2004

Common Characteristics Of Successful Websites

Melissa A. Murphy
Seton Hall University

Recommended Citation

Murphy, Melissa A., "Common Characteristics Of Successful Websites" (2004). *Seton Hall University Dissertations and Theses (ETDs)*.
985.
https://scholarship.shu.edu/dissertations/985

ABSTRACT

This study investigated the driving forces behind Internet trends by tracking successful web site characteristics, conducting an online survey, and studying the history of the Internet, the computer industry, and cultural movements during the 20th century.

COMMON CHARACTERISTICS
OF SUCCESSFUL WEBSITES

BY

MELISSA A. MURPHY

Thesis Advisor
Monsignor Mahon

Submitted in partial fulfillment of the requirements
for the Masters of Arts in Corporate and Public Communications
Seton Hall University

April 10, 2004

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

It's hard to imagine life without the Internet in today's American society. For anyone born in the 1980's, it's always been there. For others, watching the Internet develop over the past decades was a historical experience. Part of the wonder and amazement about the Internet is the speed at which it constantly advances and develops new abilities. The fact that the Internet grew from a small network of scientific research centers to the commercial empire of today is remarkable. But the radical development of the Internet would not have taken place without participation from and use by society. The Internet could very well have remained only a way for research facilities to send information back and forth to each other. It did not have to develop into e-mail, bulletin board systems, virtual communities, online banking, or cyber commerce. It was the fact that people accepted a new way of doing things, and a new way of looking at things, that drove the expansion of the Internet.

Contrary to popular belief, the Internet did not spring up over night. It took many years of development and progress. Even when the Internet was in wide-spread use it took years to evolve into what it is today. We need to keep in mind that today's Internet is not an end result, it will continue to develop and grow. The driving force behind these advances is that society continues to accept and incorporate them. As long as the social order continues, progress will carry on.

Over the past years, however, the Internet has not only been driven by society, it has engrained itself in society. The loss of the Internet today would cause everyday life to stall—both private and commercial life would grind to a halt. The American society
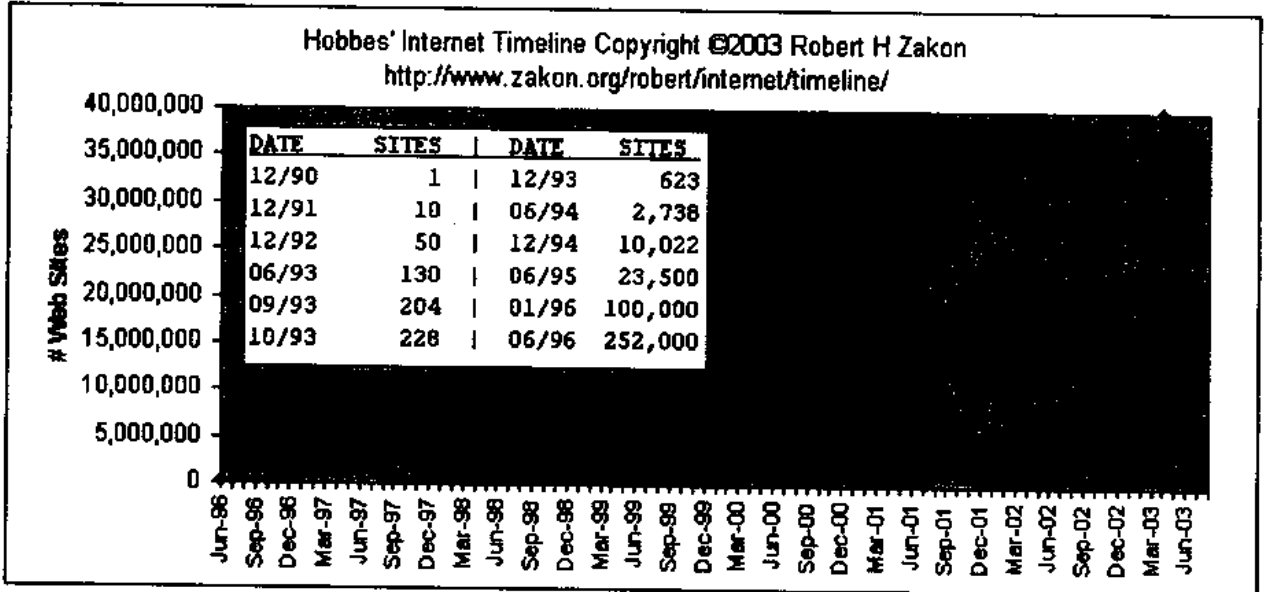
and many other societies globally, have become dependent on the Internet. At this point in history, to lose the Internet would be to take a step backwards in evolution.

One of the most common modes by which society interacts on the Internet is the web site. A web site is your corporate or even personal face to the cyber world. For all intent purposes, it is equivalently how you would conduct yourself in public. It displays your appearance, mannerisms, how you speak and interact with others, how smart you are, and what you are capable of. It also shows people your shortcomings and inabilities. All of these characteristics manifest themselves through a web site. Therefore, how you compose your Internet presence is extremely important. In the early years of the Internet it was enough simply to have a presence. Today, this is not the case. As innovation and technology give way to enhancements, the status quo is raised and expectations increase. It's a sort of online version of "keeping up with the Joneses". Of course not everyone adheres to this, but an online culture of standards does exist. The question is who sets these standards and why must we conform to them.

The explosive growth of the Internet and e-commerce has caused quite a competition for usage among web sites. According to Robert Zakon, there are now in excess of 40 million web sites on the Internet. See Table 1A. (Zakon, http://www.zakon.org/robert/internet/timeline/) As the Internet takes an ever more pervasive hold in our culture, the role of a web site becomes more important, and specific sciences have grown around this relationship. These include Human Factors, usability, and design, among others. There are entire fields of study now dedicated to the interaction of man and computer. These disciplines allow a web site to be built for optimum usage on the Internet. They determine what makes a person find, use, and

return to a web site. In essence, they help web sites chisel out their percentage of the Internet society. By gaining a larger market share of the web audience, web sites increase their readership, popularity, advertising rates, and revenues.

Table 1A

Hobbes' Internet Timeline Copyright ©2003 Robert H Zakon
http://www.zakon.org/robert/internet/timeline/

DATE	SITES		DATE	SITES
12/90	1		12/93	623
12/91	10		06/94	2,738
12/92	50		12/94	10,022
06/93	130		06/95	23,500
09/93	204		01/96	100,000
10/93	228		06/96	252,000

Y-axis (# Web Sites): 0 to 40,000,000
X-axis: Jun-96 to Jun-03

Research Question

What are the common characteristics of successful web sites? This study will focus on determining the traits, attributes, and qualities of successful web sites based on information, statistics, and experience from web sites, magazines, newspapers, and web site award criteria. This paper will also attempt to determine what the driving forces behind Internet trends are by tracking successful web site characteristics, conducting an online study, and looking at the history of the Internet.

Subsidiary Questions

In an effort to determine the common characteristics of successful web sites, this paper will also investigate answers to the following questions:

1. What are the distinctive characteristics which distinguish web sites into categories?

2. What are the common characteristics found across these categories?

3. What do users/visitors expect and want from a web site?

4. Are any of the characteristics of a successful web site dependent on one another?

Purpose of the Study

As competition for visitors grows among web sites, there are certain characteristics that make some web sites more desirable, easier to use, or more reliable than others. These web sites become the literal "favorites" of web surfers across the Internet. When web sites become favorites, they grow in popularity and gain advantage over other sites. An economic advantage is gained for commerce sites, by acquiring a larger audience, and therefore, a larger population to sell goods to. A social advantage is gained for personal web sites by an increase in readership and a rise in popularity.

There are many theories as to what characteristics will make a web site successful, but the purpose of this study will be to compare all of these suggestions and determine which of these characteristics are the most popular and common.

For the purpose of this study, the term "successful web site" will refer to any web site which meets its objective or mission statement, and creates a steady stream of visitors.

4

Objective

The objective of this study is to identify the most common characteristics of successful web sites, and also to explain how these characteristics work to make web sites successful. It's not enough to say X, Y, and Z are the ingredients for a thriving web site. It is necessary to look at the reasons why these traits are needed. What are the driving forces behind these characteristics—are they society, the computer industry, or technology? The author will also look at what past trends have been, and investigate if can they help us determine what the trends of tomorrow will be.

This study will be conducted by researching 50 web sites and web site award criteria. It will also utilize an anonymous survey of 100 people on Internet usage.

Limitations

One limitation of this study is the vastness of the Internet. For the purposes of this study only a small portion of the Internet will be researched. The number of web sites that exist in 2004 is astronomical. Therefore, this study will focus only on those web sites which are customer-centric.

Another limitation of this study is that it does not investigate society's interaction with the Internet on a global basis. Although the web is an integral part of the American culture, this is not a world-wide standard. Therefore, all conclusions and speculation in this paper is confined to the American culture, and some other first-world countries.

CHAPTER 2

The History of the Internet

Most of us think of the Internet as something new. And it's true—what we perceive as the Internet today is relatively new. But the idea of the Internet has been around as long as man has been looking for ways to communicate. The Internet was the inevitable next step after the telegraph, telephone, radio, television, and computer. Much like the airplane first took shape with DaVinci's drawings long before Kitty Hawk, the Internet has been taking shape over the past two centuries. As we trace its history, we will find many instances where ideas are born and accepted long before they come to fruition.

The evolution of the Internet dates back long before the last 50 years of networking discoveries to the Industrial Revolution. This is where we find the Internet's true building blocks. The Industrial Revolution was rich with advances in communication and transportation. At this time, the two were closely linked. The notion of communication without face to face contact, other than letter writing, was difficult to imagine back then—at least for most people. It was the visionary genius of Samuel Morse, Alexander Graham Bell, Guglielmo Marconi, and others that founded the Modern Era of Communication. But advances in communication always mean advances in information dissemination. And here we find some of the characteristics which drove the Internet to what it is today.

THE 1850s – 1950s

An Age of Invention

In order to see the entire history of the Internet, we need to take a step back. As society moved from the 19th to the 20th century, historical events were taking place everywhere. These events had as much of an effect on the Internet as the foundation of the computer industry. Within approximately 60 years, the world saw inventions make leaps and bounds in communication. However, these inventions also dramatically changed the world's global society—much like the Internet did in the late 20th century. When you look back over the last 200 years, the Internet is not something new. It didn't suddenly spring up overnight. It was the next logical step in a steady evolution of communication vehicles. The Internet has followed the same path as many other inventions of the modern era.

In 1883, Charles Babbage invented the Difference Engine to calculate astronomical tables. The Difference Engine was the great-great-granddaddy of the modern computer. It gave birth to the Analytical Engine concept in 1840, which Babbage theorized would be capable of any mathematical equation. Although it used steam power, the Analytical Engine utilized punch cards for programming, paving the way for the computers of the 1940s and 1950s. Although the Analytical Engine was never finished, through this invention Charles Babbage gave us the first concept of programming. (Moschovitis, Poole, Schuyler, and Senft, 7-8)

Herman Hollerith picked up where the Analytical Engine left off. In the late 1800's, the U.S. Census Bureau sponsored a contest for an invention to aid in the 1890 Census. Hollerith, who was working for the bureau, won the contest with his Hollerith

Tabulating System. Hollerith's calculator worked so well it was used again in the 1900

Census. This event marked the humble beginning of the computer industry. In 1896,

Hollerith established the Tabulating Machine Company. It eventually merged with

another firm to create the Computer Tabulating Recording Company (CTR) in 1911.

CTR would eventually evolve into Integrated Business Machines, or IBM in 1924.

(Moschovitis et al., 13)

Samuel Morse invented the telegraph in 1844 and gave us, for all intensive

purposes, long distance communication. By 1854 telegraph lines are part of the

American landscape connecting all parts of the country. But progress doesn't stop

there—by 1866 the Transatlantic Cable is laid between Valentia Bay, Ireland and St.

John's, Newfoundland. Global communications are born. (Moschovitis et al., 5-11)

As well as laying the foundation for new disciplines, such as using cable lines,

networking, and electricity, Morse code was also binary and very similar to computer

code in nature. It also paved the way for personal communications. Who would have

thought that within 150 years of Morse's invention Ray Tomlinson would invent email?

(Moschovitis et al., 5-11)

Ten years after the Transatlantic Cable is laid between Europe and North

America, Alexander Graham Bell invents the telephone. It revolutionizes society in 1876

by providing the first two-way immediate communication. In 1901, Guglielmo Marconi

invents the radio, and broadcast communication is born. (Moschovitis et al., 4-7)

Technological advancements were taking place at a voracious speed, and there were more

to come. The automobile and the television both had huge impacts on society. However,

during this time there were many advances, discoveries, and inventions that are not as

well known. Perhaps these innovations didn't have an obvious impact on society at the time, but they certainly helped to shape our society to what it is today.

For example, in 1854, George Boole's <u>An Investigation of the Laws of Thought</u> laid the foundation for 20th century computer programming by marrying logic and communications for the first time. Boole's theories are still used today by millions of people everyday when using search engines and optimizing key words into a *Boolean* search. (Moschovitis et al., 9)

Other lesser known milestones include Alan Turing's "Theoretical Principals of Digital Computing" which established the foundations of digital, stored-program computing in 1936. John Atanasoff gave us the first prototype of the Electronic Binary Computer in 1939. Konrak Zuse built the first fully-functional, general purpose computing machine, the Z3, in 1941. The Allies used Colossus, one of the first electronic deciphering devices, during World War II. Harvard University built the Mark I, the first fully-automatic, multiple-purpose, electromechanical calculator, with Howard Aiken and IBM in 1944. This event launched IBM as a giant in the computer world. (Moschovitis et al., 14-21)

By 1945 computing prototypes are vying for media attention. John Van Neumann gives his report on EDVAC (Electronic Discrete Variable Automatic Computer). While EDVAC may not be a household name to most people, this report becomes the theoretical foundation for modern computer design. It also terms the phrase computer "memory". (Moschovitis et al., 22-24) Also in 1945, Vannevar Bush publishes "As We May Think". The article outlines theories for Memex, a machine that stores information. (Segaller, 61-62) This is the first time computers are thought of as

processing information, and not just numbers. It is a great step towards the Internet of today.

In 1947, the industry is revolutionized when Bell Laboratories invents the transistor. The transistor will go through many prototypes, but it ultimately evolves into the integrated circuit, and finally, the microprocessor, the core of the modern computer. (Comer, 19)

By 1948, the first stored-program computing machine becomes a reality with the Manchester Baby Machine, created by Manchester University. The Manchester Baby gave birth to the Manchester Mark I, which is later improved upon and replaced by the Ferranti Mark I—the first computer to be offered commercially. (Moschovitis et al., 29) The Ferranti Mark I had a great team working on it. Two members of this team were actually the parents of Tim Berners-Lee, who goes on to create the World Wide Web (WWW) many years later. (Segaller, 284)

"A Mathematical Theory of Communication" is written by Claude Shannon in 1948. In looking for ways to electronically transmit messages, Shannon proposes the "bit", a measurement for a fundamental unit of information.

The U.S. Bureau of the Census enters the picture again in 1951, when it contracts to use UNIVAC (Universal Automatic Computer) for calculations. UNIVAC is a stored-program computer specifically designed for data processing. It is one of the first instances of commercial computing. In 1952, Walter Cronkite demonstrated UNIVAC's abilities to the American public when it correctly predicted the outcome of the U.S. Presidential election on national TV. Everyone one in America now knew what a computer was and what it was capable of. (Moschovitis et al., 30-32)

THE 1950s - 1960s

The Development of the Advanced Research Project Agency (ARPA)

Although the race to build computers was taking place in America throughout the

1940s and 1950s, another race would consume the country in the late 1950s and 1960s—

the Space Race. When the USSR launched Sputnik on October 4, 1957, America saw

that it was lagging behind in technology, and it was frightened.

Fears rose and speculation grew as to whether the Soviet Union had the ability to

fire long-range missiles on North America. The American government made the military

a top priority and in 1958 created the National Defense Education Act. The country put

no limitations on resources for technology and defense. One of the many government

agencies to come out of the Space Race was the Advanced Research Project Agency

(ARPA). Its mission was to advance the military and national defense. The new agency

attracted the brightest scientists and researchers from across the country and received

large research funds. Although ARPA got off to a very strong start, President

Eisenhower created the National Aeronautics and Space Administration (NASA) shortly

after. NASA was the country's prodigal son, and it stole ARPA's thunder and funding.

Since NASA was now handling the Space Race, ARPA looked to other experimental

research fields. Under the leadership of Joseph C.R. Licklider, ARPA sets off to study a

new field—computers, information processing, and networking. Licklider soon becomes

the visionary behind the Internet. (Segaller, 35-39)

In 1963, Joseph C.R. Licklider pens the memo "The Intergalactic Computer

Network". The memo is sent to computer scientists and researchers across the country.

In it, he proposes the idea of the Internet—a network that would link people together via

computers. Licklider had done much research over the years on ways to share information and to simultaneously have people access computers and information. This memo preserved Licklider's name in history as one of the fathers of the Internet. (Moschovitis et al., 37)

In 1966, Bob Taylor, head of ARPA's computing programs department, initiates a project to link together a network of research centers. Larry Roberts, who was responsible for the first network connection via phone line from Boston to Santa Monica in 1965, is hired to manage the project. (Haffner & Lyon, 45-47)

Although the idea for the Internet and networking were bouncing around ARPA for some time now, some of the mechanics and other details were still lacking. In October of 1967, the country's leading computer scientists and researchers gathered at the Symposium on Operating Principles. It was here that Larry Roberts publicly announced ARPA's intent to build a research network. It is also here at the Symposium that Roberts was introduced to a concept called packet-switching. The ARPA team eventually hires Paul Baran, a pioneer in the field of distributed networks and packet-switching, as a consultant. Packet-switching technology is incorporated into the ARPAnet plans. (Haffner & Lyon, 76-77)

1950s-1960s: The Development of the Computer Industry

As ARPA was getting off the ground, the computer industry continued to expand. In 1957, Seymour Cray and William Norris co-founded Control Data Corporation (CDC) and began a new breed of supercomputing. In 1958, Bell Telephone Laboratories invented the modem. For the first time, information can be converted back and forth

from digital to analog. Without the modem, computer networking would be impossible. These events, combined with the patent of the microchip in 1959, help bring faster processing time, real-time computing, and networking to the 1960s. (Moschovitis et al., 41-45)

In 1962, Paul Baran presents a paper, "On Distributed Communication Networks", regarding the need for a distributed communication system that could withstand a nuclear attack. A distributed network allows information to be sent over many different possible paths and routes. This also became known as Redundant Routing. Information is sent over a distributed network by dividing the information into smaller sections and reassembling it once it reaches its destination. This method is known as packet-switching. With the development of distributed networks and packet-switching, the basis for networking is laid. (Moschovitis et al., 46-47) Within three years, Larry Roberts connects two computers via phone line from Boston to Santa Monica and establishes the first network connection. (Moschovitis et al., 52) Communications takes on a new dimension—man to machine.

Computers began their wide-spread commercial use in the airline industry. In 1964, IBM invented SABRE for American Airlines. Real-time computing, or instant processing, made SABRE unique. It was the only system up to this time that could keep up with the demand and constant changes of airline reservations. SABRE set real-time computing as a benchmark for future trends. (Moschovitis et al., 49-52)

1950s-1960s: The Development of the Software Industry

Ted Nelson took the software industry to the next level in 1965 by visualizing a computer library system named Xanadu, where information could be stored and accessed on computers non-sequentially with hyperlinks and hypertext. Nelson felt the use of hyperlinks would make the system very easy to use. As an advocate of "computer liberation", Nelson was very outspoken regarding the need to make sure computers are utilized by the public, and not just the government and industries. (Segaller, 286-288) In 1967, Nelson collaborated with Andries van Dam to complete the Hypertext Editing System (HES). Although limited, the program proves useful in many ways and is eventually adopted by NASA for use during the Apollo space program. (Moschovitis et al., 53-54)

1950s-1960s: Society and Culture

As the software and hardware industries were gearing up to cross paths and begin seriously integrating with one another, the American society was beginning to take notice of what was going on as well. In 1964, Marshall McLuhan warned America that electronic media spread on a mass scale would transform society's way of thinking. In his book Understanding Media, McLuhan coins the terms Hot and Cool Media. Hot media stimulates the senses, but does not allow interaction. Cool media is less stimulating to the senses, but engages a person via interactivity. The Internet is the coolest media the world has ever experienced. McLuhan was a visionary in regard to the Internet before it even existed. He prophesied the effect this type of medium would have

on society, and even gave us some of the cyber phrases we use today, such as "the Global Village". (Moschovitis et al., 38, 55)

Another popular catch phrase among the fledgling Internet society at this time was "don't trust anyone over thirty". Within almost ten years of its conception, ARPAnet is up and running. By the end of 1969, the first multi-computer network is connected to 4 research sites, University of California at Los Angeles, University of California at Santa Barbara, University of Utah, and Stanford Research Institute. Most of the work and installation at these universities was performed by graduate students, who helped to shape the culture of the Internet as much as they helped to build its foundation. They were the first surfers on the net—the first online culture. When you put into perspective that the year was 1969, it's understandable that this generation claimed the Internet for the counterculture. When the Network Working Group was formed to discuss technical issues between universities using ARPAnet, the minutes were documented as "Requests for Comments". By using such a loose title, the students avoided the regimented protocols they experienced in academia and invited anyone to attend meetings, make comments, or just observe. This played a vital role in establishing the open forum culture of the Internet. (Moschovitis et al., 59-61)

THE 1970's AND 1980's

ARPA Continues To Develop The Internet

Even though ARPAnet was now up and running, the Internet had not yet come to fruition. In addition to ARPAnet, other network experiments were taking place. The agency also developed ALOHAnet and SATnet.

In 1970, the ALOHAnet was set up in Hawaii under the direction of Norman Abramson of the University of Hawaii. ARPA funded the project to investigate the use of radio connections between networked computers. The project linked 4 Hawaiian Islands together by using several radios that transmitted on the same frequency and were connected to a main computer.

Larry Roberts and Bob Kahn of ARPA took great interest in ALOHAnet, and decided to build from its success. They developed a means for mobile computer networking by physically transporting computers to various locations and transmitting to a main radio station center. These became known as packet-radio networks, and were adopted by the United States Army during the 1970s.

Packet-radio networks provided a springboard to other projects. Due to restrictions on the amount of distance radio transmissions can cover, Bob Kahn began to research the use of satellite transmissions. This would allow coverage almost anywhere on Earth. SATnet, a small packet-satellite network, is set up and allows links between the United States and several locations in Europe. Through his work with both packet-radio and packet-satellite networks, Bob Kahn sets out to design a global network that would allow connections between all types of networks. Kahn's network will eventually become the Internet. (Haffner & Lyon, 220-222)

In addition to breaking ground for SATnet and mobile radio-packet networks, ALOHAnet influenced other forces behind the Internet. In 1972, Norman Abramson's work in Hawaii caught the attention of a young Harvard graduate student named Bob Metcalfe. Soon after, Metcalfe begins working on his Ph.D. dissertation—an analysis and reconfiguration of ALOHAnet. Bob Metcalfe will go on to become one of the most

respected names in the Internet industry as a columnist, the creator of Ethernet, and the founder of 3Com Corporation. (Haffner & Lyon, 238-239)

The 1972 International Conference on Computer Communications (ICCC) featured ARPAnet as the main exhibit in an effort to help promote it. Although more than 20 sites are linked as part of the network, it is only known to the computer scientist community. More than 1,000 visitors attend the conference and experience the capabilities of ARPAnet first hand. As a result of the conference, the International Networking Group (IWG) is formed. Its mission is to build an international network connecting all networks. The ICCC takes one step closer to the creation of the Internet. (Haffner & Lyon, 176-186, 222)

In 1974, Vint Cerf and Bob Kahn write "A Protocol for Packet Network Intercommunications". It outlines the design for an international network system which they call an "internet". The network will allow different types of networks to interact with one another. Cerf and Kahn want to connect ARPAnet, ALOHAnet, and SATnet. In the past few years many other satellite networks had emerged in Europe, which would be linked as well. The challenge in creating an international network was that all of these smaller networks functioned using different modes—phone line, radio, or satellite. Cerf and Kahn determined that they needed to have a "gateway" computer set up, through which information from these smaller networks passed before connecting to one another. They also needed a way to translate all of this information into a common protocol. Transfer Control Protocol (TCP) was a program written to help the gateway computers decipher the information being sent from the different types of smaller networks. (Moschovitis et al., 80-82)

In 1975, ARPAnet hits the news under allegations that the government is hiding illegal files regarding the American public within the network. An investigation dismisses the charges, but ARPAnet is now in the public eye, and the government realizes it needs to carefully manage the use of its network. (Moschovitis et al., 5-11)

In 1977, the Defense department funds a test of the TCP system. A message is successfully sent from San Francisco through 5 different locations spanning as far as London and Norway, eventually reaching the University of Southern California's Information Sciences Institute. Altogether, the information travels over 90,000 miles without losing any data. (Segaller, 110-115) Many believe this is the moment the Internet was born. In 1978, the Xerox Corporation helps develop an enhancement to TCP called Internet Protocol (IP). The combination of TCP/IP costs less to implement, is more effective, and helps drive the expansion of the Internet. (Moschovitis et al., 90-91)

1970s-1980s: The Internet is Born

By 1979, ARPAnet is continuing to grow. People are already starting to refer to it as the Internet, and a need for standardization and procedures becomes apparent. ARPA is now DARPA (Defense Advanced Research Project Agency) and forms various groups throughout the early 1980's to address technical standards, architecture, research, and other issues. (Moschovitis et al., 104)

By the close of the 1970s, ARPAnet includes approximately 100 sites, consisting mostly of universities. However, the only universities allowed to connect to ARPAnet are those conducting research for the government, specifically, the Defense department. In order to compete with the resources provided through ARPAnet, other universities

begin to construct their own shared networks. Eventually, Duke University and the University of North Carolina set up a network. The universities encourage others to participate in the network, which they name Usenet. Usenet connections expanded to Europe and Australia, allowing communication, open-information sharing, and message boards. Discussions on Usenet are referred to as newsgroups and range from a large host of topics.

Other networks begin to blossom in the following years, such as CSNET, BITNET (the Because It's Time Network), and SPAN (the Space Physics Analysis Network). With so many networks now online, a new distinction was emerging. The word internet (with a lower case i) was used to refer to small, private networks using TCP/IP, while Internet (with a capital I) was used in reference to the interconnection of many free, public networks. (Haffner & Lyon, 244)

In 1990, ARPAnet is decommissioned and replaced by NSFnet. ARPAnet was costing close to $14 million a year to run, and was slow compared to new networks. Sites were taken from ARPAnet and linked into NSFnet. NSFnet had been created by the Nation Science Foundation to provide research information to all sciences, not just those affiliated with ARPAnet. The NSFnet allowed regional universities to develop their own networks and connect to it. By the time ARPAnet is ready to be retired, NSFnet is strong enough to take its place. (Haffner & Lyon, 245, 255)

In 1983, all ARPAnet sites or those linking to ARPAnet officially implement TCP/IP, and are now collectively referred to as the Internet. The government allows the Defense Communications Agency, which was now in charge of ARPAnet, to create its

own internal network called MILNET, and leave the Internet to public use. (Haffner &
Lyon, 249)

1970s-1980s: The Development of the Personal Computer (PC)

Although many elements of the Internet are coming together at this point in time,

a wide spread medium for access to the Internet still does not exist. Computers are not

yet household items. They are only available to the government, universities, and

corporations. The invention of the first personal computer, the Altair 8800, changes this

forever. Model Instruments Telemetry Systems (MITS) announces the release of the

Altair 8800 in the January 1975 edition of *Popular Mechanics*, to the joy of computer

enthusiasts everywhere. MITS founder Ed Roberts contracts with Intel to build a

personal computer around their 8080 chip, and sells the Altair 8800 for $397 a piece.

Although the Altair has limited use, orders fly off the shelves.

Aside from being the first personal computer, the Altair spurred some other

important events. Computer buffs from all over the country started their own computer

and equipment companies, which jump started an industry. It also gave a young Harvard

student a blank slate to write a programming system for. In 1975, Bill Gates and Paul

Allen contact Ed Roberts of MITS and write an operating system for the limited-ability

Altair. That spring, Gates and Allen establish MicroSoft and are instantly successful.

MITS agrees to pay royalties to MicroSoft for sale of its software. However,

MITS customers are becoming disillusioned with the limitations of the hardware, and

were grow impatient waiting for additional equipment and MicroSoft software. In

addition, the computer community always had a tradition of sharing free information, and

they were not happy about paying an additional cost of $150 for the software. Eventually, the Microsoft software was pirated and distributed. This caused Bill Gates to publish the now famous "software flap" letter in many industry publications. In it, Gates rebuffs pirating, and thus begins the controversy of open information sharing vs. business venture. The controversy continues to this day. (Moschovitis et al., 82-88)

The first mainstream personal computers, the Apple II and the Commodore PET, were introduced in 1977. By 1981, many homes and offices were using PCs, but these machines required text commands in order to perform tasks. The effort was cumbersome and sometimes required knowledge of various programs. In 1984, Apple announces the Macintosh, a PC featuring a graphical user interface (GUI). GUIs are the icons and graphics that replaced much of the text-driven command formats necessary in early PCs. GUIs change the way people use PCs. (Segaller, 383).

The concept of GUIs was conceived back in the early 1960's when the Human Factors Research Center (HFRC) was created to study the relationship between humans and computers. Technology was not advanced enough to prototype GUIs at this time, but the concept helped to drive their future development. (Moschovitis et al., 115)

In the 1970s and early 1980s, the foremost research facility for computer development was Xerox's Palo Alto Research Center, or PARC. The research team consisted of such industry visionaries as Bob Taylor and Bob Metcalfe. Although the talent was there, Xerox's first attempt at a desktop computer failed. Even though the Xerox Star featured a mouse, icons, folders, and documents, (Moschovitis et al., 116) the PC was priced too high for the general public. In 1979, Steve Jobs, then founder and CEO of Apple Computers, saw designs for a GUI desktop while visiting the PARC

offices one day. Jobs quickly applied the GUI to Apple's first attempt at a PC, the Lisa, which also failed at market for the same reasons as the Xerox Star—price. However, Apple gave the GUI another try with the Macintosh in 1984, and met with great success. (Moschovitis et al., 116)

Steve Jobs leaves Apple in 1985 to start his own company, NeXT. After a dismal start in the hardware industry, Jobs focuses the company on software. Specifically, on software that aids researchers in simulating experiments. Although not as commercially successful as he'd hoped, Jobs' software does make great strides in object-oriented programming (OOP). OOP utilizes a new form of programming which combines both code and data. Until now, each was kept separate and could only be changed by an experienced programmer. OOP allowed programmers to write programs using prefabricated, unalterable components known as "objects". OOP became very common in many fields, such as graphic design, but more importantly, it was one of the building blocks for the World Wide Web (WWW). (Moschovitis et al., 130-133).

By 1989, America Online (AOL) is evolving from what was once a company named Quantum and an electronic bulletin board system. Founder Steve Case wanted to focus on usability after some problems setting up his own systems in the past. AOL offered online access and other services to the less computer-savvy user. Membership reached 10 million by 1998, and AOL continues to be a dominant force in the industry. (Segaller, 277-280)

1970s-1980s: Innovations

As networking capabilities continue to advance, so does software. Dennis Ritchie and Ken Thompson create the Unix operating system in 1970. Ritchie also invents the "C" programming language. The combination of the two allow Unix to be used widespread across the country as business and universities begin to utilize multiple small computers for specific purposes, rather than time-sharing on large centralized computers. (Moschovitis et al., 71-72) Unix also played a hand in helping to establish TCP/IP protocol over other protocols in the early 1980's. (Haffner, Lyon, 250).

Innovations continue in the early 1970s. In 1971, Ray Tomlinson writes several programs that allow the transfer of files and the ability to send and receive messages over ARPAnet. This soon becomes known as e-mail, and in establishing this new protocol, Tomlinson seals the application of the @ symbol in e-mail addresses forever. (Segaller, 104-106)

Bob Metcalfe submits his Ph.D. dissertation in 1973. He borrows from his analysis of ALOHAnet to outline the design for a new type of network called Ethernet. "Ethernet systems are networks that link computers, through hardwiring, within a single location, such as a school or office." (Moschovitis et al., 78) Ethernet becomes the basis for local area networks, or LANs, which are the closed, internal networks widely used today by universities and companies. Ethernet remained widely used until the 1990s. (Moschovitis et al., 78)

In 1975, public-key encryption is developed by Whitfield Duff and Martin Hellman. Public-key encryption is an improvement over past encryption in that it does

not require two parties to share a password or pin information. A few years later, the RSA public-key encryption system is developed and dubbed next to impenetrable. RSA Data Security, Inc. is founded years later, and today continues to be an industry leader in encryption. The development of public-key encryption is vital to the fields of online banking and other secure transactions. (Moschovitis et al., 91-92)

Until 1983, the addresses of web sites, or IP addresses, were strings of numbers. These numbers worked similar to telephone numbers and allowed you to connect to a specific online location. The invention of the name server allowed numeric IP addresses to be converted into words, and visa versa. This made IP addresses much easier to remember and identify, and opened up the Internet to more users. (Moschovitis et al., 111-112). The Domain Name System (DNS) was created in 1984 to accommodate the increase in Internet usage. The DNS allowed connections between name servers, so that a request for an address would go to the nearest name server to be converted, and remain stored there to help cut down traffic. (Moschovitis et al., 118)

1970s-1980s: Society, Culture, and the Virtual Community

The Computerized Bulletin Board System (CBBS) goes online in 1979. It is developed by Ward Christensen and Randy Suess in Chicago. Their intent is to provide an electronic bulletin board which allows the public to post and respond to messages. The two publish an article outlining the design of a bulletin board, and soon other bulletin board systems (BBS) are popping up. In the beginning, subject matter is confined to the computer industry, since computer enthusiasts are the only people with means of

accessing the boards. However, other topics are soon being discussed. (Moschovitis et al., 92-94)

Also developed in England in 1979 are Multi-User Dungeons (Muds).. Muds are text-based game sessions that allow participants to take on character roles when playing. (Comer, 279). Muds help set the tone for online interaction and anonymity that will become so prevalent in future years.

Online communities are vital to the Internet because they don't just define some of the technology being used, they define the culture of how the Internet was used.

One of the best known online communities was the Whole Earth 'Lectric Link (WELL). Created by Larry Brilliant and Stewart Brand, the WELL was intended to be an open forum for conversation over the computer. Larry Brilliant was the owner of Network Technologies International, and Stewart Brand had established grassroots publications, *The Whole Earth Catalog* and *Whole Earth Review*, touting progressive changes to social issues. Brilliant figured by involving Stewart Brand they would have a built in audience through Whole Earth readership. Even though Bulletin Board Systems had been around for awhile, the WELL had some different characteristics. The WELL did not use anonymity when corresponding; users would sign up with their real names. By the end of 1985, even people from outside of the Whole Earth community are signing up to use the WELL. Conference topics cover a large number of categories. Conversations are saved for future read-only reference, and names are attached to posted messages. By 1991, the WELL membership is in excess of 5,000 users. In 1993, Bruce Katz, famous for inventing the Rockport shoe, buys the WELL, and by the late 1990s membership climbs to more than 10,000 users. (Moschovitis et al., 127-129)

The Cleveland Free-Net, the first free Internet access available to the public, specifically to the non-academia community, goes online in 1986. Physician Tom Grunder obtained financial backing for the project through the success of his medical bulletin board system. Anyone with a modem and PC could access the system, which provided e-mail, forums, chat, and information. Soon other Free-Nets are following this example and can be found across the country. By 1995, the Cleveland Free-Net membership reaches 160,000. (Moschovitis et al., 135)

1970s-1980s: Computer Viruses, Worms, and Hackers

The infection of a computer worm brought the Internet to its knees in 1988. Robert Morris released a computer worm through an e-mail system which infected more than 6,000 Internet host machines and caused almost $100 million in damage and repair costs. The silver lining to this event was that it opened many people's eyes to the vulnerability of the Internet and the need for security. It was also the first time that many people had heard of a computer worm, as opposed to a computer virus. While a computer virus needs the program they are embedded in to run in order to do any damage, a worm can operate on its own and multiply, spreading from one PC to another. (Moschovitis et al., 136)

It was around this time that Cliff Stoll's bestselling book, The Cuckoo's Egg, hit the shelves. In it, Stoll recounts how he tracked down a German hacker selling military information to the Soviet Union. Stoll's book brought to light the real possibilities of online espionage, and also took away the innocence and trust of many online

communities and shared networks. People had to figure out how protect themselves while continueing to share information. (Moschovitis et al., 139)

In 1988, the U.S. government launched Operation Sun Devil, led by the Secret Service to combat hackers. The largest crackdowns took place in 1990, and lead to the arrests of many well-known hackers. In some cases, the government violated civil liberties and arrested many innocent people. The event spurs the computer community to seek better laws and legislation for this new medium and the Electronic Frontier Foundation is formed. Its purpose is to educate the American public about cyberspace and keep the government in check when investigating cyber crimes. (Moschovitis et al., 144-147)

Another famous hacker is Kevin Mitnick. Mitnick made a name for himself in the early 1980s when hacking was not yet a federal offense, but more of a way to show off you computer and networking abilities. He was arrested in 1989 for stealing long distance codes and sentenced to prison. Mitnick's defense made headlines, as his lawyer pleaded that "hacking" was an addition. Upon release, evidence that Mitnick was hacking again surfaced with his erased felony record, the judge's changed credit reports, and his parole officers disconnected phone lines. He went into hiding and wasn't apprehended again until 1995, when he was made an example of for other hackers. Much like _The Cockoo's Egg_, Mitnick's actions help to replace the trust and camaraderie of the Internet with fear and suspicion. (Moschovitis et al., 139-140)

THE 1990's

Three main events shaped the fate of the Internet in the 1990's. One was the creation of the World Wide Web. The second was the invention of the browser. The third was the lifting of commercial trade restrictions on the Internet. If these events did not take place, the Internet would not be what it is today. (Segaller, 293)

The 1990s: The World Wide Web

Although by 1990 the Internet is growing at an amazing pace, the World Wide Web is just being launched. Today, it is difficult for many people to see a difference between the two. Tim Berners-Lee and Robert Cailliau developed the World Wide Web (WWW) when working for the European company CERN. It was needed to help users access large amounts of information stored in various locations more easily. Taking their lead from Ted Nelson's hypertext work, and using Steve Job's NeXT software, they develop a hypertext system know as the World Wide Web. They also went on to develop Hypertext Transfer Protocol (HTTP), Hypertext Markup Language (HTML), and the Universal Resource Locator (URL). (Segaller 283-289)

When Tim Berners-Lee linked the World Wide Web to the Internet, it made information available to a much larger audience. As fast as the Internet was already growing, the WWW helped put it into the hands of the everyday person. Once that happened, the growth rate was phenomenal. It also laid the foundation for a more common language, allowing text and graphics to be used. (Segaller, 293-297)

To help make sure the WWW continues to enhance the Internet experience for all,

Berners-Lee forms the World Wide Web Consortium, or W3C, in October of 1994. It

remains an important organization to this day with the following goals:

1. *Universal Access*: To make the Web accessible to all by promoting technologies that take into account the vast differences in culture, languages, education, ability, material resources, access devices, and physical limitations of users on all continents;

2. *Semantic Web*: To develop a software environment that permits each user to make the best use of the resources available on the Web;

3. *Web of Trust*: To guide the Web's development with careful consideration for the novel legal, commercial, and social issues raised by this technology.

<div align="right">(http://www.w3.org/Consortium/#background)</div>

The W3C continues to be a driving force in the development of new technologies, and an

Internet watchdog to ensure an open forum and access for everyone.

The 1990s: Internet Browsers

While the WWW was making information easier to access and organize, the

browser was still needed to make searching and navigating the WWW user-friendly.

Once this was an easier task for the average person, traffic on the Internet would increase.

A browser is "a piece of software which navigates the Web, retrieves information, and

presents a graphical image of the material on the user's screen." (Segaller 382). Marc

Andreessen developed the Mosaic browser at the University of Illinois using GUIs to

ensure it was user-friendly. By 1993 it was posted on the Internet for free. (Moschovitis

et al., 153-173) When Marc Andreessen created Mosaic, he intended to "give users a tool

to navigate and to find things" and to "give content providers an incentive to create

content on the Net". (Segaller, 296). Other browser interfaces were available before

Mosaic. One of the most popular was Gopher, referred to as an information browsing service. Created at the University of Minnesota, the service was menu-driven and intuitive. (Comer 189-205) Although Gopher was popular in the academic community, it did not use GUIs, which made Mosaic very popular with non-technical people. Andreessen eventually moves on to form his own company and develops one of the world's most popular browsers—Netscape. (Moschovitis et al., 177)

In years to come, Netscape holds the market share of browser use. However, in 1996 Microsoft bundles its new web browser, Internet Explorer, for free with its operating system. This raises anti-trust and monopoly charges against Microsoft. Since they were incorporating a program that was not necessary to run a computer (Internet Explorer) with the software that was necessary to run a computer (operating software), it was charged that Microsoft was preventing other companies from entering a fair marketplace. In 1996, Netscape held more than 80% of browser usage. After the bundled Internet Explorer, Microsoft gained almost 50% of the market in a few months. During an investigation by the Department of Justice other charges against Microsoft are brought up. It was alleged that Microsoft offered large amounts of money to Internet Service Providers if they agreed not to use Netscape, that Microsoft withheld technological information that could have advanced the industry, and that Gates' company charged higher fees to companies ordering a Microsoft software package without Internet Explorer. Due to pressure from Microsoft, Netscape was eventually bought over by AOL in 1998. (Moschovitis et al., 209 - 211).

The 1990s: Online Commerce

The Commercial Internet Exchange (CIX) was founded in 1991 as a nonprofit trade organization to help commercial networks connect to one another. According to a policy from the 1950's National Science Foundation Act, it was illegal to buy or sell goods over the Internet. Many people were in favor of allowing commercial traffic on the Internet, while others felt it would only lead to "mass advertising and solicitation" (Moschovitis et al., 157). A loop hole is found in the National Science Foundation Act, and commercial traffic gradually makes it way to the Internet. Eventually the Act is amended. The online commercial industry grows quickly and soon the NSFnet is decommissioned, since the commercial industry is now handling most of the Internet traffic on its own networks. (Moschovitis et al., 158)

Online markets and internet stores hit the web in 1994, and e-commerce is an open market. Concerns about security are raised, and encryption methods improve so as not to slow the speed of ever-increasing commercial traffic. Pizza Hut shows great vision by setting up a pilot program in California that allows you to order pizza online. Although short-lived, it opened the way for industries to establish an online presence for products other than standard merchandise. (Moschovitis et al., 179-186)

The 1990s: SPAM

SPAM, or unwarranted advertising, had been in use for several years on bulletin board systems, and was difficult to discourage, since it was not against the law. It was named for a Monty Python sketch where a diner serves almost nothing but SPAM. The largest SPAM attack happened in 1994 and was launched on Usenet by two lawyers,

Laurence Canter and Martha Siegel. An advertising message for services to help enroll

in a green card lottery was sent to almost 6,000 Usenet groups. It crashed Internet

Direct's (the Internet Service Provider) servers, and the couple was suspended from the

service indefinitely. The story was picked up by major newspapers and the coupled was

dubbed the "green card lawyers". By 1997, more and more charges were being brought

against spammers by Internet service providers, many being settled out of court.

Although many legislation bills are introduced in 1998, bureaucracy and freedom of

speech advocates drag out the process. (Moschovitis et al., 184) To this day, it is still

legal in America to send unsolicited email. However, views on this are changing.

Europe just recently outlawed the practice of SPAM. (The New York Times, November

9, 2003, pg. 10)

The 1990s: Domain Name Servers

The unprecedented increase in traffic on the Internet caused problems for many

online institutions, both government and public. One example was the growing need for

domain names. In 1993, the NSF partnered with Network Solutions to manage domain

names for web sites. They form InterNIC and administer domain names on a first-come-

first-served basis. Domain registration remains free until 1995. As use of the WWW

continues to grow at its manic pace the success and revenues of InterNIC skyrockets. By

1996, it is estimated to be worth approximately $1 billion. (Moschovitis et al., 174 -175)

Requests for domain names climbs to thousands per month, and InterNIC is

understaffed. The first-come, first-served process leads to many lawsuits, as

opportunistic people register well-known names and attempt to resell them. Eventually,

InterNIC implements a policy that trademark holders have first rights to a domain name. More lawsuits occur as a result. In 1998, the Internet Corporation for Assigned Names and Numbers (ICCANN) is created. The new entity is formed to alleviate InterNIC now that its contract has expired, and also to appease accusations that the U.S. government was monopolizing the domain registration industry. ICCANN focuses on root server management, domain name management, and IP address allocation. Registration would be opened up to industry. (Moschovitis et al., 189-190)

The 1990s: Other Important Developments

The Yahoo! Search Engine was created in 1994 by Stanford Ph.D. candidates David Filo and Jerry Yang. It was built from their initial bookmarked Internet pages. When their lists of bookmarks grew too large, they were categorized and subcategorized into almost anything you can find on the Web. The addition of a search engine made it an overnight success, and the founders millionaires. (http://docs.yahoo.com/info/misc/history.html)

Sun Microsystems develops Java, which is the first software that can run on any operating system. This makes it the perfect software for use over the web. (Moschovitis et al., 167)

The first multicast is transmitted by the Internet Engineering Task Force (IETF) in 1992. The original theory was developed back in the 1980's at PARC, but the IETF was taking it to the next step by setting up experimental networks to test the new technology, known as MBONE. (Moschovitis et al., 169)

Linus Torvald developed the Linux operating system in 1991 for use on personal computers. Keeping the spirit of open source code alive, Torvald distributes the code on the Internet. Linux proves to be immensely popular due to the ease of access, low cost, and customization. (Moschovitis et al., 161)

The list of accomplishments and developments goes on and on. But here we can see how the foundation was laid for what has come to be known as the Information Super Highway. Whatever name you give it, the Internet is the great communication venue the Modern Age has experienced.

CHAPTER III

RESEARCH DESIGN AND DEVELOPMENT

The objective of this study will be to identify the most common characteristics of

successful web sites, and also to explain how these characteristics work to make web

sites successful. This research will investigate what the driving forces are behind these

attributes.

Overview of Research Data

This study will be conducted by researching 50 web sites and web site award

criteria for information on what the characteristics of a successful web site are. The

characteristics were entered into a spreadsheet which also lists the source of the

information, as shown in Table 1A.

Table 1A – Sample Research Spreadsheet

	A	B C D E F G H I J K L M N O P Q R S T U
1		DATA SOURCE
2		1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
3	CHARACTERISTIC	
4	CONTENT	
5	Good Content	x x x x x x x x x x x x
6	Accuracy	x x x
7	Clear Purpose	x x x
8	About Us page	x x
9	Become the Subject Expert	x
10	Spelling	x x
11	appropriate content for intended user	x
12	Easy to read	x
13	Emphasize the Site's Top High-Priority Tasks	x
14	FAQ Page or online help	x
15	Last Updated	x
16	Show Examples of Real Site Content	x
17	suitable content for any age	
18	up-to-date info	
19	Writing Style	x
20	Privacy Policy	x

At present time, 125 characteristics have been collected. These characteristics have been sorted into the following overall categories:

- Content

- Design

- Navigation

- Usability

- Technology

- Innovation

Content

The category of Content covers many other characteristics pertaining to subject matter, writing style, and grammar. One of the most important issues with web users is to have accurate and up-to-date content. Readers want to know that the information is not stale and is constantly being updated.

It is also important for the web site to have good content. We've all heard the expression "Content is King", and it's true in many instances. Good content should have a clear purpose and be appropriate for the intended user. Users seek out sites that have unique information, and also those that position themselves as experts on the given subject.

Writing style is important. Pages should be easy to read, without too many links pulling readers in different directions. However, links to old or archived information can

be helpful to visitors. Content should not have spelling or grammar mistakes, as it takes away from the site's credibility.

The type of information that is provided is also significant. Sometimes it's not enough just to post information on a subject; there are other aspects to information that need consideration. People are wary of online information sources today, and will look for various ways to validate a site. For example, many people look for an About Us page. It helps legitimatize the source of the content they are reading. Other examples include bibliographies, copyright information, or identifying the author or publisher. Sometimes simply adding a Last Updated note at the bottom of the page or a link to a FAQ or online help page can give readers the confidence they are looking for in a site.

Design

Design is a very broad term, and covers a lot of characteristics. The obvious trait one thinks of when talking about design is graphic design. The graphic design element of a web site is very important. It covers the graphics, background, color scheme, and the theme or concept of a site.

However, there are other key characteristics that fall under the category of design. For example, making good use of empty space on a web site is often crucial due to the limited real estate, or display area, of web sites. Also, a consistent look and feel through out a web site helps users understand they have not left the site. It is also important not to over design elements of a site. Many times unnecessary graphics or over-formatted text can take focus away from the content. Users can also be distracted from the text if the design elements are not appropriate for the content. For example, if a user is looking for

information on automotive parts, they would not have a lot of faith in the information found on a site with pink background and floral graphics on it.

It is also critical for the design to make the site easy to use for visitors. A large part of design is page layout. Where the elements of a site are placed logistically can play a large part in how visitors utilize a site. A common trait users will look for is the site's logo serving as a link to the homepage. Text arrangement and chunking, or the breaking up of text into easy to read sections, can help make sure content is easy to read and comprehend. Underlining text for emphasis is a common online mistake, since visitors can mistake this for a hyperlink. Using readable type face, noticeable headings or titles, and tables are also design elements that aid in usability.

Design can also aid in usability by not making things more difficult for users. Simple details, such as making sure graphics are not too large to download, can circumvent usability issues. Providing text links for all graphic links and using thumbnail images for larger graphics can also avoid problems. Simple tasks like using ALT tags on images broaden your audience by ensuring that handicap browsers and low-end browsers will still be able to view your site. And as mentioned earlier, mistakes such as sloppy or missing graphics only hurt your credibility.

Navigation

Since navigation is what allows users to move around a site, it is a vital element. Many web sites do not pay enough attention to navigation, and simply provide links on the homepage and leave visitors to find the information they need on their own. This is the equivalent sending invitations to a party that only include directions to your city, and

expecting guests to find your house on their own. Web site visitors need very explicit instructions on where to find the information they are looking for. Sites can make this less complicated for their users by providing easy to read text links, keeping menu items in the same place on all pages, and trying not to have users click more than three times to reach important information.

The use of indicators on a site is very important. An indicator lets a users know where they are in your site at all times. An indicator can be anything from a high-lighted link on the menu to a page title at the top of the page. The means of an indicator are not as important as the purpose. Visitors who do not know where they are in a site become confused and frustrated, which often leads to them just leaving.

Sitemaps are another navigation element that helps contribute to a successful site. By providing sitemap links from every page in your site, users are always just one click away from an overall picture of your web site.

Usability

Although many of the other characteristics researched in this study contribute to the overall usability of a web site, usability itself is still important enough to warrant its own category.

In general, usability is simply making your site as easy to use as possible. In order to do this, webmasters have to acknowledge user preferences and feedback, and respond quickly to inquiries. If users are asked to provide their input, they expect to see their suggestions implemented.

Usability is also the practice of avoiding potential user problems and frustrations. For example, making sure there are no unnecessary advertisements, under construction pages, or disabled features will avoid frustration on the part of your visitor. Using descriptive text links, easy access to features, and descriptive key words will only enhance a visitor's experience on your site.

Perhaps the most important usability trait is usability testing. Thoroughly testing a site before it is published to make sure navigation paths are intuitive, link text is descriptive, and there are no unforeseen problems within the web pages will ensure that the site is easy to use overall. This, in turn, will help secure return visitors to your pages.

Technology

Technology is a broad term that covers many fields. However, for the purpose of this study, the category of technology refers to the building and hosting of a web site. Although content and design—the most visible aspects of a web site—are important, there are many behind-the-scenes elements that contribute to a web site's success also.

If technology is preventing people from accessing your site just one time, there is a good chance they will not attempt to access it a second time. One of the most popular concerns of users is quick download time. When users have to wait to gain access to a site for more than a few seconds, they grow frustrated or question whether the site is valid. Quality hosting is also important. If users cannot access your site or receive an error message that the site is not available, it may lead them to believe that the site no longer exists. Sites must also be viewable by multiple browsers. Not everyone uses the latest and greatest equipment, so sites must be built to meet the specifications of the

lowest common denominator. For example, if Microsoft releases Internet Explorer version 6, which has brand new capabilities, don't build a site that makes the most of these enhancements since they will not be seen by people surfing with Netscape version 4. This same theory applies to making sure sites can be viewed by browsers for the disabled, PCs and MACs, and both high and low resolution monitors.

In order to access your site, people first have to find it. Using a logical domain name can help people intuitively find a site. If a user is looking for the web site of the ABC Corporation, they will try typing in the URL www.abc.com or a variable of it. Search engine optimization is crucial in allowing users to find your site. A site that is not registered with popular search engines cannot be reached by a wide audience.

Interactivity is another important technological element. Users want to be able to interact with a site. They look for the opportunity to submit email, subscribe to a newsletter, or download files. Search functions are popular since they allow users to filter through very large sites and find the specific information they are looking for. One of the most important characteristics users look for these days is the security of a site. For people conducting sensitive transactions online, security is a very big issue. In this day and age, it's even important on sites that do not conduct transactions. Visitors have concerns over sites stealing personal information from them when visiting a site through cookies and then selling the information to marketing research firms.

While all of the technology characteristics are vital to the success of a web site, perhaps the most important technology trait is functionality. Functionality means that all aspects of your site are working. This can be assured by using valid HTML and making

sure all links work. In the grand scheme of things, a site that doesn't work is probably the best reason for a user never to return.

Innovation

For the purpose of this study, the word Innovation is used to describe a category of attributes that set a web site apart from the others. These could be original or creative ways of performing tasks on a site. It could be a catchy name or marketing campaign. It may be a customization or personalization feature. Implementing an application that users would greatly appreciate, such as an affiliate program, can be viewed as innovative. In general, providing something that users cannot find any place else is considered an innovation..

Research Survey

A research survey was used in this study. A sample of the survey can be seen in Appendix I. The survey was distributed to 100 people. It was anonymous, capturing only some background information, such as schooling, age, and gender. The survey was distributed online and published using www.zoomerang.com.

CHAPTER IV

RESEARCH RESULTS

Research Data

Research data was collected from 50 web sites containing information on the characteristics of a successful web site. The top 5 characteristics are:

- Good Content
- Quick Download Time
- Navigation
- Design
- Interactivity

The fact that Good Content was rated the number one characteristic for a successful web site is no surprise. Of all the sites researched, 50% included this as a necessary attribute. One can see why the phrase "Content is King" was coined. Content is the basic driving force behind the Internet, and the number one reason why people use it. The need to share knowledge is what spawned the Internet in the first place at ARPA years ago.

The second most important characteristic was Quick Download Time. This surprising trait was recommended by 45% of the sites surveyed. However, when one considers that the unbelievable growth of the Internet was empowered by peoples' acceptance of advancements in technology, it is not so surprising. It serves to reason that, just like past innovations such as cars, computers, and telephones, we constantly want our technology faster and sleeker. This diffusion of innovation is what helped drive the rapid success of most technological advancements over the last 150 years.

The third characteristic captured from the data research was Navigation. Good navigation was recommended by 41% of the web sites. As good as a site's content is, unless a user can find the content they need, they will go elsewhere to search. Navigation

is easier to incorporate these days due to established user patterns. The Internet has reached an age where it has a history and certain assumptions are expected by users. For example, users will automatically look to the upper-left corner for a logo and link to the homepage. They will scan the bottom of the page for links to copyrights and contact information.

The fourth and fifth characteristics were tied with 35% of the web sites recommending these features. The first is Design. A well-designed web site can boost usage, encourage return visits, and increase the time users spend on your site. It also helps the site sponsor establish a presence on the Internet—a virtual online face. Along with good content and easy-to-use navigation, good design will consistently surface as one of the most important elements of your site.

The fifth characteristic is not so common. Of the 50 web site researched, 35% recommend providing Interactivity. By interactivity, we mean the ability of the user to contact or interact with the site. Users look for the opportunity to submit email, subscribe to a newsletter, or download files. The unexpected entry of interactivity into the top 5 characteristics again reinforces the effect communication plays in the advancement of the Internet. It's easy to assume things like Flash technology, blinking logos, or the latest browser releases are what people are looking for, but in reality, users want to be heard and acknowledged.

Survey Research

The online survey was sent to 108 people ranging in age from 25-64. Most people were within the age range of 25-34. A majority of the participants completed college.

78% of survey participants use the Internet on a daily basis. This does not include the use of email. The largest reason for online activity was work and business related. Other reasons included:

1. Research
2. Surfing
3. Banking
4. Gaming
5. School-related work
6. Shopping

More than half of the participants (58%) are using online banking. Results such as banking, gaming, and shopping demonstrate that the Internet has become an integral part of the average American life. Daily tasks and errands are now performed on the Internet. This trend will only increase as the use of new technology is integrated into the lives of younger generations.

Contrary to popular belief, users don't always prefer form over function. 85% of survey participants would leave a site with bad navigation and search for another site with the similar information. 85% also said they would continue to use a site with the information they sought, even if it had poor design quality and was visually unattractive.

Participants ranked web site characteristics in order of importance as follows:

1. Good Content
2. Easy to Use
3. Fast Download
4. Ability to Contact Web Site

5. Design

This again demonstrates the importance of good content, as was made evident by the research data results. Users are looking for solid, reliable content, to be able to easily locate information, download it fast, and contact the source of their information. Once this is accomplished, aesthetics can come into play.

When asked what activity users perform most often on the Internet, some of the results were surprising. Activities ranked as follows:

1. Research (37%)
2. Email (25%)
3. Shopping (17%)
4. Access News (16%)
5. Banking (15%)
6. Work (6%)
7. Surfing (5%)
8. Travel (3%)
9. Stock Market (3%)
10. School Related (3%)
11. Driving Directions (2%)
12. Games (0.9%)
13. Recipes (0.9%)
14. Selling (0.9%)
15. Wedding Planning (0.9%)

Content and information are still the dominant forces for Internet use. Communication is still an important factor as well, since email usage ranked second. Shopping is a surprising third place ranking; however, it again shows the assimilation American culture is making to the online world. 3 out of the top 5 ranking activities—shopping, accessing news, and banking—are tasks which people performs in the course of an average day. We all shop for or purchase items, access news via newspaper, television, or radio, and write checks, make deposits, and withdraw money in the course of a day. However, these

tasks can now be performed much more conveniently online, and society is taking advantage of this.

Even people's expectations of the next wave of available technology are geared toward the everyday life. In some cases, the expectation has even waned. Tasks people would like to be able to perform on the Internet range as follows:

1. Nothing (32%)
2. Order Food (10%)
3. Improve Communication (10%)
4. Technology Improvements (8%)
5. Schedule Appointments Online (7%)
6. Perform Everyday Tasks (4%)
7. Improvements for Consumers (4%)
8. Improve Online Banking & Bill Paying (4%)
9. Gamble & Play Lottery (3%)
10. Find Law Sites (3%)
11. Find Land, Zoning, and Planning Info (3%)

The lack of expectation by 32% of participants displays a general complacency with the Internet. The general public is using the Internet on a daily basis, and without an in-depth knowledge of technology, they have no expectations aside from what they know and understand the Internet's capabilities to be.

The second task users are looking for was ordering food. This included ordering fast food and food from standard, sit-down restaurants. Users wanted the ability to order a meal, pay for it, and have it delivered. This also included grocery shopping. Again, users wanted to select items for purchase, pay for them, and have them delivered. This is simply the next step in the Internet performing daily tasks for the American society.

The third task was improving communication. All the suggestions in this category referred to instant messaging and email. Users want the ability to instant message anyone at anytime, without worrying about being signed on or having an

account. People also want better email functionality and improvements to spam control. Many people sought better contact through visual means via the Internet, and others wanted to be able to make phone calls.

Technology improvements was also a popular choice for people. They were looking for ways to download songs, scan documents, watch live TV, and attend classes.

The next two tasks both reinforce the Internet's grasp on everyday life. People are looking to schedule appointments online. This includes doctor and dentist appointments, as well as visits to the DMV. Users are also looking to perform more random tasks, such as develop film, renew a driver's license, or select your airline seats.

Improvements for consumers emphasize the importance of communications. It is also an example of why interactivity is such an important characteristic for web sites. People want the ability to contact service departments, and check inventories, product prices, and store locations.

Online banking and bill paying has played a large role in incorporating Internet use in our daily lives. Users would like this trend to continue by improving these types of services.

3% of users would like to be able to gamble online and play the lottery. While online gambling is already quite popular, picking up a local lottery ticket has always been a task accomplished while performing daily errands. Here again, users are looking to perform another task from home.

The tasks of finding law-related and zoning web sites are probably more the result of these being specialized fields and participants not finding a good resource for the information they often need. While not supporting an Internet trend, these tasks do

demonstrate the frustration users carry when unable to find what they seek on the Internet.

The fact that some of the capabilities identified through this question on the survey already exist is inconsequential. The lesson learned through this question's results is what people want to do online. Whether they can or not perform these tasks does not change the facts that it is what they hope to accomplish via the Internet at some point.

CHAPTER V

Summary and Conclusions

Based on the results of this study's research data and survey results, and on the history of the Internet reviewed earlier, the following conclusions are supported.

Communication is a driving force of Internet use and advancement. The use of email and instant messaging accounts for one of the most popular activities people conduct online. Communication has helped the Internet become an integral part of the American culture. Following the trend of the telegraph and telephone, email has bridged distances and provided people with yet another form of contact. Although many studies have condemned the Internet for destroying the social condition, especially in the case of teenagers, it has also provided a new communication vehicle that has been accepted by almost all age groups.

Communication is not always in the form of email. While the argument stands for kids spending too much time on the computer and not enough time interacting with peers, one must look at the reverse argument—that the Internet provides a virtual circle of peers through chat rooms, interactive gaming, and use groups for kids who are shy, unpopular, and socially awkward. Bulletin Board Systems and online communities such as the Whole Earth 'Lectric Link played a huge role in bringing the Internet into the mainstream back in the 1980's and early 1990's. The open forum qualities of the Internet were purposely forged from the Internet's inception by the graduate students who helped build the original connections to make people feel welcome and accepted. Communication is defined as the exchange of thoughts, messages, or information. The Internet provides the most robust medium for these exchanges mankind has ever

experienced. For this reason alone, the Internet will remain a vital part of the American culture.

In addition to communications, the ability to perform tasks online has also helped to engrain the Internet into American culture. As the ability to perform more activities via the Internet arises, more users will evolve. In some cases, users no longer have a choice. Baby boomers who have not already embraced the Internet, and even generations before them, find the world turning to online solutions everyday, thus forcing their hand to join the online revolution. For example, many companies have ceased printing pay checks and opt for direct deposit and online pay statements. Benefit and 401(k) information is often available to employees in an online format only. Even taxes can be filed and submitted electronically. From the survey results in the previous chapter, this is a trend users want to see continue. In today's world where parents are juggling careers, family, and a social life, anything that makes life's tasks faster and easier is a large help.

Based on the results of this study, future Internet trends will continue to foster communication and develop means to carry out everyday tasks. However, one must note that although the Internet as become an important component of everyday life, society will continue on without it. In 1988, Robert Morris released a worm which completely shut down the Internet and consequentially caused approximately $100 million in damage. Almost 20 years later, a similar event causing the Internet to become defunct for an extended amount of time would cause an astronomical amount in damage, not to mention ruin countless businesses. The industries would suffer extensive job loss and the economy would be hit hard. However, life in general would go on. We would stand in line at the bank again, go to the book store to pick up the latest best seller, visit the library

to do research, and pick up the phone or write a letter. Considering the rate of growth and advancement we have experienced with the Internet over the last 20 or so years, one must assume that we will not be able to rebound from this scenario in another 20 years. Society needs to ask itself if convenience and expediency are worth the price of complete dependency.

Bibliography

Comer, D. (1995) <u>The internet book.</u> Englewood Cliffs: NJ: Prentice Hall, Inc.

Hafner, K. & Lyon, M. (1996) <u>Where wizards stay up late.</u> New York, NY: Simon & Schuster.

Hansell, S. (2003, November 9) Spammers can run but they can't hide. <u>The New York Times</u>, p. 3-2, 3-10.

Jacobs, I., (11/05/03) 11/15/03 from http://www.w3.org/Consortium/#background.

Moschovitis, C., Poole, H., Schuyler, T., & Senft, T. (1999). <u>The history of the internet: a chronology, 1843 to the present.</u> San Diego, CA: ABC-CLIO, Inc.

Segaller, S. (1998). <u>Nerds 2.0.1 a brief history of the internet.</u> New York, NY: TV Book, LLC.

Yahoo! Media Relations (n.d.) 11/05/03 from http://docs.yahoo.com/info/misc/history.html

Zacon, R. (7/23/03) 11/15/03 from http://www.zakon.org/robert/internet/timeline/

Definition of Terms

Alt Tag - An HTML tag that provides alternative text when Web pages are displayed without images. This text is helpful for the visually impaired or those who choose not to download images on Web pages in order to increase their surfing speed.

Application - Used interchangeably with program and software, this is a general term for a program that performs specific tasks, such as word processing, database management, e-mail sending or retrieval, or Web browsing.

Back Button - One of the buttons at the top of a Web browser. By clicking on it, you "go back" to the previous Web page.

Bandwidth - The technical definition involves the difference between two frequencies and the amount of information that can flow through a channel as expressed in cycles per second (hertz). It also refers to the range of frequencies (not the speed) or the measured amount of information that can be transmitted over a connection: the higher the frequency, the higher the bandwidth and the greater the capacity of a channel to carry information.

Bookmark - A direct link to an often visited site, saved in your browser for easy access. Bookmarks help you keep track of Web sites you frequently visit. By bookmarking a Web site while you visit it, you can easily return to it later with a simple mouse click, rather than having to remember or type a very long or sometimes cryptic URL.

Boolean or Boolean logic (pronounced: boo-lee-an) - A system of math that uses computational operators, such as AND, OR, NOT, and IF ... THEN to sort data. This system is named after George Boole, an English mathematician who introduced the logic in 1847. Online it is primarily used to search and retrieve information. For example, on the Web you will come across the chance to use Boolean logic when using a search engine. These operators, when used in conjunction with keywords, enable the search engine to retrieve highly specific results. For example, a search for "recipe AND chocolate AND chip AND cookies NOT walnuts" will produce recipes for chocolate chip cookies that do not contain walnuts.

Broken Link or Broken Graphic - A link that no longer works or a graphic that does not appear when a Web page loads are said to be broken. In other words, when a link is "clicked on" and it does not take you to the correct destination, but instead an error message appears, the link is broken. When an image doesn't load, and instead you see the alt text or some generic icon shapes, it's a broken graphic.

Browser (a.k.a. Web browser) - A program used to view, download, upload, surf, or otherwise access documents (for example, Web pages) on the Internet. The browsers interpret the code into what we see rendered as a Web page.

BBS (Bulletin Board System or Service) - A dial-up meeting and announcement system for carrying on discussions, uploading and downloading files, and generally obtaining online information and services. BBS also refers to a congregation of users gathered electronically by modem, where each person can post messages.

Bundle or Bundling - To include, as in "bundled software." It refers to software that is already on a computer system when you buy it new (and is part of the system's total price).

Code or Coding - The act of creating computer programs, Web sites, and other applications. "Code" refers to the typed program instructions that programmers write. The written code is interpreted into a language that a system can read and execute.

DNS (a.k.a. Domain Name Service -or- Domain Name Server) - The Domain Name System (DNS) helps users to find their way around the Internet. Every computer on the Internet has a unique address—just like a telephone number—which is a rather complicated string of numbers. It is called its "IP address." The DNS makes it easier by allowing a familiar string of letters (the "domain name") to be used instead of the arcane IP address.

Download - To transfer a file or files from one computer to another, for example, from a server to your desktop computer. When you "load" a Web page into your browser, you are essentially "downloading" the page from the server it is hosted on.

Drop Down Menu (a.k.a. droplist -or- pull-down menu) - A list of options that "drops down" when you click on the downward-pointing arrow placed next to the first item on the list of a menu.

E-commerce - Conducting business online. Electronic mail (a.k.a. e-mail) - E-mail is mail that's electronically transmitted by your computer. E-mail sends your messages instantaneously, anywhere in the world.

FAQ (Frequently Asked Questions) (pronounced: F-A-Q or fak) - A list of questions and answers related to a Web site, newsgroup, software, or any kind of product or service.

Because these are "frequently asked" questions, most users can find the information they need on a FAQ.

Favorite - Another name for a bookmark.

Frame - A frame refers to a single section of a Web page that's been coded to display "frames."

Frames - A method of coding a Web page to divide the layout into two or more independent parts.

GIF or .gif (Graphics Interchange Format) (pronounced: giff or jiff) - This is a graphics file format used on the Internet. It stands for "Graphics Interchange Format." On Web pages, the images (or pictures) you see are usually in GIF because the files are small and can be downloaded quickly.

Graphic or Graphics - A picture or still image generated on a computer. There are two basic types of computer-generated graphics: object-oriented graphics (vector graphics) and bitmapped graphics (raster graphics). "Graphics" may be short for "graphic arts," including the creation, modification, and printing of visual works.

GUI (Graphical User Interface) (pronounced: goo-ey) - A well-known acronym for a software front end. A GUI should provide an attractive and easy-to-use interface between a computer user and an application (generally featuring graphical elements such as icons).

Homepage (a.k.a. Home or Home Page) - The first page or front page of a Web site. It serves as the starting point for navigation.

Host – A computer that functions as the beginning and end point of data transfers. It is most commonly thought of as the place where your Web site resides. An Internet host has a unique Internet address (IP address) and a unique domain name or host name. A host can also refer to a Web hosting company.

HTML (Hypertext Markup Language) - Used for publishing hypertext on the World Wide Web. HTML is a mark-up language (versus a programming language) that uses tags to structure text into headings, paragraphs, lists, and links. It tells a Web browser how to display text and images.

Hyperlink (a.k.a. link -or- a link) - The text or graphics on a Web site that can be clicked on with a mouse to take you to another Web page or a different area of the same Web page.

Hypertext - A system for writing and displaying text that can be linked in multiple ways to related documents and available at several levels of detail.

In Real Time - The present, as in right now. It means this actual moment.

Index - A file called "index.html" is most likely the starting point (or homepage) for a Web site; a server will most likely be configured to automatically display the index.html (or .htm) file when a request for a Web site comes to the server. This means it is the default page that appears when you type in a URL.

Interactive - Allows a user to manipulate the outcome of certain events (for instance, by filling out a form, requesting a new Web page, or taking an online survey) within a two-way communications system that supports direct and continual responses.

Internet (a.k.a. the Net) - The Internet is actually a network of networks. It is a system of linked computer networks that facilitates data transfer and communication services.

JPG or .jpg (Joint Photographic Experts Group) (pronounced: jay-peg) - One of the two most common types of image formats used on the World Wide Web.

Link (a.k.a. links) - Text or images on a Web page that a user can click on in order to access or connect to another document.

Menu - This term also loosely refers to any type of drop-down menu, dialogue box, check box, or list of option buttons that appear on a Web site.

Modem (short for: MOdulator, DEModulator) - A hardware device you connect to your computer and to a phone line. It enables the computer to talk to other computers through the phone system.

Navigate - The act of moving around the Web by clicking on hypertext links (or paths) that take you from one Web page to another. As you navigate, you move from one computer to another and from one server to another without realizing it.

Network - Basically, it is a collection of two or more computers and associated devices that are linked together with communications equipment. Once connected, each part of the network can share the software, hardware, and information contained in the other parts.

Online - The state of being connected to the Internet. Operating System - The foundation software of a computer system, responsible for controlling and launching the installed applications and computer peripherals.

Packet Switching - The method used to move data around on the Internet. Packet switching breaks all of the data coming out of a machine into chunks, and each chunk has the addresses of where it came from and where it is going. Chunks of data from many

different sources commingle on the same transmission lines and are sorted and directed to different routes by special machines along the way.

Resolution - On a computer monitor, it is the number of pixels (horizontally) and lines (vertically) on the screen. Search Engine - A Web site (actually a program) that acts as a card catalog for the Internet.

Server - A host computer on a network. It houses information and responds to requests for information (for example, it houses Web sites and executes their links to other Web sites).

Site (a.k.a. Web site, Internet site, search site) - A place on the Internet or World Wide Web. It refers to a body of information as a whole, for a particular domain name. A Web site is a place made up of Web pages.

Sitemap or Site Map - A Web page included on many Web sites, its purpose is to help users navigate large, complicated sites. The sitemap usually lists text links to the content of a Web site in its entirety, on one page.

Spam - An e-mail message sent to a large number of people without consent, also known as junk e-mail. Spam is usually sent to promote a product or service.

Surf or Surfing - To browse or look at information on the Web by pointing and clicking and navigating in a nonlinear way (meaning you can go to any site at any time you like).

TCP/IP (Transmission Control Protocol/Internet Protocol) - The set of protocols that make Telnet, FTP, e-mail, and other services possible among computers that don't belong to the same network.

Traffic - The amount of user activity on a Web site.

User (a.k.a. users -or- a user) - A term that defines the online audience, it also refers to anyone who uses a computer.

User-friendly - Easy to use or learn.

Virtual - A simulation of the real thing, it means the same as "almost. The Internet itself can be seen as a virtual world; however, most users prefer the term "online."

Webmaster - A commonly used term that can refer to a variety of individuals involved with the creation or management of a Web site. Most correctly, a Webmaster is the person who maintains, runs, or "watches over" the content and functionality of a Web site. In other words, he or she is the all-points information person or ambassador for a Web site.

Webmistress - A female Webmaster.

World Wide Web (WWW) - "The Web," as it is more commonly called, can be described as a collection of graphical pages on the Internet that can be read and interacted with by computer.

Survey

PART I – Survey Questions

Please answer the following questions by checking the box that applies.

1. Apart from email, how often do you visit web sites on the Internet?
☐ Daily   ☐ Weekly
☐ Monthly   ☐ Less than once a month

2. What do you most often use the Internet for? (Check all that apply)
☐ Business   ☐ Recreation / Leisure
☐ Personal Business (banking, paying   ☐ Other: _____
bills, etc.)

3. If a web site had information that you needed, but was difficult to navigate, would you continue to use the site or would you search for another web site with the needed information?
☐ Continue to use site   ☐ Search for new site

4. If a site had information that you needed, but was visually unattractive, would you continue to use the site or would you search for another web site with the needed information?
☐ Continue to use site   ☐ Search for new site

5. Please rank the following characteristics in order of importance to you when using a web site. (1 – most important 6 – least important)
☐ Good Content   ☐ Design
☐ Easy To Use   ☐ Fast Download Time
☐ Ability to Contact Web Site

6. Do you use online banking or pay bills over the Internet on a regular basis?
☐ Yes   ☐ No

7. What activity do you perform most often on the Internet?

_____

_____

_____

8. What is one activity you would like to perform on the Internet, but the capability is not available?

_____

_____

_____

9. How often do you use either email or instant messaging?
☐ Daily   ☐ Weekly
☐ Monthly   ☐ Less than once a month

PART II – Personal Information

Please answer the following questions by checking the box(es) that apply.

1. Gender:
☐ Male
☐ Female

2. Approximate Age:
☐ Less than 18   ☐ 18-24
☐ 25-34   ☐ 35-44
☐ 45-55   ☐ 55-64
☐ 65+

3. Ethnicity / Race:
☐ Caucasian   ☐ African American

☐ American Indian   ☐ Asian
☐ Hispanic   ☐ Other: _____

4. Please check the highest level of education you have completed:
☐ Some high school   ☐ Some college
☐ Some graduate school   ☐ Other: _____