

2020
WEB
VISION

*How the Internet Will Revolutionize
Future Homes, Business & Society*

Robert D. Oberst

I gratefully acknowledge Pat Oberst, my wife, for her encouragement support, and editing of this work.

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About the Author

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FORWARD

During my career, I frequently performed reengineering assignments for mega-sized companies. As a result, I discovered that the most revolutionary transformations sprang from improvements that connected customers directly to the system, thereby stripping away layers of unnecessary, inefficient, and costly steps. Interactive technologies enabled these radical improvements, of which the Web is the most advanced form.

There are a variety of interactive media including voice response and multimedia kiosks, each with their advantages and disadvantages. In the early 90s, I wrote an article comparing interactive media, but longed for something better. Soon afterwards, the Web arrived. The Web is better than the other interactive media, offering nearly all the advantages with few disadvantages. Web communications provides a radical improvement in interactive technology itself, promising to connect the entities of the world virtually.

In the past, I found myself waiting for technology to arrive. My impatience began after reading *Scientific American's* book on computer chips in 1980. *Scientific American* not only explained chip design and manufacture, but more importantly, how it would revolutionize key industries such as communications and data processing.

Scientific American along with Moore's law accurately predicted the current digital revolution, since its proclamation in 1965. Gordon Moore was one of the founders of Intel and predicted that the power of microchips doubles approximately every eighteen months. Now, I sense that technology is evolving faster than we can foresee. We are in a pivotal period of rapid change that makes the amazing digital revolution thus far seem slow. The significant question is—what will this digital future bring to us and where will it lead? Is there a corollary to Moore's law relative to the Web? Will communications among humans and businesses experience a similar acceleration?

Moore compared the increase in the number of transistors packed into a chip to formulate his law. This related to the speed and power of the chip. The corollary for the Web would be the number of pages available on the Web. The number of Web pages hit a billion in early 2000, then

two billion in the Fall of 2000, and four billion in early 2001. Based on this brief trend, the corresponding law indicates that the power of the Web doubles every 6 months. If we say that 1,000 pages were offered in the first year of the Web, then this trend has held on average for 10 years.

The significant measure of power is not the number of pages, but what is done with those pages. Better measures of power include: the number of pages flowing through the Web, the work or benefit provided by those pages and the dollar volume of commerce conducted as a result. By any measure, it is obvious that the power of the Web is doubling at a rapid pace even during slow economic times.

This book represents a realistic, straightforward view of the future. It emanates from a practical minded analyst who has labored in the systems fields, constantly dealing with the frontiers of technology, applying those evolving technologies on behalf of industries and non-profit organizations.

In the book, the Web has been used in a generic sense. Other types of transactions and protocols are used over the Internet, especially to conduct business transactions (FTP, SMTP, IRC, NNTP, VPNs). Over the next 20 years additional protocols and types of networks will develop over the Internet for business and virtual communications. For simplicity, these evolving technologies are treated as extensions of the broader Web.

Note: The vast majority of research done for this book was performed over the Web.

INTRODUCTION

In its brief history, the *World Wide Web* became a phenomenon. It is primordial, yet evolving at an exponential rate. The Director of Web Consulting for a large firm related that one Web year is equal to three months, underscoring its rapid change. During the late 90s, we heard of new opportunities regarding the Web daily. The media obsessed over the Web. Hundreds of companies formed every month to work on some, up until then, obscure corner of the Web. Billionaires emerged literally overnight after their companies' IPO, Initial Public Offering. Many people rushed to the net, like farmers to a gold rush.

This was virtual gold. With little more than a concept, many Web companies' stock capitalization was in the hundreds of millions and even billions of dollars. Why?—because, people believed in the potential value of their concept. They actually believed that the net would replace “brick and mortar” stores. It is hard to recall a phenomenon that attracted so much interest, activity, and investment in the later half of the 20th Century.

Crash

A crash occurred in early 2000 as severe to the dot com world as the 1929 crash was to the industrial world. By the Winter of 2001, the NASDAQ, home of the dot coms, lost over half its value, experiencing its largest decline ever. Suddenly, investments in Web companies seemed more like pyramid schemes. Many highflying web stocks dropped to a fraction of their former values. Web millionaires lost millions and many Web companies went out of business or were bought out. The gold rush was obviously over, but was the gold gone?

The easy gold was certainly gone or more appropriately, panned out. Panning in a stream is an easy way to acquire riches, since the only tools needed are a pan and a shovel. That is, until the surface gold found in the stream or slue is spent. Initially, there were many easy ways to create wealth through the Web. Once these simple applications were accomplished, the more intricate applications remained. The situation is similar to the more sophisticated mining of gold using complex mining equipment to extract ore deep from within the bowels of the earth. The Comstock load of the Web is still there, but it will require sophisticated techniques to extract. (Interestingly, Comstock sold his interest in the mine named for him for \$11,000. The mine eventually produced

hundreds of millions of dollars in the late 1800s, which would be billions today.) This lesson could well apply for Web investors.

The automobile industry in the first decade of the 20th Century provides another parallel. There were over 800 automobile companies then. People evidently recognized the potential of the automobile to alter our future and invested their efforts in the industry. Many could see that the automobile would replace the horse and buggy and transform their world. Of course, most of these early automobile manufacturers went bust or were incorporated into larger ones, which has been the fate of many web companies. There is a shaking out period, where many dot coms become ghost coms, like the ghost towns of the 19th Century gold rush.

In the past, the Web was so new and moved so fast that it was difficult to judge its direction. It generated confusion in its wake. Now, we are entering a new phase of the Web, a more mature phase.

There is a lack of understanding regarding the direction of the Web; a lack of integration and a lack of vision. However, what if we could divine where the Web was heading? Perhaps the first thought that comes to mind is that we could become the next Henry Ford who transformed the auto industry, industrialization itself, and even society. If we captured the vision, we could bet on the next Amazons, Yahoos, and E-bays and be rich.

There is another factor to predicting the course of the Web's development beyond personal riches. The deployment of the Web will require massive expenditures of capital and labor to bring it to its natural state. Wasting these vital resources will delay achievement of the Web's eventual goal. The crash showed how vital capital can be squandered. If one had the foresight to see where the Web was heading, an immense amount of effort could be saved by avoiding pitfalls and unsuccessful ventures. If we had a blueprint, we could save our time rather than wondering aimlessly in cyberspace. If we could peer into the future, conserve our energy, and avoid frustration, we could save billions of dollars. This money could then be applied to go that much further with the Web, providing us with even more benefits.

If a clear vision existed of where the Web was heading we could efficiently marshal resources towards objective goals. Kennedy's announcement to have a man on the moon by the end of the 60s created an extraordinary amount of energy. The Space Administration then accomplished an incredible feat because there was a clear goal to work towards. Since then, the exploration of space seemed to wonder because there is no goal of equal importance. Having clear-cut goals for the Web will help to obtain its full potential.

The essence of the Web's success has been its freedom and corresponding lack of legislative control. In 1998, Congress passed a three-year moratorium on sales tax regarding Internet purchases. Once it becomes regulated, the evolution will slow. For this reason, it is important that goals are not imposed upon the Web, but that applied resources nurture the Web and help it to grow naturally.

The best way to manage a system development project is to uncover the system rather than force it. There is a tendency to apply technologies aimlessly, which results in an attractive system of little value; to start programming before knowing the requirements. There is a natural end state for every system, in effect, a vision of that system, which is not clear until after the discovery phase is complete. The harder you try to drive the system to preconceived notions, the less likely the project will succeed. The uncovering philosophy leads to successful, quicker, and less costly results.

So, just how do we discover the natural course of the Web? If we had a time machine, we could set the dial for 2020 and go there. Once we arrive, we could verbally query a computer and ask it about what the Web accomplished. We could walk around and see what the Web was doing. We could see how people lived, how they worked, and what society was like at the time. Gathering this knowledge, we could then re-enter our time machine, return to the 2000s and tell everybody what we learned. We would be heroes.

Unfortunately, time machines do not exist yet. So, how do we look into the future of the Web without the time machine? Realizing that any projections we make will be imperfect, how do we go about constructing a reasonable proximity of the future Web? A college history professor, my father, stated that history repeated itself in an advancing spiral. If history does repeat itself, let us look at history to see if there are any past phenomena similar to the Web. Let us look at the trends and see what lessons we can apply to the future of the Web.

A scan of significant events in history should suffice to gain a reference point for the Web and to see its potential compared to other similar events. What should be more instructive is an examination of computer history. Computers have been extremely active over the last 40 years, which is long enough to provide historical perspective. Despite its random appearance, there is an underlying force to computerization. We will look at the history of computers thus far and find some revealing trends. Armed with these revelations we will apply the knowledge to the Web to ascertain its likely path.

There is another very valuable prophecy of the Web's future. Something that is actually here today—Emerging Technology. We see the amazing results of technology and think that new advances constantly

bombard us. We cannot keep up with the frightening pace of technological change. Yet, technologies take a long time to develop. Afterwards, they take as long or longer to become accepted. Accordingly, many of the future technologies should be here today. All we have to do is identify viable emerging technologies and mix them with the Web to project what the combination will produce. Not unlike mixing chemicals together and watching them react. This mixture will yield a surprisingly clear picture of the future.

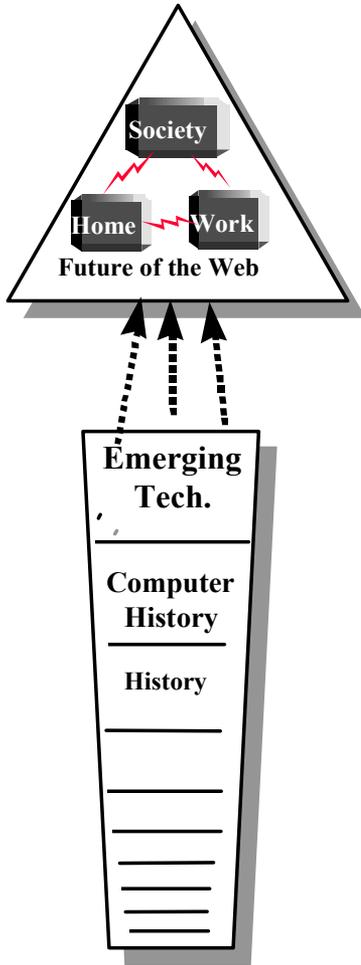
As we look towards the future of the Web, what do we want to look at? Do we want to concentrate on the home and the consumer? Or, do we want to look at work and businesses? Certainly the home sounds more interesting, but, a huge portion of the benefits of the Web, especially in this the second phase, will be seen in business—trillions of dollars. We really should look at both.

One of the postulations of this book is that the emerging technologies will lead to a large segment of the population working at home. So, the distinction between home and work will blur. Of course, last century was the only time there was much of a distinction anyway. Most people until then had homes attached to their shops or lived and worked on their land as farmers, herders, or ranchers. In addition, most businesses ultimately produce goods for the home, so the home and work are closely linked.

Summary

In summary, this book will examine history with a particular focus upon computer history. Then, it will look at emerging technologies. It will look back and draw a line from the past to the present, extending it as a dotted line along the same course into the future. The result will not be much different than using past population trends to predict the future population. This will be done for both home and work. The outcome will be a picture of a future dramatically influenced by the Web. Once we paint this picture, we will be able to look at the effect of the Web upon society as a whole—both the positive and the negative results. We will see the way in which the world will be radically changed by not only the Web, but by the digital technologies attached to the Web to serve mankind.

The goal of this book is to project until 2020 when the Web is mature. Once we are at that point, why not go further, granting that our vision beyond 2020 will blur. The following picture displays how this book will look at the future of the Web from various perspectives to gain a clearer vision.



1

EFFECT OF THE WEB

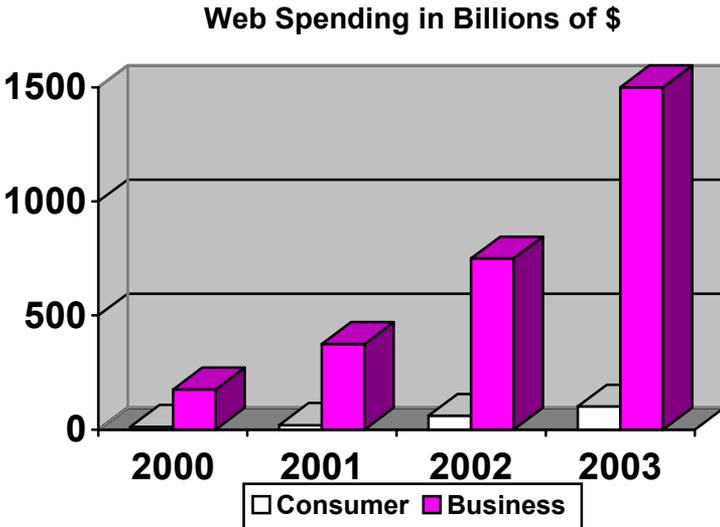
Soon everybody will be in on it with over a billion people accessing the Web at the dawn of the new millennium. An indication of its prominence at the end of the last millennium, was the election of Amazon.com founder, Jeff Bazos, as the *Time* Man of the Year. The Internet had existed for over 30 years, yet it grew exponentially in the 10 years following the invention of the Web in 1991. These 10 years comprise the Web's first stage of growth ending with the Crash of 2000. What will happen in the next stage is the subject of this book.

Our children are growing up with the Web and our grandparents are the fastest growing segment of Web initiates. We assume everything is on the Web; you simply sign onto the Web and do it, for it is self-teaching.

Amazon, America Online, e-Bay, Yahoo, and Excite became billion dollar companies and household names, yet they were unknown in 1995. The speed of their growth was astounding compared to their mega-company brethren. Nearly every company has a Web site and is in the process of expanding it. As the new millennium turned, there were more new dot com commercials on TV than any other type as new Web sites competed for recognition. There are already millions of Web sites throughout the world with billions of pages of content instantly accessible to potentially everybody in the world.

Holiday shopping in 2000 was 10 billion dollars, twice the amount in 1999 according to Forrester Research Inc. Jupiter states that the net provides 10% of airline tickets. By 2003, Forrester expects business-to-consumer spending to grow by 70% a year to \$100 billion, and \$184 billion by 2004. The business-to-business Internet spending should reach \$1.5 trillion by 2003, growing at 100% a year. Yet, the total volume of Web transactions through 1997 was only \$2 billion.

The following chart based on data from IDG illustrates the dramatic growth.



The key concept portrayed by this graph is how business-to-business spending dwarfs business-to-consumer spending. The crash of 2000 underscores the transformation of the Web from a consumer to a business media. Many of the later, less rational consumer Web concepts vanished in a natural extinction. The business-to-business Web transformation is more complex and therefore will take more time, effort, thinking, and capital to accomplish. Unfortunately, it is less exciting.

The immense success of the early Web sites drew unprecedented investments to rapidly build Web services until the crash. There is still uncertainty regarding where the Web will lead. The low hanging fruit is harvested. The days of building a Web site in the garage and having it become a billion dollar company overnight have passed.

The following chart demonstrates the devaluation of some of the more popular Web stocks. It displays the year 2000 highs and lows. It then shows the ratio or fraction between the high and low. Some of these stocks went even lower in 2001.

Popular Web Stocks Decline

	High	Low	Fraction
Amazon	113	15	1/8
Yahoo	250	25	1/10
e-Bay	127	27	1/5
Web Van	27	0.21	1/1000
E-toys	61	0.03	1/1000

These five stocks dropped over 200 billion dollars of their market value in 2000. USA Today's Internet 100 fell 81.9% from their 2000 highs. USA Today dropped 44 stocks from the index due to mergers, loss of capitalization, or failure. Over 117 dot coms failed in a year. Some of the better-known names that spent millions on advertising are gone or greatly diminished. Priceline.com eliminated its grocery business. Pets.com with its sock puppet went out of business. E-toys ran out of cash early in 2001.

Despite recent setbacks, we are starting a new stage of the Web. (An associate whose house is in the middle of an avocado grove in southern California talks about his boom fruit. After you pick the low hanging avocados, you use a boom to knock down the remaining fruit. This is the boom fruit.) The easy applications are complete, but there are still many wonderful opportunities requiring more ingenuity and work. Large companies are investing in the Web and tackling these more complex business applications. This is the boom phase of the Web.

The term boom was chosen, because it emphasizes the immense, although more complex, opportunities remaining. The previous extreme phase might be called the **Rush** phase—a time of excitement approaching hysteria. One envisions wild, wide-open gold rush towns where anything goes and prices are sky high. It is interesting, that the California gold rush was close to the heart of the “Web Rush” in Silicone Valley. Indeed, the gold and later silver from the Comstock load (1859---1882) built San Francisco.

The Rush phase was advantageous. The incredible opportunities and immense amount of capital that it generated served as a catalyst to vastly accelerate the pace of the Web's growth. Many people burnt by the crash, included some large individual investors and mutual funds. Imagine not worrying when a stock will be profitable. We are now in a more realistic period of growth. Investors may feel jilted or jaded by the change, but the future expansion is eminent.

Pessimists view the crash as an indication of diminishing returns for the Web; optimists see it as the end of the first wave crashing onto shore with a much more powerful wave forming on the horizon.

To better understand the current state of the Web requires an analogy. Perhaps the best analogy relates to the state of electricity at the turn of the last century. Many people did not have electricity at the time. Notably, former president Jimmy Carter did not have electricity on his family's farm until the 1920s.

Many electric devices were invented throughout the 1800s. Most of the devices we have in our homes today trace their origins to the 19th century. The telephone, radio, phonograph, light bulb, and computer originated in the 19th century. In one sense, our modern devices are merely advancements of these initial ideas. The cell phone is just another type of phone and the television is the next progression of the radio. It was not until the early 1900s that electricity became widely available in homes and businesses. Then it was practical and profitable to adapt a large array of devices for the home. Bringing the Web into the home is similar to bringing electricity into the home. It will enable a completely new array of virtual devices, many of which are here now in a different form.

Electricity in the home caused a revolution in the way our ancestors lived. Before electricity, people went to bed early. There was little to do without electric light or a radio to listen to. Gaslights were available, but they were dim, dirty, required lighting and extinction, and were a dangerous source of house fires. The electric refrigerator allowed people to keep food fresh longer and shop less often without bulky ice deliveries. Electricity also allowed them to cut the physically demanding weekly washing and cleaning chores from days to hours through electric powered washing machines and vacuums.

The transformation of 20th century businesses was as dramatic. Manufacturing transfigured through the application of a seemingly infinite array of electric powered machines epitomized by robotics in automobile manufacturing today. The application of electric powered office machines and computers transformed office work and the services.

The next major transformation will happen—a revolution in the way we live caused by the Web. Similar to any revolution, there will be many experiments and companies that go awry. These companies will shine brightly, and then vanish like comets in the sky. But, what if there was a comprehensive vision of the future? Then, we could work towards that vision and waste less money, time, and equivalent person-lives. This book is not necessarily the consummate vision of the Web. The intent however, is to present a comprehensive view of the future, shaped by the Web relying on empirical evidence to stimulate thought and discussion.

2020 Brave New World

Many wonderful results will accrue from the combination of the Web and emerging technologies to benefit society at a time when these capabilities will help most. For instance, environmentalists have been projecting for 50 years that we will eventually run out of oil. Periodically, we experience gaps between supply and demand often caused by artificial variables such as OPEC or deregulation. In the winter of 2000–2001, California utilities faced bankruptcy after billion dollar losses due to deregulation and inadequate capacity. Meanwhile, natural gas prices escalated by 50% and higher in the East. We have always been able to find new sources of energy thanks to improving technologies, but the demand despite periodic dips continues to rise, partially attributable to the popularity of larger vehicles such as SUVs.

It is not clear exactly when we will run out of oil, but it is inescapable; eventually it will happen. Periodic shortages will likely occur over the next 20 years, hurting the economy, and sometimes leading to recessions. As the impact becomes more debilitating, it will become incumbent upon society to switch to other energy supplies and reduce demand. The Web will bring relief on the demand side of the equation, for it will facilitate virtual contact among people, businesses, and institutions without inefficient transportation costs. By 2020, the large metropolitan areas where 80% of us currently live will have grown to even more unmanageable proportions and densities. Without the Web, commuting trips of two hours, which are rare today, will be commonplace. At that time, telecommuting through the Web will become an inevitable alternative for both employers and employees.

Highly efficient Web Delivery Centers will provide goods at lower prices than physical shopping. One reason for their success will be the lower relative fuel costs of driving one delivery vehicle to a neighborhood, versus driving 20 personal vehicles from the neighborhood to pick up weekly supplies. People will still choose to go to the mall or convenient store if for no other reason than to get out of the house. The virtual shopping experience of the Web will provide all of the benefits of physical shopping and more. The Web Delivery Center will furnish any item found in the supermarket, K-Mart, drugstore, and most items found at the mall, to your door within an hour or a day. Indeed, the experience will be similar to walking through a mall if you like, but if you want to find something instantly without wandering, that capability is at your fingertips. You can try clothes on and see them on your monitor as if you were looking at a mirror. Then, store them in your virtual closet to

try on in combination with other items you have or are thinking of buying. Virtual sales agents will be available to answer most questions.

The business restructuring that occurred in the 80s and early 90s voided the implied social contract between an employer and employee. The new generation of employees, logically, does not exhibit the same loyalty as their jilted parents. The new psychological contract as evidenced by the standard employment agreement is *employment at will*. Either party is free to separate at any point; like living together versus a committed marriage. They see themselves as free agents, similar to today's million dollar athletes. These free agents will often work for consulting, contracting, and temporary agencies. Many will work independently. They will supply knowledge-based labor to companies remotely through the Web.

Efficiencies provided through digital technologies delivered through the Web will eventually reduce labor demands, despite labor shortages at the start of the millennium. Eventually, both spouses will no longer need to work. They will, in concert, be able to provide more care for their children. Various working combinations will emerge. One spouse may opt to work ½ time and assume more of the responsibilities for the household and family. Both spouses may decide to work half time or three quarters time. These decisions will change over time as the individuals and families mature.

Simulating the reality at the turn of the 19th into the 20th century, many people will work much of their time in their homes. Proximity to megalopolises will not be a requirement for employment, but it will still be a viable choice for those who wish to take advantage of the city's cultural atmosphere. Consequently, the distinction between urban, suburban, and rural residence will blur. The constantly advancing urban sprawl boundary will become diffuse. A new type of organization will arise to provide local services and socialization.

Business will radically transform through the Web. The integration of systems within a company accomplished over the last 40 years resulted in the current state of Enterprise Resource Planning (ERP) systems. The ERP will soon take a new evolutionary step. System integration will evolve outside of the company and extend over the Web between companies and their customers, suppliers, and service providers. Eventual integration will result in Data Reserves, which will concentrate an immense amount of data for a broad range of companies in one common place. Paper and even transactions will no longer need to exist. It will no longer make sense to update a computer's database with a transaction from your computer's database. There will instead be one central storage facility for both of their data—a Data Reserve.

The remainder of this book uses emerging technologies in light of a historical perspective to paint a picture of the Web-enabled world of 2020. This is not a *1984* Orwellian view, but rather a realistic vision of what will be.

Origins

Several stages led to the Web we use today. The Internet has been around since 1969 when the government built the *ARPANET* for military and scientific communications. In 1991, Tim Berners-Lee pioneered the concept of the World Wide Web, developed its first browser, and promoted hypertext with the ability to combine words, pictures, and sound over the Internet. All of these facilitate much easier access to the Internet. Still it was difficult to find specific information on the network, until the invention of the search engines like Yahoo, which help people weed through billions of Web pages to fulfill their requests. Once the Web, Web browser, and search engine were in place enabling easy access to the Internet, usage exploded. (Like mixing sulfur, charcoal, and potassium nitrate to make gunpowder—*boom!*)

By 1996, there were 10 million hosts on the Internet. The volume of e-mails increased from 100 million per year in the late 1970s to 200 billion by the late 1990s. In the early 1990s, data traffic represented about 5% of telecommunications traffic. In 2000, it represents about 50% and is growing rapidly.

Companies wanted to take advantage of the new Web technologies, but were concerned about security. Many began to build their version of the Internet called **Intranets**. Intranets use the same protocols and tools as the Internet, but are secured within the company protected against intrusion by a firewall.

Companies also wanted to cooperate with others for their mutual benefit outside the boundaries of their Intranet. So, a new type of network was established—an **Extranet**. The term Extranet is used to describe a number of networked relationships between organizations. The first use is the case where an organization provides limited access through its Intranet to others such as to its customers and suppliers.

The second usage is the case where a separate organization sponsors a network for other organizations to use, such as a buyer group. The most prominent example of this is the Auto Network Exchange (ANX) currently operated by SAIC. Ford and GM were in the process of building their own Extranets when they decided to support the common initiative ANX.

A third type of Extranet is the case of a separate service company providing extended services to organizations. A company may not choose to build all the functions it wishes to perform on its Intranet. Instead, it contracts with another company to provide these additional services. These services may appear transparent to those using the Intranet. The client company's **Intranet** or the public **Internet** provides access to the **Extranet**.

What You Can Do Now

It is amazing that so much has been offered through the Web in such a short time. Look at some of the things you can do. We are all familiar with the channel feature of some of the key players on the Internet such as AOL or the layered menus on the browsers like Yahoo. They offer possibilities similar to the following:

<p>Communications</p> <ul style="list-style-type: none"> -E-mail family and friends throughout the world -Join chat groups on topics of interest -Search for missing friends and former contacts -Send out proposals, memos, presentations, plans, agendas, or reports to clients or business associates 	<p>Online Purchases</p> <ul style="list-style-type: none"> -Buy books or toys -Buy wine, flowers or gifts -View and purchase fine art -Participate in an auction -Buy clothes -Order groceries -Order pharmaceuticals -Buy most other types of merchandise
<p>Reference</p> <ul style="list-style-type: none"> -Reference major libraries throughout the country including the Library of Congress -Access the Encyclopedia -Research history -Read world newspapers -Catch up on the latest local news -See the latest weather maps and forecasts -Catch the latest sports scores and watch a game broadcast on your PC -Learn about companies from their corporate Web sites -Perform genealogical research on your family tree 	<p>Services</p> <ul style="list-style-type: none"> -View real estate throughout the country -Access an on-line travel agent and see live pictures of vacation destinations including hotel accommodations -Review multiple itineraries and purchase airline tickets -Review maps at any level of detail and obtain directions to any address anywhere -Conduct your banking -Get stock quotes, company research, and buy or sell stocks immediately

<ul style="list-style-type: none"> -Access millions of jobs on a local or national level through professional groups, companies, central sites or newspapers -Explore new cities for relocation 	<ul style="list-style-type: none"> -Review the latest medical research and advice -Place or review personal ads
<p>Entertainment</p> <ul style="list-style-type: none"> -Sample music clips prior to purchase -See local movie schedules and review movies -Read magazines -Hear radio broadcasts from the other side of the country -Review television program listings -Order tickets -View pornography or gamble online -Download and play games -Monitor the progress of a landing craft on Mars and see what it sees. 	<p>General</p> <ul style="list-style-type: none"> -Download software -Buy or maintain a computer or any machine -Conduct a survey -Commit a crime -Start a political action

To illustrate how much the Web can do for you, consider the case of a friend, Jim, who after a rough winter, wanted to move to a warmer climate. First, he and his wife, Christie, used the Web to research various areas to live. They chose North Carolina. Then, he found a consulting job requiring his particular skills through the Internet. After sending a resume by e-mail, interviews were conducted via telephone. Jim accepted the offer. Christie next found a house to rent—again, through the Internet. They did all of this without ever going to North Carolina. Sounds a little radical, but it worked.

The first time Jim, Christie, and their two young children visited the area was when they moved. Ironically, a long lost coworker of his from another state, Bob, had moved in next door. Jim did not know this until the move. Imagine Bob’s surprise when he saw the moving van drive up and later saw his old buddy Jim. The relocation seemed risky, arranged in the virtual world. Jim, however, loved his new job and even received an early promotion. Within a year, they found a new house over the Web. They have been very happy in North Carolina and with the decisions they made over the net.

2

THE WEB'S PLACE

The Democratic Network

The net is an infinite point network. Virtually everybody in the world can connect to it. It is similar to our brain and our neural network, which have billions of neurons, each able to connect to each other.

In the past, computer networks were centralized with all connections coming to a central hub. A network administrator rigidly controlled these networks. The process was complex and time consuming. Despite the hurdles, centralized networks grew and expanded throughout the 70s and 80s.

Personal Computers connected to the mainframe networks. Later, PCs connected to their own networks, which became LANs or Local Area Networks. The PC networks were theoretically simpler, but since connections still had to be planned and controlled, they too required skilled network engineers.

The Web broke this restricted, caged-in environment. Now, anyone could access the Web anywhere, at any time. The analogy is like a centralized regulated economy being replaced by a free market. The first rule of the Web is that everybody can access everything. There is one notable exception to the rule—passwords can restrict access to Web pages. For instance, anyone can access your bank's home page, but you would not want them to access your individual bank account.

Once open communications existed, controlled networks took advantage of it. Companies could now connect to other companies, suppliers, and clients to transact e-business without dedicated lines.

Let us take an example of companies working together in an e-commerce application. A medical equipment corporation spent a huge amount of time processing benefit enrollment forms for their employees. The company decided to set up an Intranet application to streamline this process. Employees would use the Intranet to make their decisions, thereby eliminating burdensome forms processing. Most of the professional employees had access to the company Intranet, but the

factory employees did not. They would use a separate voice response system instead, hosted by a consulting company.

One of the first steps was to establish a central file for both systems to use (the Intranet and voice response system). An employee might enroll over the Intranet and then decide to change his enrollment over the telephone. If two separate databases were used, the employee's first transaction would be lost. The common data should exist at only one site, so the consulting company was chosen. The technology used to accomplish this was not that expensive or difficult to install. In affect, employees would access their data through the company's Intranet, but the data would reside at another company.

There are many ways companies cooperate to build and operate systems, and share common data. These are explored with more depth in a latter chapter. Another reason the Web is so powerful is its relative simplicity compared to the previous monolithic networks.

Simplicity

The dominant communications system since the early 70s was IBM's CICS (Customer Information Control System) the bulwark of mainframe networks. The previous most common communications protocol was Teletype based, TTY; the same ancient protocol used to deliver telegrams. As a typical IBM product, CICS is very powerful, yet complex, and requires the advanced education of a network engineer for it to perform its magic.

The Web uses HTML (Hypertext Markup Language) in its set up, which is much simpler. Instead of CICS screens, the Web has pages. Powerful utilities like Microsoft's FrontPage, Dreamweaver, or Visual Page create Web pages without having to revert to a language. These are as easy to use as word processors, desktop publishing, or presentation packages. Many college students have their own Web sites and you can easily set up your site on America Online as well as many other Web service providers.

Computer systems tend to be complex; hence the first commandment of data processing is Keep It Simple Stupid—KISS. The Web is the essence of KISS for it has these simplifying elements in its favor:

- Universal access throughout the world
- Straightforward addressing scheme using meaningful words
- Page content similar to printed documents
- Integrated links from one page to another
- Standardized protocol (TCP/IP)
- Standard Query Language for accessing data (SQL)

Simplicity offers power.

When PCs first came out, the CIO, Chief Information Officer of TRW, a *Fortune* 50 automotive, and aerospace company pronounced a revolution with the saying, “*More power to the people.*” Employees would no longer have to be dependent upon the monolithic mainframe to work, but could work by themselves on their PCs.

Prior to this pronouncement I performed a feasibility study for TRW and interviewed several managers at its large Western space technology center. During the interview process, we found one department frustrated with the amount of time it took to have programmers complete reports for them. Because of a long backlog, it took months. So this department acquired a PC and kept a separate database for its reporting needs. They had become quite proficient and could produce a report in a couple of hours.

We also interviewed the Chief Information Officer of this business sector. He complained about not having ready access to employee data and specific reports. It turned out that the independent department had developed the reports he needed months ago. They had not told data processing since they were afraid that their actions were illegal within the company’s policy. We urged the department to supply these reports to the CIO. The CIO was so impressed he changed his mind regarding user access to data.

The above story exemplifies the first stage of the revolution. This band of rebels effectively declared that they wanted access to data themselves without having to go through the bureaucracy. The IT bureaucracy did not really resist this notion, because they could not effectively support all of the user needs without an army of programmers. They eventually welcomed, supported, and later trained the rebels.

The disadvantage of local PCs and later, Local Area Networks was that people operated in a closed loop. If employees wanted to work with others or access common data, they would still have to go through the mainframe with its controls and complexities. In the above example, this group had done some marvelous work, but there might be 10 other groups out of the 100 divisions performing the same tasks. If there were a common mechanism for sharing work, the company would gain. If there were a common mechanism to share ideas between companies, the company would gain even more.

Now, with the Web we can access data anywhere in the world through our PCs. Soon, a billion people throughout the world will contact any one of millions of Web sites to obtain information and knowledge. This is truly a worldwide democratic institution.

Until now, the Web has been in the hands of the more affluent and educated. These people tend to be the early adopters of new technology.