txt", and "myprog.exe" are valid DOS filenames, but sadly, "foo.html" is not. This means that HTML files on a dos system must

use the extension ".htm" rather than the ".html" extension used on many other systems. This problem also affects many other common extensions such as ".jpeg", ".mpeg" and others.

A filename's extension is very important in that it tells not only you, but your software, the kind of file it is, and what it needs in order to be understood. For example, when your web browser encounters a file with a .html or .htm extension, it will assume it is hypertext, and will know how to display it and follow its links. When it gets a .txt file, it knows to display it, and that it will have no links. Your browser can also be configured to understand other file formats which can be made to be displayed with the browser, or another program, or saved to disk, etc. For example, you might configure your browser to start up Word when it encounters a .doc file.

File extensions indicate file format. Just as there are different file extensions for different text file formats, there are different extensions for different graphic file formats. That goes for sound file formats, video file formats, data base files, and others.

Different software understands different file formats and will create and display only those formats it understands. For this reason, software which translates a file from one format to another is often necessary.

For example, if you create a file with Microsoft Word you will usually save it in Word's native format as a ".doc" file. You can also choose the "save as" option to save it as plain text in the .txt file format. Although some format information will be lost in the translation, words and numbers should remain unchanged. If you wanted to give others access to the file, and you couldn't assume that they all have Word, you would want to present it in .txt format. Note that a .txt file is also easily formatted into .html.

File formats and extensions are discussed throughout the following sections.

After you've resolved to some extent, what it is you want to do, and what hardware and OS you'll need, there are a great deal of software packages available to help you with all sorts of things on the computer.

Software designed to make your life easier by using your computer, include dictionaries and other reference materials, accounting, bookkeeping desktop publishing and other business needs software, as

well as landscape and architectural planning software, health and nutrition software, educational and entertainment software, and much, much more. Your computer need not only be your link to the world, but also a major organizational tool in your life.

For accessing the Internet, you'll need communication software. There are a few different pieces to this part of the puzzle. There is the software which communicates between the operating system and the modem or network card, there's the software which speaks IP and allows communication over the Internet, and there's the software which you use which is called the "user interface", or application program. For accessing the web, your application will be a "web browser".

Web browsers are available in stores that sell software packages, and are also available free on the Internet. Since you would not be able to reference the online material without a browser, and since most available periodicals will be likely to focus on commercial browsers, the Resources section provides a pointer to a free browser available by mail for the cost of postage, or over the Internet using the File Transfer Protocol, FTP.

Ftp software is available both free and commercially. Other Internet communication software, referenced throughout this document, are email, news, gopher, and telnet among others.

With any system, you should ensure that it contains the software and hardware necessary to maintain both itself and your data. While computer data is not particularly fragile, it is still sometimes lost due to hardware or software problems or simple human error. For this reason it is considered important to "back up" your system by making extra copies of important data. While simply copying data onto floppy disks could work, the small storage size of the disks makes it both time consuming and prone to human error. Many large capacity disk and tape drives are available with special software specifically for doing backups. It is highly recommended that you purchase a backup solution along with your computer.

It is also important to protect your data from being damaged by computer viruses. When you connect to the net and move data back and forth, it is possible that there can be a small piece of software called a "virus" that could hide in some of the data and infect your system, possibly then using your system to infect other machines that you connect to. These viruses are often created by misguided people as a sort of computer prank, and can accidentally or maliciously

damage your data. Fortunately it is possible to obtain virus checking software that can regularly scan your system to see if it has been infected. This software is important whether you are downloading information from the net, or using other peoples floppy disks. See Section 8.2 for more information on viruses.

Determining your ideal hardware and software configuration will take some time and patience. You need an understanding of what you want to do, and how, and whether you wish to simply view, or create.

You'll also want to know the limitations and expandability potential of the system, so you can determine if it will have a useful lifespan. If the machine cannot grow for the foreseeable few years, it will become obsolete before its given you its fullest value.

6.3 Multimedia

When one media is not enough.

Depending upon your needs, you may require special hardware installed in the machine, or attached externally by cables. These additional pieces of hardware are known as peripherals.

The peripherals needed for accessing information on the Internet might include the following:

- a sound card and speakers to hear sounds, music, speech, etc.
- a CD-ROM player to read commercially available computer CDs
- midi equipment for audio artists
- video equipment
- a printer to make hardcopy of files, or images
- Other equipment for creating content See Section 7.

Most of these peripherals will also require specialized software. If you plan to purchase all the hardware and software at once, find a vendor who will connect and test all the hardware, software, and peripherals for you. Due to the complexity of these systems, they can be difficult to configure for the inexperienced user.

Also, verify that the vendor will stand behind their equipment, and this configuration in the event that it doesn't work the way you want it to. Hook the system up, and test it extensively right away, so as to determine any problems before your warrantee period expires.

Many of the Internet related periodicals available run articles on choosing a computer, as well as the latest software and hardware news and reviews.

You can also explore the pointers in Appendix B for the information you need.

7. Creating Content

As the hardware and software of the net becomes cheaper and better understood, the technology itself will become less important than the content which lives on the net. Many of the rewards of the Internet will go to the people who create such content.

There are different ways to add content to the Internet. One may start with pre-existing content, such as paintings or stories, and find a place for it, or one may create content specifically for the computer such as web pages, graphics, video and audio files, etc.

Let us for the moment assume that you have already created something which you would like to make available on the net. There are many ways in which you could do this. You could deal with agencies who provide this service professionally, find friends or others willing to do it for free or barter, or get yourself on the net in some fashion, learn, and create a place for it yourself.

If you chose to do it yourself, you will need your own computer and some form of Internet access from an Internet Service Provider (ISP) or Web Space Provider (WSP).

Once you have a place to put your content, you will need to understand a little more about file formats. Images may have to be digitized, audio may have to be recorded into computer files, etc.

While hardware, such as image scanners, are readily available, there are also many other options available. For example, most print, or copy shops today can do high quality image scans and some photolabs now provide photos-on-disk as one of their services.

If you are placing your content on the Web, a web page must be created for it in the form of an HTML document. While this is easy enough to do yourself, many WSPs also offer this service, and there are also independent web page designers who may be able to do a better job.

Creating online content involves moving your art into an electronic form and then perhaps, re-formatting it for the Internet. For some art forms, the initial electronic step is fairly painless: typing a short story, poem, novel, or other text into HTML is fairly

straight forward. Moving a computer graphic to the Internet may require a conversion program to make it useful to others. Performing arts, sculpture, and other pieces may be more difficult to capture on a computer disk, and may require more work and creative thinking.

Much of the information needed to help you think creatively about publicizing your work online is available in classes, books, local Internet cafes, and on the Internet itself. Many Internet magazines are available for subscriptions or individual issues can help get you started. Most new bookstores and, to some extent, used bookstores provide numerous volumes of Internet information. However, even the most recently published books may contain outdated information. The latest 'standards' can be obtained directly from the Internet Engineering Task Force, or IETF, at <http://www.ietf.org/>. The document you are reading now is a product of that organization. The documents of the IETF are collected and maintained on anonymous ftp sites, as well as in the web. These sites are referenced in the Resources section, and Appendix B.

A really good way to learn how to write html documents is to look at the source code of html files already available. Just use your browser to look for pages you like, and then use your browsers "view source" feature to see how it was done.

If however, you learn better by having someone teach you, you may be interested in taking a HTML or Internet Introduction course at a local college. Most larger metropolitan area schools provide classes for the basics, which can also expose you to other artists. Make sure you read the course description; some courses may only cover accessing the Internet while you may want to actually be creating documents. If no colleges in your area offer classes, contact the computer science department or the continuing education office and suggest a topic. If the school can obtain enough support, they may offer a class the following semester.

Artists in smaller communities may need to rely more heavily upon online sources of information. Appendix B provides some useful sites to get you started.

7.1 Getting Help

Once you are connected to the Internet, there are many more ways of getting help with it. Try the forums, listed in Section 5, such as Newsgroups, Bulletin Boards, and Chat rooms. If you have checked the local netiquette guidelines, and behave accordingly, the Internet community will usually be very helpful toward new arrivals.

When looking for good consultants and web page designers, start with the sites you like, and find out who did their pages. Discuss your needs with other artists, or check the phone book, library, books, magazines and other periodicals for artist collectives and groups who may be available to assist you. Look for groups whose cause is artistically motivated, rather than trusting people who are paid to point you at a particular consultant or assistant.

Know what you want. If it takes you a while to figure out what you want, take that time. This should not be something you are rushed into. The Internet is not going to go away. Whatever you decide to do, do not be afraid to ask for references. A good provider of services will always be happy to provide you with a list of happy customers.

7.2 About File Formats

As described in Section 6.2, there are many file formats available on the Internet. You'll need to understand a bit more about the formats you'll want to present, in order to create them for others to see. Some formats are called Public Domain, and are freely copyable, and the software tools used to create this content is available for you and others to download off the net. Other formats are called "proprietary", and are only readable and creatable using software that must be purchased from the vendor who created it, or their authorized reseller.

Some formats, and their associated formatting tools, come along with other software packages. For example, Microsoft Windows comes with a Sound Recorder, which makes and plays back .wav files. Apple also offers Quicktime free for their OS, as well as Windows and others, which also records and plays back .wav files. So many Internet explorers already have access to tools which will allow them to hear your .wav file, if you were so inclined. They may not, however, have a player for a proprietary format for which they would need special software.

When creating content for the Internet, its important to consider the format most likely to be understood by your target audience.

More information on file formats can be found at:
<http://www.matisse.net/files/formats.html> and
<http://rodent.lib.rochester.edu/multimed/contents.htm>

Some artists are actually using html as an artform in itself and are helping to push the boundaries of this exciting new medium. The current HTML specification can be found in the RFCs referenced in the Resources section.

7.3 Creating Text and Hypertext Documents

Text files are stored on a computer by encoding the text in ASCII, "American Standard Code for Information Interchange", which substitutes a distinct number for each character of text, and stores the result in a file. Text files are often given the file extension ".txt".

Text files can be created in many ways. The two most common types of programs used are called "text editors" and "word processors". Actually both types of programs are similar. They both allow you to move around within the document, and add, delete, and otherwise modify text, as well as create and save text files. Word processors differ from text editors in that they usually also have a great deal of options for formatting and printing text, and may support alternative file formats, such as ".doc" which inserts many formatting commands that are understood by printers, but not always by browsers.

Since HTML formatting is simply ASCII text with special formatting commands, you may use either text editors or word processors to create a ".html" file. Alternatively, there are many Web authoring tools that will allow you to use a graphical interface to specify how you want your page to look, and will automatically generate the HTML formatting commands and output an ".html" file directly.

Text editors, Word Processors, and other document creation tools are available both freely and commercially for all operating systems.

Look to currently available computer related books and periodicals to provide sources of information about text editors, word processors, and document and web page authoring tools.

HTML is a technical specification of the Internet Engineering Task Force, and the most current documents can be found on the IETF site(s) listed in the Resources Section.

7.4 Creating Graphic and Moving Images

Whether you want to put your existing images on the Internet, or create new images using electronic creation tools, there are a few basic pieces of information which will be useful. The following two sub-sections provide an overview of image formats, and creation tools.

7.4.1 Bitmap Image Formats

Pictures may be stored on computers in many different ways. One of the most common, is a simple bitmap consisting of a list of pixel colors, and header information describing how to map this list of pixels back into the image. Bitmap formats are .bmp in windows, and

Bitmap images may be created by scanning in existing images, or by creating images directly on the computer, using programs such as Adobe Photoshop, Corel Photo Paint, Windows Paintbrush, and many others available both freely and commercially.

A scanner works very much like a copy machine, or fax machine, in that it "scans" your artwork or text and "encodes" it into a machine readable format of numbers and formulas. A scanner is a hardware tool, and usually comes with at least some of the software you need to use it. Generally it will connect to your computer and you will either place your work on it, or run the scanner slowly over your work, depending on the type of scanner you select. Scanners are only available commercially, and come in a variety of sizes and styles with a variety of features and prices. As with all computer tools, understanding what you want to accomplish will help you decide what you need to purchase.

Since it can take a lot of data to encode an image, there are many different kinds of file formats that contain compressed versions of the file data. These formats vary greatly in how they compress the data. Two of the most popular compressed image formats on the net are .gif and .jpg.

GIF, short for Graphic Image Format, compresses an image by reducing the number of colors in the palette the image is reconstructed from, allowing them to shrink down the size of the color specification for each pixel. Even if you only save a few bits per pixel, there are typically enough pixels that the savings are significant. Under extreme amounts of compression, images start to look like childrens coloring books, but it is possible to get great looking images with moderate amounts. GIF files typically use the extension ".gif".

The JPEG format uses complex mathematics to approximate the whole image. Under extreme amounts of compression, images start to look like bizarre cubist interpretations of the original image, but because everything about the image is compressed, it is still possible to get dramatic reductions in file size while retaining acceptable image quality. JPEG files typically use the extensions ".jpeg" or ".jpg"

Both of these formats are what is known as "lossy" compression because they actually lose information from the original image, thus degrading (hopefully by a negligible amount) the image quality. There are also "lossless" compression schemes that offer smaller reductions in file size, but allow perfect reconstruction of the image.

7.4.2 Vector Image Formats

Another way images may be stored is in "vector" format. This format is useful because of one of the techniques for creating images on a computer. There are programs that allow you to create images by creating shapes like circles and polygons, and specifying colors for them. If the entire image is constructed this way, it is possible to encode the list of information describing each polygon using only a fraction of the information it would take to describe each pixel.

Vector images also have the wonderful quality that they may be scaled without loss of image quality. For example, if you were to enlarge a bitmap image of a circle large enough to see individual pixels, you will find that pixels are actually square dots, and if enlarged enough, the circle will have very jagged edges. However if you enlarge a vector image of a circle, it remains perfect down to the limit of resolution of the screen or printer, because it is stored as the mathematical representation of a circle which is independent of scale.

For this reason, much commercial art and layout is often done in vector formats.

Vector formats may be created using many commercially available software packages, and many freely copyable conversion tools are also available.

7.4.3 Video Formats

Images received by the retina of the eye persist for a short period of time, and then fade. A sequence of images or "frames", with small changes, sufficiently close together, will give the illusion of a moving picture. How much of the picture changes between one image and the next affects how smoothly or jerkily the movement will appear. Frame rates of 10 per second and above are enough to give a reasonably realistic rendition of natural scenes. In fact, the way that motion is perceived by the human brain means that less detail is required in fast moving segments of a picture.

Video on your television, or Video Cassette Recorder (VCR), is formatted quite differently from video formatted for viewing, storage, and transmission over the Internet. Disk space and bandwidth being constantly at a premium, methods of compressing video data have been developed to shrink the size these video files might otherwise be.

Just as described in Section 7.4.1. regarding compression of static images, there are different compression utilities and formats for video images. There are many video compression formats, and we have provided information on two here.

MPEG (pronounced M-peg), stands for Moving Picture Experts Group. The mpeg format creates files with a .mpg or .mpeg extension. Mpeg players are freely available on the Internet. Mpeg files can be created using a number of commercially available products. More information on mpeg can be found by following the links available in Appendix B under Video Resources.

Quicktime was created by Apple, and is currently available for both Macintosh and Windows systems. Quicktime files have a .wav extension and can be played with many freely available viewers. Quicktime creation and viewing tools can be found via the links in Appendix B.

There are other video formats being created all the time.

7.5 Music and Sound

The World Wide Web supports audio data as well as visual data. The most obvious way to send audio across the net would be to use digital audio like that used for the Compact Disc or "CD". However, CD format digital audio requires 44,100 16 bit words per second for a mono signal, and twice that for a stereo signal. While there are many places where one can find digital audio in Windows ".wav", or the Macintosh ".au" format, these files typically take a very long time to download even a few seconds of audio. The size of these formats makes them too inefficient for widespread use on the net today.

It is however possible to do "useful" audio over the net. The emerging "de facto" standard seems to be RealAudio, based on the freely distributable server/player application, RealAudio version 2.0, developed by the Seattle based company Progressive Networks. First released in 1995, RealAudio allows useable digital audio in realtime over a 28.8 kB line, and has already been put into service on the home pages of most major record companies as well as in many niche applications. In addition, RealAudio provides a "Voice mode" optimized for understandable speech transmission over a 14.4kB line.

Unfortunately the quality of `_RealAudio_` leaves much to be desired. In particular, the sample rate in Music Mode is only 8Khz (as compared to CD quality 44.1 Khz), meaning that all high frequencies above 4khz are simply missing. The resulting audio is still pleasing to listen to, but sounds very dull and dark.

More information about RealAudio can be found at www.RealAudio.com.

Clearly Digital Audio is the way of the future, but until more bandwidth is available to the average person, it may not be the way of the present. Fortunately, at least in the area of music, there is an interesting alternative.

MIDI (the Musical Instrument Digital Interface), as developed for electronic musical instruments (keyboards, samplers, drum machines, etc.) works well for certain kinds of music over the net. It involves sending no sound sources at all, just the description of the music -- kind of like the score, without the instruments. If the receiver has the right instruments on their computer (such as the sounds defined in the General Midi soundset found on many soundcards), they can play back the musical score.

The big disadvantage to using MIDI is that other than the limited selection of sounds in the General Midi set, it is extremely difficult to make sure the music sounds more than approximately like the original. And there is no way to handle non-MIDI instruments such as guitar or voice, so it is useless to hear the new song by your favorite rock and roll band.

The big advantage to MIDI is how fast it works over slow net connections. For example, five minutes of music, fits in a mere 30k file, and usually will not take more than a few seconds even on the slowest of dialup connections! This makes it ideal for applications such as networked games, or music to go along with a web page.

There are many ways of embedding MIDI files into HTML documents, for Internet distribution.

Anyone who wants to add MIDI to a page can choose to use existing public access MIDI file banks, of which there are many, or to produce new MIDI themselves.

Crescendo is one package available for embedding MIDI files in HTML
<http://www.liveupdate.com> Crescendo works for both Macintosh and Windows.

Helpful Links: Publicly Available Audio and Music Applications
<http://reality.sgi.com/employees/cook/audio.apps/public.html>

Music of J.S. Bach for keyboard

<ftp://ftp.cs.ruu.nl/pub/MIDI/SONGS/CLASSICAL/BACH/HARPSICHORD/>

RISM (repertoire of manuscript sources), plus other access to online scholarly music resources. <http://rism.harvard.edu/RISM/>

Crescendo is used in the web pages at <http://mcentury.citi.doc.ca> along with a growing number of others. One very interesting use of Crescendo occurs on the Music Theory Online publication, a serious scholarly site for publishing and debating musicology and music theory. Articles there now routinely include short musical examples, a great sign of the future of scholarly publishing in the age of dynamic, interactive content.

<http://boethius.music.ucsb.edu/mto/issues/mto.96.2.4/>

Formerly, debate on musical form and structure occurred in the pages of journals, referring usually to music examples in terms of its visual notation. This notation requires a certain degree of training to decode, effectively restricting the potential readership to those with this professional training. With sound examples embedded directly in the text, at least the aural effect of the music comes across, even to those unable to read the notation accurately. This shift is appropriate to the newer trends in music scholarship, which talk about music in terms of its social and cultural context, instead of only in formal terms.

7.6 Content Design Issues

Know your intended audience. If you want more people to see your work, you'll need to make it more accessible.

Many sites are very careful about what content they will allow access to. If you want all audiences to be able to view your work, make sure you are careful about your content and language.

Another content design issue is tool friendliness. Some machines have limitations which will not allow them to see or hear what you'd like them to. For example, older or less expensive models of monitors may have monochrome, or one-color displays, or display only 16 colors, or 256 colors. If you create and view images which look fabulous with a 64,000 color display, you may want to test them using a 16 color display to see what the effect is. Sometimes you can modify your image slightly to get a wider audience while only having a minor impact on the effect.

The following sites give you pointers on what to consider when designing a web page that is content- rich:

- Sun's Guide to Web Style - <http://www.sun.com/styleguide/>
- Yale C/AIM Web Style Guide - <http://info.med.yale.edu/caim/manual/>
- Web Development - <http://www.december.com/web/develop.html>
- A Guide to Creating a Successful Web Site = <http://www.hooked.net/~larrylin/web.htm>
- Bandwidth Conservation Society - <http://www.infohiway.com/faster/>
This is resource for web developers with an interest in optimizing performance.

See Section 8 for other issues and challenges relating to content.

Artists should post how they want their art treated on the web, and how it may be used and post their copyright notice there.

For example, some artists allow their work to be used freely as long as it is not used for financial gain, and request that people contact them for permission if they wish to use their works for a commercial purpose.

Artists need to be aware that when people view their works from the web, their art is downloaded to the viewers computer as that is how browsers work.

7.7 Publicizing your work

The fastest way to publicize your work on the Internet, is to have the most popular sites link to your pages. There are many sites on the net, such as the search sites mentioned earlier, that are interested in listing a pointer to your site for their own purposes.

It is also helpful to have other artists link to your site and it is great to have other art sites link to you as well. "Art on the Net", Art.net, offers free linking to artist sites and provides this as a service to the artist community on the Internet. There are also other art related sites which do this.

It can also be helpful to put your URL on your business card.

The Internet's origins in the Research and Education communities played an important role in the foundation and formation of Internet culture. This culture defined rules for network etiquette (netiquette), and communication based on the Internet's being relatively off-limits to commercial enterprise.

Certain styles of marketing and advertising will therefore not be effective on the Internet, and mass mailings or inappropriate postings to newsgroups, will most likely do more harm to your enterprise than good. If you intend to do marketing on the Internet, please read the Netiquette Guidelines document RFC 1855 listed in the Resources section.

8. Issues and Challenges

The Internet has many issues and challenges, among which are security, privacy, property rights, copyrights and freedom of speech. Security issues involve both the security of your data, as well as your image. Viruses can be transmitted easily over the net, and precautions should always be taken. If you choose to keep your own information available on the net it can be the subject of vandalism and theft. You may also find yourself being persecuted for the information you provide as more and more people join the Internet community and feel the need to impose their morality upon it.

This is no different from any society. We must draw our own lines, and our own conclusions. This section is terribly brief, and entirely summary in nature, and is in no way intended to be comprehensive. It is intended to warn you and advise you. If you have real concerns about your property rights, copyrights, and/or personal rights, please do your own research. Internet laws are in such a state of flux that they are changing as I write this, and they will be changing as you read it.

At last check, however, freedom of speech was prevailing in the United States, and so far the government has not upheld any laws prohibiting the exhibition of anything on the Internet. Support your local constitutional rights.

8.1 Security Issues

There are three major security areas of which the Internet user should be aware; Security of content, Site security, and Security of ownership.

Security of Content, ensures that that which you put on the Internet is not altered, or vandalized. Some Web Servers are inadequately secured, allowing vandals to modify your pages on your web sites, without your knowledge or permission. If your pages are your business, you can imagine the problems this might cause. Your words, art, and other work could be changed, your image tarnished. If you cannot ensure that the content of your site cannot be corrupted, at least check it frequently to ensure that it has not been. Keep frequent back-ups and periodically verify that you can retrieve data from them.

Site security, will protect your data from viruses, worms, and sneak piracy. Some software pirates, on the Internet, use unsuspecting sites to run their schemes. Anonymous FTP servers which have write permission are most vulnerable. Pirates can upload software onto your machine using cryptic filenames you may not even see in standard directory listings, and then publish the softwares whereabouts for others to download. Not only will this compromise your reputation on the Internet for responsible system administration, it may make you liable for damages. Learn what you need to learn to secure your system, or hire some security muscle to tighten down your site for you. Section 11 provides some good information to get you started.

Security of Ownership, involves copyrights and intellectual property laws. If your work is your livelihood, having your rights compromised could be disastrous. Section 8.4 provides an introduction to copyrights.

This document only intends to bring the issues to your attention, and does not aspire to thoroughly cover these subjects.

Please read another project of the IETF, the Site Security Handbook (FYI 8, RFC 2196), <ftp://ds.internic.net/rfc/rfc2196>.

The Handbook is a guide to developing computer security policies and procedures for sites that have systems on the Internet. The purpose of this handbook is to provide practical guidance to administrators trying to secure their information and services. The subjects covered include policy content and formation, a broad range of technical system and network security topics, and security incident response.

Section 11 provides more information on site security.

8.2 Viruses

A "virus" is a program that modifies other programs by placing a copy of itself inside them. It cannot run independently. It requires that its host program be run to activate it.

The damage caused by a virus may consist of the deletion of data or programs, maybe even reformatting of the hard disk, but more subtle damage is also possible. Some viruses may modify data or introduce typing errors into text. Other viruses may have no intentional effects other than replicating itself.

Viruses can be transmitted over the Internet inside other programs, but usually they are transmitted by floppy disk. Your best bet is to purchase a really versatile and up-to-date virus checking program from your local software retailer, and run it over every floppy you plan to read, and every program you plan to run, as well as periodically over the entire machine.

Computer viruses are enough like organic viruses that many of the same precautions apply. Early detection is key. Diligence will mitigate potential damage, but frequent incremental backups are your best strategy for recovery.

8.3 The Standard Disclaimer

As you have observed throughout the document, it is not common for you to get Internet access without having a provider of that access. Some Providers, such as universities and business, often require that you provide a disclaimer on every page stating that your opinions are your own, and not necessarily those of your affiliation. What follows is a sample Standard Disclaimer:

This information is provided as-is. No warranty as to the accuracy is guaranteed. Opinions expressed are entirely those of myself and/or my colleagues and cannot be taken to represent views of our employer. If you notice something incorrect or have any comments, feel free to mail me.

Other examples of disclaimers can be found via the search links listed in Appendix B.

8.4 Copyrights and Intellectual Property Issues

The arrival of the Information Age has emphasized many questions that human society must answer. One of the most important of these is the question of "Intellectual Property", which asks: "when and where is it appropriate to allow people to own information?"

Copyright, Trademark, and Patent law are some of society's responses to earlier versions of this question. They support the idea of ownership of ideas, or information, which can be used to assist the creators of the information in making a living from its creation. This is good for society.

It is also good for society for information to flow freely. Our technology, and even our society are built on a growing pool of shared information. If we restrict the flow of information into that pool, then we restrict the rate at which society grows and becomes wiser.

These two opposing drives have been highlighted by our newfound ability to distill many different things down to information that can be stored on a computer. One of the computers greatest virtues is that once you network them together, the information they hold becomes more fluid, more easily moved, changed or copied. This is great for society, but may not be so great if you spent your life creating that "information", and would like compensation.

Because Copyright, Trademark, and Patent law were never designed for an economy built out of information, understanding how they apply to your information can be a tricky thing. Since these laws vary from place to place, it is also difficult to know how to apply them to the Internet which has no definite location. Worse yet, most of these laws are in the process of being rewritten today, a state that will continue for a long time because no one seems to know what to do about it.

With that in mind though, here is how things stand today...

8.4.1 Copyright

A Copyright is first established when a work is "set in media", which extends from paper to the Internet. A work, once published in a web page, for example, is said to be "owned" by its owner. However, applying for, and being granted, a copyright on your work by The Copyright Office of the Library of Congress will give your rights more legal weight. Whether you plan to put your own works on the Internet, or simply download the works of others, you may want to familiarize yourself with the rights granted by "Copyright" as well

as The Berne Convention for the Protection of Literary and Artistic Works.

Sample Copyright Notice

Permission is granted to transfer this document electronically only for the purposes of viewing it on the world wide web. Subject to fair use provisions, the right to print this document or to make electronic copies of this document available to others is expressly retained although direct requests will be considered.

8.4.2 Trademark

A Trademark is a word, phrase, symbol or design, or the combination of words, phrases, symbols or designs, used to identify and distinguish the goods or services of one party from those of others.

Trademark issues include both Trademarks which you own, and Trademarks which are owned by others. If you own your own Trademark, you may want to familiarize yourself with legal ways of protecting it. Some of the pointers in Appendix B provide that information, but we recommend retaining your own legal council.

Trademark Infringement occurs when there is a "likelihood that consumers will be misled or confused as to the source or origin of the goods or services. This is the basic test used under both common law, and U.S. Federal Law.

One issue regarding Trademarks on the Internet, is that of Domain Names which resemble, or infringe upon registered Trademarks. Each case is being handled individually, and the text of cases can be found on many Internet sites. The short version is that if a Domain Name is registered in good faith, "innocent registrations", the register can often keep the name, however, if the domain name is being used by a competitor, or to "force the trademark owner to pay a sum of money to acquire the name", the courts will generally not allow the register to keep the name, or profit from it.

Trademark Dilution occurs when unauthorized use of a mark on dissimilar products or for dissimilar services causes the mark to cease functioning as a unique identifier, or becomes consciously or unconsciously linked with poor quality goods or services. The Federal Trademark Dilution Act covers these issues. If you may put trademarks on your web page, be sure you do not infringe upon the rights of the owner of the trademark.

A good rule of thumb, offered by one company with concerns for their trademark, is that, if you mean a tissue, you should say "tissue", if you use the Kleenex(R) name, use its Registration mark "(R)".

8.4.3 Privacy

The concept of trademarks extends to personal names or likenesses, in that you can infringe on their rights, including their right to privacy. This issue has both legal and ethical implications.

U.S law currently recognizes four types of invasions of privacy: intrusion, appropriation of name or likeness, unreasonable publicity and false light. In most states people have a "Right of Publicity" which gives individuals the exclusive right to license the use of his identity. You will want familiarize yourself with privacy law if you want to make other peoples likeness, name, address, or others personal information available on the Internet.

Rights vary from state to state and country to country and many international, and U.S. sites are provided in the Law section of Appendix B.

8.4.4 Seek Professional Advice

A number of organizations exist which can be of assistance in ascertaining the appropriate legal status, law, statute, or standing, of your particular issue and helping you understand your rights and responsibilities.

One of these is The Citizens Internet Empowerment Coalition, CIEC. CIEC is a large and diverse group of Internet users, businesses, non-profit groups, and civil liberties advocates, who share the common goal of protecting the First Amendment and the viability of the Internet as a means of free expression, education, and commerce.

The CIEC homepage URL is listed and a number of sites in the U.S. and other countries are represented in Appendix B, under the heading "Law".

8.5 Conducting Business over the Internet

Since people are doing business over the Internet, they want to ensure that their personal information, credit card number, etc. is not used or compromised in any way. Since the Internet is a public place, the only way to get information across it without anyone being able to retrieve it, is to encrypt it. Encryption, is a process for scrambling access codes to prevent illicit entry into a system. The study and work for people creating these system is called

Cryptography.

Secure HTTP (S-HTTP) provides secure communication mechanisms between an HTTP client-server pair in order to enable spontaneous commercial transactions for a wide range of applications. SHTTP and SHTML are Internet-Drafts, which are "works in progress" of the Internet Engineering Task Force WTS working group. The Resources section provides information on retrieving Internet-Drafts.

You should be aware that encrypted communications are illegal in some parts of the world. You should check your local laws regarding legal uses of encryption.

Before you begin installing any encryption software, back up your files and make sure your computer is not needed for any deadline tasks in the next few minutes or hours. If you mess up the installation or forget some password along the way, your files will be protected from everyone, including you.

8.6 Netiquette

Like any community, the Internet has a code of conduct, for which the users have created the term "Netiquette". Much of it will probably seem like common sense, but since the Internet spans many cultures' ideas of "common sense", its worth paying attention. Remember, when you put something onto the Internet, you're publishing it in front of a very large audience.

What follows is a few short ideas to start out with. If you wish to behave well on the Internet, you really should read:

FYI 28 "Netiquette Guidelines", (Also RFC 1855), October 1995.
available at <ftp://ds.internic.net/rfc/rfc1855.txt>

First of all, most forums have their own guidelines posted near the door for new arrivals. For Usenet News, for example, read [news.announce.newusers](#). It never hurts to keep silent until you know your audience better. Once you join a forum, see how others behave before making too much of an impression. Also, try not to jump to conclusions about others. Internet media conveys attitudes and emotions differently than face-to-face, or even telephone communication. You are also dealing with more cultural diversity on the Internet than you are likely familiar with. Realize that many things have very different meanings in other cultures than they might in yours. Try not to take things too personally. Avoid attributing to malice what might be adequately explained by ignorance. And hope others will do the same.

9. Glossary

This glossary contains a few of the words used in this document, which were least likely to appear in any common dictionary. If there are other words in the document which are not in your dictionary, some other glossaries are referenced in the Resources section which follows.

- Boolean:** adj. Of or relating to an algebraic combinatorial system treating variables, as propositions and computer logic elements through the operators AND, OR, NOT, IF, THEN, and EXCEPT.
- access:** n. 1. A means of approaching, passage; 2. The right to enter or use. v. To gain access. e.g., computer information.
- bandwidth:** Technically, the difference, in Hertz (Hz), between the highest and lowest frequencies of a transmission channel. However, as typically used, the amount of data that can be sent through a given communications circuit.
- bit:** n. (From "Binary digIT") 1. A single character of a language having just two characters, as either of the binary digits 0 or 1. 2. a unit of information storage capacity, as of computer memory.
- bitmap:** A graphic image format which consists of a list of pixel colors, or shades of gray, and header information describing how to map this list of pixels back into the image. Bitmap formats are .bmp in Windows, .pict on a Macintosh, and .anm and .btm on Unix.
- broadcast:** A special type of multicast packet which all nodes on the network are always willing to receive. See also: multicast, unicast.
- btw:** By The Way
- byte:** 8 bits
- encryption:** The manipulation of a packet's data in order to prevent any but the intended recipient from reading that data. There are many types of data encryption, and they are the basis of network security.

fyi: For Your Information

html: HyperText Markup Language:
The language used to create hypertext documents. It is a subset of SGML and includes the mechanisms to establish hyperlinks to other documents.

http: HyperText Transfer Protocol:
The protocol used by WWW to transfer HTML files. A formal standard is still under development in the IETF.

hyperlink: A pointer within a hypertext document which points (links) to another document, which may or may not also be a hypertext document

hypertext: A document format which contains "hyperlinks" to other documents.

imho: In My Humble/Honest Opinion

interactive: Capable of acting on, or influencing each other.

lag: The failing behind or retardation of one phenomenon with respect to another to which it is closely related; time delay.

multicast: A packet with a special destination address which multiple nodes on the network may be willing to receive. See also: broadcast, unicast.

multimedia: Transmission that combine media of communication (text an graphics and sound etc.)

netlag: time delay over the Internet. See also: lag.

packet: The unit of data sent across a network.

proprietary: Manufactured articles which some person or persons have exclusive right to make and sell. [from U.S.Statutes]

protocol: A formal description of message formats and the rules two computers must follow to exchange those messages. Protocols can describe low-level details of machine-to-machine interfaces (e.g., the order in which bits

and bytes are sent across a wire) or high-level exchanges between allocation programs (e.g., the way in which two programs transfer a file across the Internet).

- realtime: occurring at and in the present time
- reflector: A file server whose purpose is to receive packets from a source site and forward it to other sites.
- ttn: ta ta for now - a colloquialism for goodbye.
- unicast: An address which only one host will recognize. See also: broadcast, multicast.
- url: Uniform Resource Locator:
A URL is a compact string representation for a resource available on the Internet. The syntax and semantics for URLs are defined in RFC 1738.
- virtual: Not real, but similar in relevant ways.

10. Resources, References, etc.

The information in this document has been gleaned from the minds of its authors and contributors, and from some of the following sources. More information on the topics discussed can be found in these sources, and in the information referenced in Appendix B.

10.1 RFCs and Internet-Drafts

One of the most important collections of informational documents about the Internet are written as Requests for Comment by the Internet Engineering Task Force, IETF. The name Request for Comment is historical, as these documents are submitted by their authors' for the approval of the Internet community as Internet Standards, and valid Informational RFCs called FYIs, of which this document is one.

Basically, if the IETF collective uses a tool or resource, they document its use in an RFC so that there is no mystery to its functionality, uses, designations, specifications, or purposes.

More information on RFCs, FYIs, the IETF, and its organizations, documents, policies and purposes can be found in the RFCs themselves, or at <http://www.ietf.org/> and <http://www.isi.edu/rfc-editor/>

There are many way to get copies of RFCs over the Internet (see *ConneXions*, Vol.6, No.1, January 1992). Most of these simply access a directory of files where each RFC is in a file. The searching capability is generally limited to the filename recognition features of that system.

The ISI RFC-INFO server is a system through which you can search for an RFC by author, date, or keyword (all title words are automatically keywords).

RFC-INFO is an e-mail based service to help in locating and retrieval of RFCs and FYIs. Users can ask for "lists" of all RFCs and FYIs having certain attributes ("filters") such as their ID, keywords, title, author, issuing organization, and date. Once an RFC is uniquely identified (e.g., by its RFC number) it may also be retrieved.

To use the service send e-mail to RFC-INFO@ISI.EDU with your requests in the body of the message. Feel free to put anything in the SUBJECT, the system ignores it. This service is case independent. Appendix C provides examples for using the RFC server.

10.2 Internet Documents

FYI 18 "Internet Users' Glossary", (Also RFC 1983), August 1996.
Available at <ftp://ds.internic.net/rfc/rfc1983.txt>

FYI 22 "Frequently Asked Questions for Schools", (Also RFC 1941), May 1996. Available at <ftp://ds.internic.net/rfc/rfc1941.txt>

FYI 28 "Netiquette Guidelines", (Also RFC 1855), October 1995.
Available at <ftp://ds.internic.net/rfc/rfc1855.txt>

FYI 29 "Catalogue of Network Training Materials", (Also RFC 2007), October 1996. Available at <ftp://ds.internic.net/rfc/rfc2007.txt>

RFC 1866 "Hypertext Markup Language - 2.0", November 1995. Available at <ftp://ds.internic.net/rfc/rfc1866.txt>

RFC 1942 "HTML Tables", May 1996. Available at <ftp://ds.internic.net/rfc/rfc1942.txt>

RFC 2070 "Internationalization of the Hypertext Markup Language", January 1997. Available at <ftp://ds.internic.net/rfc/rfc2070.txt>

RFC 2068 "Hypertext Transfer Protocol -- HTTP/1.1", January 1997.
Available at <ftp://ds.internic.net/rfc/rfc2068.txt>

RFC 2084 "Considerations for Web Transaction Security", January 1997.
Available at <ftp://ds.internic.net/rfc/rfc2084.txt>

RFC 1738 "Uniform Resource Locators", December 1994. Available at
<ftp://ds.internic.net/rfc/rfc1738.txt>

RFC 977 "Network News Transfer Protocol", February 1986. Available
at <ftp://ds.internic.net/rfc/rfc977.txt>

RFC 821 "Simple Mail Transfer Protocol", STD 10, August 1982.
Available at <ftp://ds.internic.net/rfc/rfc821.txt>

RFC 959 "The File Transfer Protocol", STD 9, October 1985. Available
at <ftp://ds.internic.net/rfc/rfc959.txt>

RFC 1034 "Domain Names - Concepts and Facilities", STD 13, November
1987. Available at <ftp://ds.internic.net/rfc/rfc1034.txt>

RFC 1035 "Domain Names - Implementation and Specification", STD 13,
November 1987. Available at <ftp://ds.internic.net/rfc/rfc1035.txt>

RFC 791 "Internet Protocol", STD 5, September 1981. Available at
<ftp://ds.internic.net/rfc/rfc760.txt>

Internet Drafts

The Secure HyperText Transfer Protocol, SHTTP.
<ftp://ds.internic.net/internet-drafts/draft-ietf-wts-shhttp-04.txt>

10.3 Other Sources

The Getty Research Institute for the history of art and the humanities is one of six independent entities of the J. Paul Getty Trust. Its goals as a research institute are to promote innovative scholarship in the arts and the humanities, cross traditional academic boundaries, and provide a unique environment for research, critical inquiry, and debate. You can contact the institute at:

The Getty Research Institute
401 Wilshire Blvd.
Santa Monica, CA 90401
PHONE: (310) 458-9811, FAX: (310) 458-6661

The National Initiative for a Networked Cultural Heritage (NINCH) is a broad coalition of arts, humanities and social science organizations formed to assure the fullest possible participation of the cultural sector in the new digitally networked environment.

National Initiative for a Networked Cultural Heritage (NINCH)
21 Dupont Circle NW, Washington, DC 20036
Tel: 202/296-5346 <http://www-ninch.cni.org> Fax: 202/872-0886

10.4 Freely Available Web Browser Software

The University of Illinois at Urbana-Champaign, National Center for Supercomputing Applications, NCSA, developed the first Mosaic Browser, and continues to maintain and update it, as well as making it freely available over the Internet at <http://www.ncsa.uiuc.edu/>. Hardcopy manuals and software disks and tapes can be ordered through the NCSA Technical Resources Catalog for postage and handling charges only. Postage and handling on all orders must be prepaid. For a copy of the catalog, contact NCSA Orders by email at orders@ncsa.uiuc.edu, by phone at 217-244-4130, or by U.S. mail at:

NCSA Orders, 152 Computing Applications Building, 605 E. Springfield Avenue, Champaign, IL 61820-5518

10.5 The Internet Assigned Numbers Authority

The IANA coordinates the assignment and use of various Internet protocol parameters, manages the Internet address space, and manages domain names. See: <http://www.iana.org/iana/>

You should get your IP address (a 32bit number) from your network service provider.

Your network service provider works with a regional registry to manage these addresses. The regional registry for the US is the Internic, for Europe is RIPE, for the Asia and Pacific region is the AP-NIC, and parts of the world not otherwise covered are managed by the Internic.

If for some reason your network service provider does not provide you with an IP address, you can contact the your regional registry at one of the following addresses:

Internic	<hostmaster@internic.net>
RIPE	<ncc@ripe.net>
AP-NIC	<admin@apnic.net>

Please do contact your network service provider first, though. The regional registry will want to know all the gory details about why that didn't work out before they allocate you an address directly.

11. Security Considerations

There are a wide variety of ways in which systems can be violated, some intentional, some accidental. Of the intentional attacks, a portion may be exploratory, others simply abusive of your resources (using up your CPU time) but many are actively malicious. No system is 100% safe, but there are steps you can take to protect against misconfigured devices spraying packets, casual intruders, and a variety of focused assaults.

Your best defense is to educate yourself on the subject of security. There are places on the net devoted to teaching users about security - most prominently, the CERT Coordination Center located at the Software Engineering Institute at Carnegie Mellon university. You can point your web browser (or direct your ftp connection) to ftp://info.cert.org/pub/cert_faq to start. This is a frequently asked questions guide and general overview on CERT. It includes a bibliography of suggested reading and a variety of sources to find more information.

Next, you should probably read

ftp://info.cert.org/pub/tech_tips/security_info

which contains a (primarily based on the UNIX operating system) checklist to help you determine whether your site has suffered a security breach. You can use it to guide you through handling a specific incident if you think your system has been compromised or you can use it as a list of common vulnerabilities. CERT also maintains a wide variety of bulletins, software patches, and tools to help you keep up to date and secure.

Before you are even online, you should consider some basic steps:

11.1 Formulate a security policy.

It should include policies regarding physical access procedures, security incident response, online privileges and back-up media. Put a message at the login to establish your policy clearly.

An example:

"This system is for the use of authorized users only. It may be monitored in the course of routine operation to detect unauthorized use. Evidence of unauthorized use or criminal activity may result in legal prosecution."

11.1.1.1. Talk to your Internet Service Provider.

Depending upon your provider and router management situation, there are a number of things your ISP should be able to do for you to make your site more secure. Foremost, packet filtering on the router that connects you to the Internet. You will want to consider IP filters to allow specific types of traffic (web, ftp, mail, etc.) to certain machines (the mailhost, the web server, etc.) and no others. Other filters can block certain types of IP spoofing where the intruder masks his or her identity using an IP address from inside your network to defeat your filters. Discuss your concerns and questions with your provider - the company may have standards or tools they can recommend.

11.1.1.2. Make sure your systems are up to date.

A significant number of incidents happen because older versions of software have well-known weaknesses that can be exploited from almost anywhere on the Internet. CERT provides a depository for software patches designed by concerned net.citizens, CERT's engineers, and by the vendors themselves.

11.1.1.3. Use the tools available.

Consider recording MD5 checksums on read-only media (the MD5-digest algorithm determines an electronic "fingerprint" for files to indicate their uniqueness -comparing more recent checksums to older ones can alert you to changes in important system files), installing tripwire on your systems (notes size and MD5 checksum changes, among other sanity checks), and periodically testing the integrity of your machines with programs an intruder might use, like SATAN and crack. [Details on MD5 are contained in RFC 1321.]

Most files and fixes go through the basics before leaving you to figure things out on your own, but security can be a complicated issue, both technically and morally. When good security is implemented, no one really notices. Unfortunately, no one notices when it's not taken care of either. That is until the system crashes, your data gets corrupted, or you get a phone call from an irate company whose site was cracked from your machines. It doesn't matter if you carry only public information. It doesn't matter if you think you're too small or unimportant to be noticed. No one is too small or too big, no site is immune. Take precautions and be prepared.

12. Acknowledgments

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Julie Jensen
Scott Stoner

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Appendix A. Internet Projects of Interest to the Arts and Humanities Communities

The commonplace insight about the web as a new distribution channel for cultural products is that it effaces the traditional border between producer and consumer. Publishers exploit two-way interactivity by re-designing the editorial mix to include reader response. What follows are some examples of the way creative artists attempt to design structures flexible enough for significant viewer input.

RENGA (<http://renga.ntticc.or.jp>) - An inspired transposition of a traditional collaborative writing practice into the realm of digital media supported by the NTT InterCommunication Centre in Tokyo. Renga means linked-image or linked-poem, and draws on the Japanese tradition of collaboration which effaces the unique notion of original author.

PING (<http://www.artcom.de/ping/mapper>) - by Art+Com, a Berlin based media centre and thinktank. Art+Com is a leader in producing high-end net visualization projects. Ping lets the browser add a link, which then becomes a part of the ongoing visual structure. It is similar, in this sense, to the Toronto Centre for Landscape Architecture's OASIS site.

Art+Com's T-Vision project (<http://www.artcom.de/projects/terra>) which uses satellites and networked VR computers to permit an astonishing fly-in to earth from space: acclaimed as one of the most imaginative realizations of the potential of networked computing.

OASIS(Image)INTERNET-DRAFT Toronto Centre for Landscape Architecture's OASIS site requires a specialized browser, but from a standard Netscape connection, you can view stills that give a sense of the beautiful images produced by the collaborative "design process". It is introduced by its designers as follows:

Oasis is a shared 3-Dimensional navigational environment for the world wide web. This virtual landscape allows one to bury their own information links throughout the terrain or to discover and connect to new information left by others.

TechnoSphere (<http://www.lond-inst.ac.uk/TechnoSphere/>)

Is TechnoSphere a Game?

Yes and no. It's an experiment on a global scale, a chance to develop complex artificial life on digital networks. TechnoSphere is interactive like a game, but transgresses the linear boundaries of branching and hierarchical games narrative to enable freer

movement. TechnoSphere is designed to encourage a non-linear experiential exploration.

Body Missing (<http://yorku.ca/BodyMissing/index.html>)

Toronto artist Vera Frenkel created this richly evocative site on the disappearance of art and memory as an extension of her Transit Bar installation. It is conceived as a site open to new 'reconstructions' of the artworks confiscated during the Third Reich. First opened to the public as part of the ISEA95 exhibition in Montreal, it has since earned widespread critical comment and praise.

Molecular Clinic 1.0

(http://sc_web.cnds.canon.co.jp/molecular_clinic/artlab_bionet)

Molecular Clinic 1.0 ' is an art project realized through a collaboration between ARTLAB and Seiko Mikami, and is one of the most elaborate custom designed art projects yet created for the Web. During their initial visit users should download the MOLECULAR ENGINE VIEWER, which is a type of molecular laboratory for their computer. What they will see on the web site after this initial download is a virtual space containing a three dimensional computer generated Spider and Monolith object. The user will be able to navigate through and into this virtual space and can zoom into the spider all the way to the molecular level.

File Room (<http://fileroom.aaup.uic.edu/FILEROOM.html>) -

Cumulative database info on Censorship, hosted in Chicago but conceived by Spanish artist Antoni Muntadas.

Idea Futures (<http://if.arc.ab.ca/~jamesm/IF/IF.html>) -

Winner of the grand prize at the 1995 Ars Electronica competition for Web Sites, Idea Futures is a stock market of ideas, based on the theories of mathematical economist Robin Hanson. The 'truth' of any claim is assigned a weight calculated by the amount of virtual cash which members of the exchange are willing to bet. The scheme leads might lead toward a radical democratization of academic discourse, but just as easily, toward the trivialization of thought. See the following for a philosophical critique of the system. (<http://merzbaum.citi.doc.ca/~henry/Matrix/Erewhon.html>)

Firefly (<http://www.agents-inc.com/>) also a prize winner at Ars

Electronica in 1995, Firefly is an prototypical example of what enthusiasts call a "personal music recommendation agent", which makes suggestions for what you might like to listen to, based on a stored profile of your own likes and dislikes, and the evolving ratings submitted to the system by other members. Worth visiting, if only to understand what all the fashionable hype about 'intelligent agents' is all about; skeptics should know that even

the promoters of these services admit the circularity of their systems: they're capable of reinforcing existing taste, but little else.

Appendix B: Some other URL's of interest

Art

<http://www.louvre.fr/>
<http://www.art.net/>
<http://www.artnoir.com/>
<http://www.artincontext.com/>

Art Education

<http://www.kn.pacbell.com/wired/art/art.html>

Artists

<http://www.yoko.com/>
<http://www.thinkage.on.ca/~dmowbray/botticelli.html>

Artist Memorials

<http://www.cascade.net/kahlo.html>

Audio Video Conferencing

<http://www.lll.hawaii.edu/workshops/pedagogy/audiovideo.html>
<http://cu-seeme.cornell.edu/>
<http://www.indstate.edu/msattler/sci-tech/comp/CU-SeeMe/>

Building Arts Audiences on the Web

<http://www.artswire.org/spiderschool>

Chat Forums

<http://pages.wbs.net/>
<http://acm.ewu.edu/homepage/wmundell/chathole.htm>

Cryptography

<http://www.fttech.net/~monark/crypto/index.htm>
<http://www.pgp.com/>

Frequently Asked Questions, pointers to lists

<http://www.cis.ohio-state.edu/hypertext/faq/usenet/top.html>

Filtering Software

<http://www.surfwatch.com/>
<http://www.solidoak.com/cysitter.htm>
<http://www.cyberpatrol.com/>

FTP Archives

<ftp://rtfm.mit.edu/pub>
<ftp://athos.rutgers.edu/pub>
<http://hoohoo.ncsa.uiuc.edu/ftp/>

Gopher Sites

<gopher://peg.cwis.uci.edu:7000/11/gopher.welcome/peg/GOPHERS/gov>

Law

<http://www.findlaw.com/01topics/10cyberspace/index.html>
<http://www.ciec.org/>
<http://www.netlaw.com/>
<http://www.law.cornell.edu/>
<http://www.fplc.edu/tfield/order.htm>

<http://w3.gwis.com/~sarbar/>
<http://www.eff.org/>
<http://www.efa.org.au/Issues/IP/Welcome.html>
<http://www.yorku.ca/faculty/osgoode/uc.htm>
<http://www.lawsoc.org.uk/>
<http://www.jurisnet.com.mx/jurisweb2.html>
<http://www.iupui.edu/it/copyinfo/intelect.html>
<http://law.house.gov/105.htm>
<http://www.ipcenter.com/>
<http://www.intellectual-property.co.uk>
<http://www.blueriver.net/~wyrm/tele.html>
<http://www.fplc.edu/tfield/ipbasics.htm>

Libraries

<http://www.ipl.org/>

MUDs

<http://lamar.ColoState.EDU/~mojo/kevpag/mud/>
<http://www.lysator.liu.se/tolkien-games/>
<http://www.godlike.com/muds/>

Music Production

<http://www.ebb.ele.tue.nl/midi/index.html>

Musical Groups

<http://www.dead.net/>
<http://www.netspace.org/phish/>

News

<http://www.w3.org/pub/DataSources/News/Groups/Overview.html>
<http://www.duke.edu/~mg/usenet/>

Other Standards Organizations

<http://www.iso.ch/>
<http://www.ansi.org/>

Photography

<http://www.nyip.com/>

Reference

<http://www.ipl.org/ref/RR/>
<gopher://gopher.uiuc.edu/11/Libraries/writers>
<http://www.ex.ac.uk/~ftapson/dictunit.html>
<http://www.learn2.com/>
<http://www.ipl.org/classroom/userdocs/internet/citing.html>
<http://www.theslot.com/contents.html>
<http://www.bsdi.com/date>

Rembrandt

<http://www.bod.net/CJackson/rembrandt/rembrand.htm>
<http://found.cs.nyu.edu/fox/art/rembrandt/self1660.html>
<http://www.siam.net/rembrandt/index.html>
<http://www.lososos.com/Rembrandt'sCafe/>

Search Sites

<http://www.yahoo.com/>
<http://www.altavista.digital.com/>
<http://www.lycos.com/>

<http://www.dejanews.com/>
<http://query.webcrawler.com/>
<http://www.mckinley.com/>

Video Resources

<http://www.mpeg.org/>
http://www.maxibyte.com/mpeg_samples.htm
<http://www-plateau.cs.berkeley.edu:80/mpeg/>
<ftp://sokaris.ee.upenn.edu/pub/MPEG2Tool/>

Writers

<http://the-tech.mit.edu/Shakespeare/>
http://www.rain.org/~da5e/tom_robbins.html

Appendix C: Examples for using the RFC server RFC-INFO@ISI.EDU

To get started you may send a message to RFC-INFO@ISI.EDU with requests such as in the following examples (without the explanation between []):

```

Help: Help                [to get this information]

List: FYI                 [list the FYI notes]
List: RFC                 [list RFCs with window as keyword or
                          in title]

  keywords: window
List: FYI                 [list FYIs about windows]
  Keywords: window
List: *                   [list both RFCs and FYIs about windows]
  Keywords: window
List: RFC                 [list RFCs about ARPANET, ARPA
                          NETWORK, etc.]

  title: ARPA*NET
List: RFC                 [list RFCs issued by MITRE, dated
                          1989-1991]

  Organization: MITRE
  Dated-after: Jan-01-1989
  Dated-before: Dec-31-1991
List: RFC                 [list RFCs obsoleting a given RFC]
  Obsoletes: RFC0010
List: RFC                 [list RFCs by authors starting with
                          "Bracken"]

  Author: Bracken*       [* is a wild card matches everything]
List: RFC                 [list RFCs by both Postel and Gillman]
  Authors: J. Postel     [note, the "filters" are ANDED]
  Authors: R. Gillman
List: RFC                 [list RFCs by any Crocker]
  Authors: Crocker

```

