Impact of the Internet and Online Services on Business Research Methods

by

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ABSTRACT

Commercial information sources such as Lexis-Nexis, DIALOG or EyeQ have become the traditional source for providing business research. However, with the explosive growth of the Internet and Consumer Online Services, such as America Online or CompuServe, the domain of the commercial information providers is being challenged. A comparison of the three sources of business information was made to assess the content of information provided and trends.

It was shown that the commercial information sources still maintain a huge advantage in quantity of data and ease of retrieval, but advances in technology and Internet growth may eventually degrade the advantage.

In addition, an analysis of the market behavior and trends for the Internet was done. This was coupled with a system dynamic model for growth of the Internet with an evaluation of corporate strategies for emerging technologies. The model indicated that the continued growth of the Internet is dependent on several major improvements such as the availability of low-cost high-speed access and greatly improved information content and retrievability.

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Dan Bradley
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CHAPTER 1. INTRODUCTION

Effective communication of information is the lifeblood of modern business. Whether a firm wants to communicate product information to customers, coordinate manufacturing or design details with a partner, gather market data or learn about the implications of copyright laws, efficient communication is crucial to survival.

The world has witnessed the explosive growth of the Internet. It seems that everyone is getting online in some form. In fact, failure to get online may mean losing touch with the rest of the world. In the business world that can mean the difference between life and death.

The Internet and World Wide Web offer a revolutionarily different way for communication of all sorts. In the next decade, the way business is conducted will change radically due to this evolving medium. Obvious business applications for the net are market research, advertising, human resources and internal resources to name a few. The Internet seems to be a panacea of communication and information.

But is it truly the answer to all the information needs of the corporate world? How is it being utilized right now? For example, if a business needs to gather data on market trends for strategic planning, can they get what they need from the net? If an investor needs the details on the performance of a potential acquisition, can he or she get the dirt? Maybe or maybe not. If they do get some data, how much confidence can they place on that data? These are crucial questions for business researchers.
This thesis will address these questions and try to assess the impact that the Internet has had on the business world. Additionally, it will attempt to extrapolate trends and technology to guess the future of the net.

However, the remainder of this chapter will be dedicated to building a framework for coherent discussion. In the following pages, a quick review of the basic history and elements of the Internet and other information services and systems will be provided. The reader should keep in mind that the magnitude of the subject requires that the background material that follows is a bare minimum. There is much more to the world of information and communication than can possibly be addressed here.

A Brief History of the Internet

Not too surprisingly, the Internet evolved from a U.S. Department of Defense program. It was sponsored by the Pentagon's Advanced Research Projects Agency (ARPA) and initially conceptualized by the RAND Corporation. The goal of the program was to develop a military communication network that could survive a nuclear war.

Though developed with military secrecy, the RAND proposal (the brainchild of RAND staffer Paul Baran) was made public in 1964. The network would have no central authority. In addition, it would be designed from the beginning to operate while in tatters. The network itself would be assumed to be unreliable at all times and would be designed from the outset to transcend its own
unreliability. All the nodes in the network would be equal in status to all other nodes, each node with its own authority to originate, pass, and receive messages. The messages themselves would be divided into packets, each packet separately addressed. Each packet would begin at some specified source node, and end at some other specified destination node. Each packet would wind its way through the network on an individual basis.¹

During the 60s, the concept was formalized at RAND, the Massachusetts Institute of Technology and the University of California at Los Angeles (UCLA). The National Physical Laboratory in Great Britain set up the first test network on these principles in 1968. Shortly afterward, ARPA decided to fund a larger, more ambitious project in the USA.

In the autumn of 1969, the first node was installed at UCLA. By December 1969, there were four nodes on the infant network, which was named ARPANET, after its Pentagon sponsor. The four computers could transfer data on dedicated high-speed transmission lines. They could even be programmed remotely from the other nodes. Thanks to ARPANET, scientists and researchers could share one another’s computer facilities by long-distance. This was a very handy service, for computer-time was precious in the early ’70s. In 1971 there were fifteen nodes in ARPANET; by 1972, thirty-seven nodes.

Throughout the ’70s, ARPA’s network grew. Its decentralized structure made expansion easy. Unlike standard corporate computer networks, the ARPA network could accommodate many different kinds of machines. As long as individual machines could speak the packet-switching

language of the network, their brand-names, and their content, and even their ownership, were
irrelevant. The ARPA's original standard for communication was known as NCP, "Network
Control Protocol," but as time passed and the technique advanced, NCP was superseded by a
higher-level, more sophisticated standard known as TCP/IP. TCP, or "Transmission Control
Protocol," converts messages into streams of packets at the source, then reassembles them back
into messages at the destination.

IP, or "Internet Protocol," handles the addressing, seeing to it that packets are routed across
multiple nodes and even across multiple networks with multiple standards -- not only ARPA's
pioneering NCP standard, but many others were being used by other networks to link to
ARPANET. ARPANET itself remained tightly controlled, at least until 1983, when its military
segment broke off and became MILNET. But TCP/IP linked them all. ARPANET itself, though
it was growing, became a smaller and smaller neighborhood amid the vastly growing galaxy of
other linked machines.

As the use of TCP/IP became more common, entire other networks fell into the realm of the
Internet. Since the TCP/IP software was public-domain, and the basic technology was
decentralized, it was difficult to prevent new computers from linking up. In fact, nobody wanted
to stop them from joining this branching complex of networks, which came to be known as the
"Internet." Like the phone network, the computer network became steadily more valuable as it
embraced larger and larger territories of people and resources.
In 1984, involvement of the National Science Foundation was heightened through its Office of Advanced Scientific Computing. The new NSFNET accelerated the pace for technical advancement, linking newer and faster supercomputers through faster links. The system upgraded and expanded in 1986, 1988, and 1990. Other government agencies joined the fray, including The National Aeronautics and Space Administration, the National Institutes of Health, and the Department of Energy.

The nodes of the network were separated into several categories. Foreign computers, and a few American ones, chose to be denoted by their geographical locations. The others were grouped by the six basic Internet "domains": gov, mil, edu, com, org and net. Gov, mil, and edu denoted governmental, military and educational institutions, respectively, which were, of course, the pioneers. Com, stood for commercial institutions, org represented nonprofit organizations and the net computers served as gateways between networks. These domain labels are still used as part of the Internet address for each node.

The World Wide Web is the user-friendly information portion of the Internet. Its easy to use interface has supplanted character or text-based information tools. Tim Berners-Lee, a researcher at the Particle Physics Laboratory in Geneva developed the World Wide Web in 1990 as a way to foster communications among particle physicists worldwide. The World Wide Web was designed to emulate the human brain, which links together random associations.

The World Wide Web uses interactive, graphical links that form a web of connections across a worldwide computer network. Like other Internet applications, the World Wide Web is based on
a client/server architecture. The client is called a “browser” and can be nearly any computer platform. The World Wide Web supports hypertext and hypermedia documents, including graphics, audio and video.

Each World Wide Web page is linked to other World Wide Web pages with hyperlinks — words, phrases, or graphics that are highlighted in some manner. Each hyperlink is linked to the World Wide Web address of a page containing additional information on the particular subject. By simply clicking on a topic using a browser, it is possible to access the page to which it graphically points or references.²

The Internet and World Wide Web have grown at an exponential rate since the early days with no immediate signs of slowing down. Figure 1.1 shows the fantastic growth of the number of hosts on the Internet.

![Growth of Hosts on the Internet](image)

Figure 1.1 From Hobbes' Internet Timeline

Other Important Features or Related Elements of the Internet

e-mail

For completeness, electronic mail must be mentioned. It is the service that most people use first in networking, whether they are on a Local Area Network (LAN) or on a service connected directly to the global Internet. It is the most commonly used service on the Internet and has become standard practice for much of the daily communication of the business world.

E-mail allows for quick and informal communication from person-to-person, whether they are in the same office or on the other side of the globe. It is not essential that e-mail be transmitted on the Internet, communication within a closed LAN is common, however Internet connectivity enables the user to send and receive messages from a large portion of the world.

Usenet

Net News, Usenet News, or News are all terms that refer to a vast network of special interest Newsgroups where open communications are presented to an interested community. Within this framework, a forum is established whereby professional organizations or individuals can share information on nearly any subject imaginable. Besides e-mail, Usenet Newsgroups comprise the largest information sharing mechanism on the Internet. Net News is asynchronous, one-to-many communication and the newsgroups cover every conceivable category.³

The Usenet began quietly in the late 1970’s when some Unix developers came up with a new feature: a system to allow Unix computers to exchange data over phone lines. In 1979, two graduate students at Duke University in North Carolina, Tom Truscott and Jim Ellis, came up with the idea of using this system known as Unix-to-Unix CoPy (UUCP), to distribute information of interest to people in the Unix community. Along with Steve Bellovin, a graduate student at the University of North Carolina and Steve Daniel, they wrote the conferencing software and linked together computers at Duke and UNC.

By 1981, a graduate student at Berkely, Mark Horton and a nearby high school student, Matt Glickman, had released a new version that added more features and was able to handle larger volumes of postings.\(^4\)

Like the Internet itself, the Usenet has grown at a phenomenal pace. There were over 9,000 newsgroups worldwide as of late 1994 and that number has been steadily growing. The number of Usenet sites exceeded 190,000 in 1994 and the number of countries with active sites is now almost 200.

**FTP**

File Transfer Protocol (FTP) is yet another way to retrieve files from remote computers. With FTP, large archives of shareware, freeware and public domain software can be downloaded as

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well as image and video files, sound and Midi (musical instrument digital interface) files and
countless other information sources.

Unlike the World Wide Web where contact with other computers is essentially transparent to the
user, FTP requires the user to log onto the host computer. This typically requires a very basic
knowledge of the UNIX operating system to navigate through the files.⁵

A comprehensive list of over 1,000 FTP sites is maintained by Perry Rovers. Subscription to this
list can be done by sending an e-mail message to mail-server@rtfm.mit.edu with no subject and
these lines in the body:

    send usenet/news.answers/ftp-list/faq
    send usenet/news.answers/ftp-list/sitelist/part1
    send usenet/news.answers/ftp-list/sitelist/part2
    send usenet/news.answers/ftp-list/sitelist/part3
    send usenet/news.answers/ftp-list/sitelist/part4
    send usenet/news.answers/ftp-list/sitelist/part5
    send usenet/news.answers/ftp-list/sitelist/part6
    send usenet/news.answers/ftp-list/sitelist/part7
    send usenet/news.answers/ftp-list/sitelist/part8
    send usenet/news.answers/ftp-list/sitelist/part9
    send usenet/news.answers/ftp-list/sitelist/part10
    send usenet/news.answers/ftp-list/sitelist/part11
    send usenet/news.answers/ftp-list/sitelist/part12
    send usenet/news.answers/ftp-list/sitelist/part13

**Gopher**

Gopher is an Internet navigation tool that allows a researcher to find and retrieve information
using a hierarchy of menus and files. Gopher was developed at the University of Minnesota to

provide a better interface to distribute campus information for local users. Its success and popularity led to Gopher servers spreading throughout the Internet. The significance of Gopher is that it was the first Internet application that enabled a user to search the Internet for resources without knowing a specific address in advance. “Surfing the Net” was born with the proliferation of Gopher.

Veronica (Very Easy Rodent-Oriented Net-wide Index to Computer Archives) and Jughead are search services of gopherspace. They construct menus based on keyword searches.

Telnet

Telnet is a simple way to access a remote computer as if the user was logged on locally. This text-based interface allows the user to access and move files in much the same way a person at a dumb terminal can manipulate files on any mainframe computer. Use of Telnet is fading as Gopher and World Wide Web become the preferred method of remote access.

The Players

There is a large body of companies that are willing and able to provide information services of one kind or another. With the explosion of the Internet and the World Wide Web, the number is growing rapidly. For the purposes of this report, the firms are separated into three groups, commercial information services, online services and Internet service providers. However, as should become apparent over the following chapters, the distinction between the three groups is fading. The interaction and competition between them is a key issue of this document.
Commercial Information Services

The commercial information services represent the oldest and most reliable group. They provide the basic research information that businesses have depended upon for decades. Essentially, these services compile massive databases of reports and articles from a wide variety of sources such as newspapers, magazines, journals and books. For a price, a researcher can access these databases to search and retrieve whatever information is desired. The powerful search engines allow the researcher to be very specific in their search for topics, keywords, dates, authors, publications or any number of other parameters.

Typically, the quality and reliability of the data retrieved from such services is very high. A firm or individual must make a tradeoff decision on the quality and content versus the high cost of the information. Pricing and data delivery options abound. Depending on the service, a user may subscribe to a program that periodically delivers updated CD ROMs for a flat fee. Another alternative is to connect directly to the information service, via modem or other network connection, and perform the research online. In the case of online research, pricing schemes vary between flat fees or per-search rates.

Online Services

Online services have come into prominence over the last decade. They are designed to provide a wide range of informational services both to individuals for home use and to businesses. Along with providing some type of access to the Internet, the online services also provide a wide range
of current news, sports, weather and entertainment. There is a major war in progress as the leading online services strive to provide the most desirable “content” and win the loyalty of millions of customers. As the quality of content rises, the online services are beginning to infringe on the markets of the commercial information services.

Again, pricing rates and strategies vary. However, the typical pricing schedule calls for a flat monthly rate up to a certain threshold of access time. Beyond the threshold, users are billed incrementally for additional access.

**Internet Service Providers**

As the label implies, Internet service providers (ISP) primarily function to give individual or corporate users direct access to the Internet. The leading providers usually try to include other useful benefits to their customers such as proprietary web browser software, World Wide Web home page support, Usenet access, e-mail or technical support in order to make their service more attractive to customers.

Pricing for ISP’s is similar in structure to that of the online services.

As the quality and content of viable information on the Internet grows, the ISPs are also starting to infringe on the market of the commercial information services. In addition, with the huge growth of users on the Internet, the online service companies are also beginning to compete directly with the ISPs.
Summary

To try and summarize the Internet in a few words; due to the grass roots nature of the evolution of the Internet, there is no ownership, no governance and no boundaries imposed on the network. It is a truly anarchistic realm that is shrinking the world in ways that we can only guess.

Useful Resource Materials

An outstanding historical timeline of the Internet can be found on the World Wide Web at

http://info.isoc.org/guest/zakon/Internet/History/HIT.html

A historical timeline of the World Wide Web can be found at

http://www.w3.org/pub/WWW/History.html

Another useful resource is the EFF’s (Extended) Guide to the Internet which can be found at

http://mr2.wes.army.mil/docs/net/tdg/eeg_1.htm
CHAPTER 2. TRADITIONAL BUSINESS USES OF INFORMATION

Business research has been conducted for centuries by gathering information from conventional sources such as newspapers, library references, financial disclosures, academic institutions and professional journals as well as court and legal records or government sources. With the advent of computers, information was still obtained from the same sources directly or indirectly. Over time, a greater portion of the information was compiled in computer data bases for more convenient and expeditious retrieval.

Corporate researchers and modern libraries rely heavily on these types of business information sources. Firms evolved to provide the computer based business information on central mainframe computers. Further advances in technology led to the use of CD-ROM data base services that could be updated periodically and distributed to a subscribership. There is a wide variety of highly reliable and valuable sources that will be discussed subsequently that provide crucial business information for a price.

The traditional commercial information services have undergone major changes with the onslaught of the Internet. In particular, the World Wide Web, with it's intuitive and user friendly graphical user interface (GUI) has forced most of the older services to enhance their appearance and usability.

This chapter will explore the commercial information services. In particular, 4 areas will be considered:
• Who are the leading participants?
• What do they provide?
• How has the Internet driven changes in these businesses?
• Pricing Strategies

NOTE: The reader should keep in mind that the following is not a comprehensive list.

Worldwide, there are hundreds, if not thousands, of information sources to choose from. This
discussion is intended to give the reader a comprehension of some of the prominent services and
the wide range of information available. Additionally, pricing strategies are in a constant flux due
to the heated competition. Actual prices may be considerably different than listed here.

The Commercial Information Providers

LEXIS-NEXIS

LEXIS -NEXIS, headquarter in Dayton, Ohio, is the world's leading provider of enhanced
information services and management tools. The company's mission is to help legal, business and
government professionals collect, manage and use information more productively.⁶

LEXIS-NEXIS is a full-text database service which incorporates two parts: LEXIS and NEXIS.
LEXIS is an international full-text information retrieval system covering case law and statutes, as
well as administrative materials, annotated reports, law reviews, business, current affairs and
patents information. Important databases include the GENFED Library which contains the full-
text of U.S. Federal cases, reported and unreported, beginning with the first Supreme Court case

in 1790, and the British ENGGEN Library, which contains the full-text of English cases, reported and unreported, amongst others. Statutory law, administrative law, secondary authorities and citators are also included. LEXIS also makes available Australian statutory and case law, as well as SCALE, the Commonwealth Attorney-General's database, available via the LEXIS Australian Library section, ALLI and AGIS.

The NEXIS service includes the full text of newspapers, journals, government documents and specialist trade publications in a range of subject fields. Over 2,300 publications are represented. The NEXIS service is updated on a daily basis, and is an excellent source of current news and information.

LEXIS-NEXIS has made and is continuing to undertake many improvements in order to increase its desirability to business researchers. The focus of their improvement strategy is primarily in the area of material content. In addition, they have developed a more competitive pricing strategy that enables the customer to have more selection and control over the information for which they are billed.

New market research data was made available in early December, which features reports from more than a dozen, notable brand names, such as Datamonitor, FIND/SVP and Nielsen. Market research reports provide an independent expert's view of changes in an industry. This research data, which often includes forecasts, assessments and market-share standings, help a variety of business professionals make important investment, product and service decisions.
Customers can purchase the report information online by subsection, eliminating the cost of buying an entire report. LEXIS-NEXIS users will also have the unique ability to preview more of a market research report online than traditionally offered. Users may browse the entire table of contents and study the methodology of most reports, as well as view actual tables, minus the data, before purchasing the information. As of this writing, table of contents browsing of an entire report is not available on any other online service.  

The subsections of the market research reports on the NEXIS® Market Research Product have been formatted by the market research providers as complete, stand-alone units of information. These subsets, called documents, are $18 each. If a subset includes a table, it is $20.

The initial providers include: A.C. Nielsen, BCC Reports, Business Trend Analysts, Collector Trends Analysis, Datamonitor, Euromonitor Market Journals and Reports, FIND/SVP, Freedonia Group, The Information Catalog, Leading Edge, MarketLine International, Packaged Facts and Specialists in Business Information (SBI). More than 20 additional market research report providers are scheduled to be added in 1996.

LEXIS-NEXIS has been criticized for the technological state of its user interface. Despite, the Windows based software, the database interaction is still predominantly text based and considered tedious to search. In a move to improve this situation, LEXIS-NEXIS has announced a product

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development and joint marketing agreement with ALTA Analytics, a leading provider of interactive data analysis and visualization tools. LEXIS-NEXIS has teamed with ALTA Analytics to develop products incorporating their online service and the NETMAP® Software System by ALTA Analytics.

Providing interactive data analysis, the NETMAP Software System analyzes data from multiple sources and allows users to selectively correlate, cluster, target and graphically display relationships and transactions. Users can identify associations typically buried in complex data, as well as determine ongoing trends and organizational structures. In addition, NETMAP readily configures to a variety of applications. Widely used in intelligence and law enforcement, NETMAP also has applications for the commercial sector such as insurance and marketing.

**DIALOG**

DIALOG is a Knight-Ridder Information, Inc. service that provides access to over 450 online databases and more than 45 CD-ROM titles which contain over 330 million articles, abstracts, and citations with particular emphasis on news, business, science, and technology.\(^8\)

DIALOG offers:

- The complete text of articles from more than 2,500 journals, magazines, and newsletters
- The complete text of over 60 leading U.S. and international newspapers, plus wire service stories from Knight-Ridder/Tribune Business News, PR Newswire, Business Wire, and Reuters
- References to and abstracts of articles from more than 100,000 international publications on science and technology, social sciences, and humanities

\(^8\) http://www.dialog.com/dialog/about/dialog6.html
• Financial profiles and back-ground information on more than 12 million U.S. and 1 million international companies
• Details on over 15 million patents from 56 patent-issuing authorities worldwide
• Data on more than 10 million chemical substances

All this information is accessible through a powerful, flexible search language common to all databases on DIALOG.⁹

Each database is individually priced and search costs depend on the amount of time a user is connected to the service.¹⁰

Profound

Profound is powerful, easy to use, and provides vast amounts of information. The service is actually a series of databases called Researchline, Newsline, Wireline, Companyline, Brokerline, and Countryline which cannot be searched simultaneously, but since each is so extensive, this isn't much of a drawback. Newsline alone covers 4,000 newspapers, magazines, and journals from 190 countries. Profound maintains databases of all its documents. They are indexed by market sector, company name, country, words in headlines, publisher, date, and scope (a hierarchy of subjects ranging from abortion to zoning).

With innovative Microsoft Windows-based software that makes use of Adobe Acrobat to display documents in their original format, Profound is a powerhouse of business and general information, and it's relatively easy to set up for personal news delivery. It counts such information sources as

⁹ http://www.dialog.com/dialog/about/introducing-dialog.html
AP, Knight-Ridder, and Reuters among its news sources. Additionally, Profound provides a wide range of financial data. Searches can be based on company name or ticker symbol for quick reports or more detailed historical information.\textsuperscript{11}

Broader and Narrower option buttons in the Navigator, which are used to select the search criteria, offer help in adjusting a search. Profound has two searching methods: AutoSearch is the simpler one, lacking the Scope and Title text criteria of the more complete WorldSearch. Queries can be saved as Custom Alerts, which let the researcher define how often the sources should be searched, daily or weekly.\textsuperscript{12}

Profound is an industrial-strength business service—fast, extensive, and relatively expensive, but worth it when crucial data is needed. The company has made Profound available through its new World Wide Web site (www.profound.com), as of February 1996. Even with such power and ease, it costs a reasonable $19.95 a month, with a $6.95 per hour connect charge. Full-text articles cost an extra $1.50 each to download

**Data Times EyeQ**

Using EyeQ is a mind-boggling experience. The services are fast and easy to use, especially considering the depth of available content, and they dig up a depth of information unmatched by the online services that will be discussed in later chapters. An EyeQ subscription connects a researcher to more than 5,000 sources of business information, including publications,

\textsuperscript{12} DeJong, Jennifer. "The Hunt for Business Intelligence." Computer Shopper, March 1, 1996. pg. 599
newsletters, company reports, and other market and financial data. It is the only service whose entire content can be scanned with a single global search.

EyeQ's interface is simple. To conduct a search, a user merely fills in some blanks in a who/what/when/where grid. EyeQ then displays the search results, ranked according to relevancy. If desired, EyeQ's Mentor feature can be activated at this point, which will fine-tune the search by helping the researcher choose the most pertinent industries, company names, locations, and publications.

EyeQ also provides the PrivateEye feature, which the user can customize to receive (by e-mail, fax, or postal mail) stock quotes and documents about companies automatically. AT&T Business Network and Profound offer similar services.

The cost of EyeQ is $39 per month plus charges for nearly all data accessed. Everything viewed costs something: $3 for each article, $5 for each financial report, and $29 for a more detailed, on-demand company report, which can be faxed to the researcher within two hours. All prices are clearly marked.

If deemed worth the price, EyeQ has virtually any business intelligence needed. While the service is impressive, it's important to ensure that a researcher doesn't wind up paying for data that may be available for less or for free elsewhere.
The AT&T Business Network is a new service, launched in November 1995 and available through the AT&T Interchange platform. Announcements have been made indicating that the service will soon migrate to the World Wide Web. The service is geared to small-business entrepreneurs and employees in larger companies. Its scope is less broad than the heavyweights Profound and EyeQ, and it provides far fewer data sources. But since nearly 90 percent of its data is free, it is much less expensive.

The service carries many of the major databases found in other services: SEC disclosures, Standard & Poor's, TRW credit reports, Reuters, Dow Jones, CCH business-law information, and Information Access Co.'s Prompt database of trade and business journals and newsletters. Other resources, such as the BNA Human Resources Answer Center, are especially useful for small businesses.

Each AT&T Business Network database must be searched separately. But this is not too time consuming for two reasons: Every data source is listed on one screen, and the user can search each one in the same way.

AT&T's search mechanism is extremely powerful. Searches can be done by multiple criteria, specifying keywords, titles, publication dates, and other criteria to narrow the search. The Business Network's consistent, powerful search tools are its main advantage over CompuServe and America Online, and while it lacks the massive volume of data found in Profound or EyeQ, it is just as easy to use. In addition, the service is an excellent source of daily news.
The AT&T Business Network is a solid "in-between" solution. It is cheaper than top-end services, and it provides more powerful and much easier-to-use tools than the consumer online services.

Other Information Services

In addition to the major information services described above, there are hundreds of other services that provide specialized information, catering to the needs of one or several specific industries. Usually, data or reports can be acquired directly from these services. However, as mentioned previously, their databases are often made available to subscribers of the major providers as an enhancement to those services. The following provides a brief description of some of the more prominent sources.

FIND/SVP

FIND/SVP, Inc. is a worldwide consulting, research and advisory firm. The goal of each of FIND/SVP's services is to help executives solve difficult business problems by providing them with relevant knowledge and insights to make on-target decisions. FIND/SVP Publishing is the largest U.S. publisher of reports on consumer products. Published reports include: healthcare, food/beverage, demographics, consumer durables, media, publishing and health/beauty. The company also offers research on process control, industrial automation and environmental control.

FIND/SVP analysts interview 80 to 100 business executives per month to gauge their interest and needs for more information on certain topics. Due to its successful consultancy, the company
prides itself on being tapped into the factors that affect its large base of business clients.

FIND/SVP also has special relationships with leading qualitative data suppliers (such as IRI, Simmons and Walsh America) which give FIND/SVP analysts access to the most reliable and respected industry sales data available. Hardcopy versions of FIND/SVP reports, under the brand names FIND/SVP, Packaged Facts and SBI, range in price from $895 to $3250.

Datamonitor

Datamonitor is an independent, strategic management consultancy which specializes in analyzing global market and company dynamics. Datamonitor's international offices allow the company to provide on-site research capabilities in over 35 countries in the Americas, Asia-Pacific and European regions. The company is a market leader in providing over 700 high-quality, syndicated reports to over 8000 companies around the globe.

Datamonitor offers reports on a variety of industries including: Pharmaceuticals, Consumer Goods, Financial Services and High Technology. The company specializes in primary research conducted by highly-credentialed analysts who have industry experience in their fields of concentration.

A variety of professionals use Datamonitor reports such as, CEOs, VPs, strategic planners, marketing managers, brand managers, consultants, brokers and bankers. Hardcopy versions of the reports, sold under the brand names of Datamonitor and MarketLine International range in price from $1,000 to $4,000.
A.C. Nielsen

A.C. Nielsen is the world's leading provider of decision support services, including business information, analysis and insights. A.C. Nielsen worldwide has been the primary supplier of information-based systems and analyses for nearly 70 years. The company operates in 88 countries and employs over 17,000 associates and is the largest operating unit of the Dun & Bradstreet Corporation.

A.C. Nielsen provides data to customers to enhance decision-making so that participation in a product category can be more profitable. The company's main customers are consumer goods manufacturers and retailers, broadcasters, advertising agencies, computer products manufacturers and distributors, publishers and governments. Hardcopy versions of the reports, sold under the brand names of MarketTrack(TM) (Canada), ScanTrack(TM) (U.S.) and Nielsen Computer Product Index (Canada), range in price from $500 to over $10,000.

Dow Jones Research Service

The Dow Jones Research Service news sources include The Wall Street Journal, Barron's, and Dow Jones News/Retrieval. A search there turns up a headline list, from which a researcher can choose articles to be delivered within the hour by fax (for $12 per article) or sent by postal mail.

ABI/INFORM

ABI/INFORM is a full text, bibliographic database containing information on worldwide business and management issues for areas such as accounting, banking, computers, engineering,
environment, health care, international trends, marketing, and more.\textsuperscript{13} Data is drawn from than 1000 current business journals, professional periodicals, and trade publications.

In addition to the full text of summaries, the records contain bibliographic information, abstracts, text, and indexing information. A word count is included to help the user determine the length of the record.

\textbf{Summary}

With an understanding of the magnitude and content of data and information available from the commercial information services, the value to business organizations becomes readily apparent. Typically, the decision regarding the purchase of information is "how much?" rather than questioning whether to acquire the data at all. It is clear that massive quantities of pertinent data can be collected by a small staff. Tradeoff decisions must then be made to weigh the merits of staff size against the wide range of costs of the various services described. A trend to keep in mind is that the higher the quality of data and the ease of access, the higher the cost.

\textsuperscript{13} http://www.th-darmstadt.de:81/ze/online/stn-info/ONLINE/DBSS/abiformss.html
CHAPTER 3. INEXPENSIVE BUSINESS INFORMATION SOURCES

There are several options for business information that are considerably less expensive than the major commercial information services discussed in Chapter 2. These alternative sources are separated into two different categories: consumer online services (COS) and Internet service providers (ISP). As the name implies, the primary function of the ISP is to provide a direct connection for a user to the Internet. The COS, on the other hand, has a much broader offering, both for business and personal interests.

Within both groups, most providers offer other basic electronic services such as email, access to the Usenet, File Transfer Protocol (FTP), Gopher and Telnet. All of these elements are described in Chapter 1. COSs provide full content on their own, plus easy access to the Internet and pricing plans geared to the occasional Internet user. ISPs are targeted more heavily at Internet users who know what they want and like to choose their own access software.

The purpose of this chapter is to introduce the reader to the leading competitors among these services and to give an idea as to the nature of information available and pricing structures. Strategic and market positioning of the various services will be discussed in later chapters.
Consumer Online Services

America Online

America Online (AOL) is the leading online provider in the U.S. with nearly 5 million subscribers. Some useful business content is offered, however the emphasis and customer base is primarily personal/entertainment for private users.

For business information, AOL offers Hoovers Business Resources which include profiles and other data on more than 8,800 public and private companies. Hoover’s reports are well written, thorough and include lists of competitors which may be a very useful feature.\textsuperscript{14} Hoover’s is also available on CompuServe and the Microsoft Network but navigation is much easier on AOL.

AOL also offers a disclosure database which contains much of the detailed financial data that publicly held companies are legally bound to file with the Securities and Exchange Commission (SEC). This includes balance sheets, income statements, cash flow, earnings and estimate reports. However, all the same disclosure data is available on the Internet and will be discussed in greater detail in Chapter 4. The benefit of using AOL to gather this data is its ease of navigation.

Additional business news is available from AOL via online magazine and newspaper sources such as Business Week, the Mobile Office magazine and Investors Business Daily. The drawback to these news sources is that only the most recent issues are available, historical research cannot be done. AOL does enable the user to gather historical as well as current stock prices of companies.
AOL is very effective at integrating Internet offerings with its own, providing direct links to relevant World Wide Web pages from most of its own subject areas. AOL has integrated its Web browser into the service's interface. To access the Web, the user simply clicks on a button labeled Internet Connection on the opening screen; this leads to a menu that gives access to FTP, newsgroups, Gopher, and AOL's Web browser. Also, most non-Internet sections of AOL now include a Globe icon that yields a menu entitled Top Internet Sites which leads to related Internet resources.

While the Usenet newsgroup reader is not new, it is certainly improved. A researcher can access more groups than before (over 20,000, according to AOL) which is only a subset of all available newsgroups. The newsgroup reader interface is well organized and allows downloading of selected newsgroups for off-line reading, something that no other service offers. Help menus and publications about the Internet are abundant on AOL and appear in just about every menu screen.

AOL earned the 1995 PC Magazine Editors' Choice for Internet access from an on-line service and is currently the only COS with nationwide 28.8 kilobytes per second (kbps) access, via its AOLNet network. It was judged to have one of the most flexible and impressive Web-browser implementations by PC Magazine and was one of the first services to allow any Winsock compatible browser to run over its network. This means that third party software, such as Netscape's web browser can be used with AOL.15

The cost for a single AOL account is $9.95 per month for five hours of access plus $2.95 for each additional hour. There are no additional charges for access to any of the AOL information resources.

**CompuServe**

CompuServe, a part of H & R Block, Inc., runs a close second place to AOL in subscribership with 4 million customers as of December 31, 1995. As with AOL, a large portion of CompuServe's users are private individuals and the service caters well toward them, however there is a stronger slant toward the business customer.

Magazines such as Fortune and Forbes and many of the standard financial databases, such as Standard & Poor's Online, TRW Credit Profiles, SEC disclosure filings and Hoover's Business Resources, form the bulk of CompuServe's business library. What distinguishes the service from AOL and others consumer online services is Business Database Plus, a premium service that contains business-related articles from more than 500 publications, along with industry and company reports. The Business Database Plus interface is text-based, but simple. If researching a company report, the software will even inquire whether the user wants to look at related articles or industry reports. Though Business Database Plus costs an extra $15 per hour, plus $1.50 for each article read or retrieved, it is fast and powerful.

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16 H&R Block, Inc., 1995 Annual Report
There are other vast business databases available on CompuServe, such as the Dow Jones News/Retrieval or the Executive News Service, which tracks news coverage of specific companies on the AP, UPI, and Reuters wires. However, CompuServe's own large databases described above are the service's most useful areas, since they can be accessed quickly without searching through many publications or smaller resources.

CompuServe offers vast stores of business information, but its interface is not as user-friendly or intuitive as AOL. There is no top-level icon for business, and the downloadable service directory is vague about specific business offerings. Finding company data requires trial and error; but is typically quiet useful.

CompuServe does not offer as much assistance navigating the Internet as either AOL or Prodigy. Nor does CompuServe seamlessly integrate Internet offerings with its own. But full access to FTP, Telnet, Usenet, and the World Wide Web are available.18

New pricing options have made CompuServe more competitive. The Internet Club offers the most reasonable pricing scheme; $24.95 for unlimited basic CompuServe services plus 20 hours of Internet use and $1.95 for each hour thereafter. Different pricing is available when using CompuServe as bundled with Internet-In-A-Box; $9.95 for 7 hours or $19.95 for 20 hours.

Prodigy

Prodigy, a joint venture of IBM and Sears, Roebuck and Co., is in a distant third position with 1.6 million customers as of December 31, 1995. This represents a slight reduction in subscribers despite a large growth in that market sector.

Prodigy has a comprehensive dial-up service for personal finance and business information that provides economic, market, industry and company news. Quotations for stocks, bonds and mutual funds as well as bulletin boards on finance topics are also available. In addition, Prodigy offers financial columns, online brokerage services and an optional banking service called Strategic Investor which has a data base containing more than 5,000 stocks and 2,500 mutual funds.

Prodigy has recently developed a new interface which is based on the Hypertext Markup Language (HTML) making interaction with the World Wide Web appear seamless. The new screens operate very much like the World Wide Web; content pages are filled with high-resolution color images and embedded links to related information on the Web.

The cost for Prodigy is $9.95 per month which buys five hours of access time. Each additional hour is $2.95.

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20 "Online Services can be Big Financial Aid for Investors." The Orlando Sentinel, November 19, 1995.
Microsoft Network

The Microsoft Network (MSN) is the newest competitor in the Consumer Online Service segment, debuting on August 4, 1995. Despite its fledgling status, MSN claimed to have 525,000 subscribers by mid November of 1995. This is due, in part to Microsoft’s controversial strategy of bundling MSN with the release of the highly touted Windows 95 Operating System.

MSN’s Internet Explorer provides access to the World Wide Web, FTP, Gopher, Telnet, and Usenet newsgroups. Based on the National Center for Supercomputing Applications (NCSA) Mosaic, it has all the basic features found in Netscape, including the ability to add favorite Web sites to a pull-down menu.

Although criticized for a lack of information content, MSN is developing some useful sources. The service includes many of the standard business databases, including Hoover's reports (unlike AOL, downloading of each report costs $1) and SEC disclosure filings, and it continues to sign up new data providers. Approximately 150 content providers have, or will soon, be added to the service. These include C-SPAN, NBC, Court TV, U.S. News & World Report and the Home Shopping Network Interactive.

Early reports on MSN also criticize its response speed, or more accurately, its lack of speed. While its list of business offerings appears extensive and its interface intuitive, its 28.8 kbps

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connections respond more like 2,400 bytes per second. Microsoft admits that speed has been the major complaint about MSN and is working to alleviate the delays. It is not too surprising that there are some deficiencies with the service in its early stages of life. However, once Microsoft advances down the learning curve, it is expected that MSN will start to compete more closely with the other services.

Microsoft currently offers three pricing plans: $4.95 per month for 3 hours use, plus $2.50 for each additional hour; $19.95 per month for 20 hours of use, plus $2 for each additional hour; and $49.95 per year for 3 hours of monthly use, plus $2.50 for each additional hour.

Other Consumer Online Services

There are two other consumer online services worth mentioning, GEnie and Delphi Internet. These services have lost considerable market share over the last few years. Their combined subscribership is less than 200,000 which represents less than two percent of the market. However, they are not completely gone. Both are working to regain customers and market share.

Delphi Internet was one of the first on-line services to offer full Internet access and lived up to its name with a wide variety of Internet features, including FTP, newsgroups, Gopher, Telnet, and the World Wide Web (text only). But compared with offerings from America Online and Prodigy, Delphi’s mostly text-based interface is archaic and is not well suited for beginners.  

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GENie Online Services; GE Information Systems, Inc's online service, recently added Internet access and a brand-new Windows front end to its array of services. Like Delphi, however, GEnie has no graphical tools once the user gets onto the Internet, and World-Wide Web access is text-based. While GEnie charges just $8.95 per month (which includes 4 hours), abundant surcharges may make GEnie much more expensive than other online services.²⁴

Internet Service Providers

For years the Internet was a barren, elitist, network for computer experts and university researchers.²⁵ However, recent advances in hardware and software such as the World Wide Web have made it accessible to anyone with a personal computer and a modem. Here lies the opportunity for the ISP.

A big difference between the ISPs and other information sources is that the ISPs do not actually provide any business information. Rather, they provide an easy access to the Internet. It is up to the researcher to acquire and use the tools needed to find whatever information is wanted.

It is relatively easy to become an Internet provider; a few telephone lines and modems plus a PC with networking hardware and software is all that is needed. As a result, there are thousands of ISPs worldwide. An exhaustive review of ISPs is not practical for this report, however a list of

nearly 2,000 of them can be reviewed at http://thelist.com. The list, which is sponsored by Internet Direct and I-Site, includes pricing, connection rates and contact information for each ISP.

The following discussion will focus on three of the leading ISPs whose recent success have made a big impression on Wall Street. The reader should note that in each case, quoted prices are based on modem connections. High speed Integrated Services Digital Network (ISDN) or other direct connections are priced much higher.

NetCom

NetCom was one of the first Internet providers to offer specialized software for its subscribers. It is a solid solution for users eager to get on-line but in need of a comfortable interface and a bit of help in setting up.26

All of NetCom's 175 U.S. points of presence (POP) are equipped with 28.8 kbps modems. Toll-free access for 8 cents per minute ($4.80 per hour) is available for remote areas. NetCom has begun to offer limited ISDN and is expanding the capability nationwide.

The current version of NetCruiser, Version 2.1.1, has been refined, and its flexible windowing is popular. The interface allows painless e-mail, Usenet, World Wide Web, Gopher, FTP, and Internet Relay Chat (IRC) access, along with the usual contingent of file viewers and applications such as Telnet. NetCom also offers access via non-proprietary Serial Line Internet Protocol

(SLIP) and Point-to-Point Protocol (PPP) connections that allow a researcher to use third-party browser software such as Netscape.

The company recently unveiled its NetCom Business Services Group, geared toward providing high reliability and direct dedicated connections to large sites. NetCom's recent alliance with LDDS/Worldcom indicates that business Internet connectivity will grow in importance for the company.

NetCom is a friendly solution for getting on-line with minimal effort. For an Internet novice, it's hard to go wrong with a NetCom account. NetCom is also a good deal: $19.55 per month gives unlimited access to the Internet.

**Performance Systems International**

PSI's Pipeline USA offers software and pricing for novices, and its Interramp service offers flexible higher-end, high-speed access for more advanced users. With an aspiration to offer ease of use on a par with AOL, the provider is reaching out to all markets with its 200 POPs.

To broaden its reach, PSI recently made several important acquisitions. Most significantly, service provider Pipeline New York was acquired, from which PSI gained the company's Internaut software. This was the first Windows based software provided by an ISP. Today's Pipeline USA software competes with other providers' offerings and many bundled packages.
The current software used with Pipe-line USA is good but not spectacular, with a Web browser that is somewhat sluggish and not as easy to navigate as NetCom's NetCruiser. But as part of PSI's Pipeline USA service, the software is an excellent and sturdy package for new users who do not need sophisticated TCP/IP programs and who value a good e-mail and Usenet reader. Pipeline USA charges a flat rate of $19.95 per month for unlimited use.

The alternative to Pipeline USA is PSI's Interramp, a full-fledged TCP/IP service, priced at $9 for 9 hours or $29 for 29 hours, with $1.50 for each additional hour. (Weekends and non-prime-time weekday hours, 11:00 P.M. to 8:00 A.M., are free.) Interramp will work with any TCP/IP connection software.

Access at 28.8 kbps is currently available on more than half of PSI's POPs and ISDN single-channel access at 128 kbps is available at all locations. PSI also offers 24-hour technical support.27

UUnet

UUnet provides highly reliable service to users who know what they want and are not uncomfortable setting up Internet software. AlterDial, the dial-up component of UUnet's AlterNet, has approximately 130 access points in the U.S. with 20 additional international numbers. AlterDial offers excellent connectivity and even a good software package in

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NetManage's Internet Chameleon for Windows. In addition, Chameleon has robust FTP, Gopher, and World-Wide Web utilities, plus e-mail and a newsreader that work together well.\textsuperscript{28}

UUnet recognizes that serious users get upset when they are unable to connect to the service; the substantial UUnet infrastructure ensures that users will almost never get a busy signal. All of AlterDial's POPs handle 28.8 kbps and ISDN connections. The company will even assist users in dealing with the frustrating process of coordinating ISDN access with local telephone companies.

UUnet's AlterNet specializes in leased-line connections for businesses that require full-time access. The company also offers direct dial-up connections for Local Area Network (LAN) based users. Toll-free numbers are available for users logging in from the road or from remote areas.

For businesses with capable information technologists on the staff, UUnet is a strong contender. The absence of preordained interfaces and the focus on technically adept users ensure that particular connectivity needs will be met. The tradeoff for this no-worry formula is a lack of hand-holding. New users should look elsewhere.

Pricing is on the high side among service providers. Setup costs $25; $30 buys 25 hours of use per month, and $2 is charged for each additional hour.

CHAPTER 4. FINDING BUSINESS INFORMATION ON THE INTERNET

The previous chapter discusses a variety of avenues to access the Internet in order to gather data for business research. However, identification of actual Internet sites where data can be found is seemingly absent. That is the purpose of this chapter.

Unlike the commercial information providers described in Chapter 2, finding reliable and useful information on the Internet is a much more difficult task. There are literally millions of sites on the Internet and World Wide Web, many are frivolous, personal or utterly useless for business application (pornography is a popular use of the Internet). So finding the right information may be like hunting for the proverbial needle in a haystack.

The situation is worsened by the fact that there is no regulation, review or control over what is put on the Internet. The result is that much of the information is placed by sources that are likely to benefit from the exposure. Consequently, the information may be biased, misleading or totally untrue but appear to be perfectly valid.

A good reason for going to the Internet for information is that in most cases it is free (with the exception of the ISP fees). Unfortunately, due to the nature of the business world, nobody is willing to give away their most valuable data. There are some exceptions, such as governments and academic institutions, that may have a more charitable attitude toward the sharing of information.
Despite the apparent pitfalls, there is useful information to be found. The researcher just has to know what tools are available and where to look. Interestingly, a survey undertaken by the Business Communications Review found that of the respondents (primarily IT managers and end users), information gathering and research was second only to email for use of the Internet.  

The remainder of this chapter will describe tools for conducting research on the Internet and will also identify sources of reliable and useful data.

Tools and Techniques

Browsers

A browser is the researchers interface application for the Internet. There is a wide variety of options to select in a browser; Gophers may connect a user to other Gopher sites, and, as the name implies, web browsers are used to explore the World Wide Web. In addition, FTP, Telnet, IRC and Usenet also require interface applications.

Today, most good browsers have the capability to interface with all of the above mentioned sources. The trend now is for the browser to be primarily a web browser with added capability for the other services. The reason for this is that the World Wide Web is, by far, the fastest growing segment of the Internet. It has become very popular because of its friendly Graphical

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User Interface (GUI), point-and-click interaction, and multimedia capabilities. Although the industry trend is shifting more information to the World Wide Web, the serious researcher must keep in mind there is still useful data is elsewhere on the Internet. However, this might not be the case much longer.

All of the COS's and ISP's described in Chapter 3 provide proprietary browser software to their customers. In addition, there are several third-party browsers that are very effective. As the industry grows and matures, there has been a struggle between competitors to establish a standard. Netscape is currently enjoying a comfortable lead with over 80 percent of the browser market. The overwhelming popularity of Netscape has driven most providers to begrudgingly enable its' use with their service.

As of this writing, the PC Magazine web pages list and describe 32 different browsers. The following list will briefly describe the most prominent:

- **Cyberjack**, Symantec Corp.: Delrina, recently acquired by Symantec Corp., had three goals in mind when designing Cyberjack. First, create a set of Internet tools that is easy to install and configure; second, give the user the means to access all aspects of the Internet; and third, provide a coherent and well-organized interface. The result is a tightly integrated set of tools that offers Web browsing as well as access to each of the Internet's lesser-known protocols.

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32 http://www.zdnet.com/pcmag/1U/bcentral/reviews/br-dir-f.htm
• **Emissary**, The Wollongong Group Inc.: Version 1.1 offers one of the most powerful integrated Internet packages available. In addition to browsing, the user can send e-mail, read newsgroups, and download files via FTP from the same interface. It might not be worth buying Emissary just for Web access, but it is an excellent way to organize the Internet's myriad protocols.  

• **Explore Anywhere**, FTP Software Inc.: Version 2.0 is a powerful product, essentially what is expected from a leading TCP/IP vendor. With its 14 powerful applications and utilities, the user can fully explore both the Internet and company-wide intranets. Unfortunately, the 32-bit NCSA Mosaic-based browser currently provided with Explore Anywhere doesn't live up to the rest of the package's potential. It lacks some now-standard HTML features including background colors, tables, textures, and wrap-around text.  

• **Internet Explorer**, Microsoft: Version 2.0 is the leading contender to Netscape. To attract users, the latest version includes a number of features such as an uncluttered interface, tight integration with Windows 95, new HTML multimedia extensions (including moving marquees, table alignments, colors, fonts, and background WAV sounds and AVI video animation). In addition, commerce-friendly technologies such as secure sockets are included and it also supports most Netscape and HTML 3.0 extensions. Even more is promised for the future including an integrated Virtual Reality Modeling Language (VRML) viewer, Object Linking and Embedding (OLE), Visual Basic scripting, and Java support. Perhaps most enticing of all, the Internet Explorer can be downloaded free from Microsoft's Web site.  

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• *Mosaic in a Box for Windows 95*, CompuServe: This is an affordable browser that provides basic functionality but lacks the more advanced features; FTP, Gopher, newsgroups, and e-mail features provide basic but limited functionality. For instance, the browser's mail cannot send attachments. The newest version of Mosaic from the CompuServe Internet Division (formerly Spry) offers several welcome enhancements, but it provides fewer features and slower performance than most of the other browsers discussed herein.\(^{37}\)

• *NCSA Mosaic*: The latest version of the world's first Web browser – which can be downloaded from the NCSA Software Development Group's home page – is available for Windows 95 and Windows NT, as well as Windows 3.x. Version 2.0 does not do everything that the leaders do, but it performs the standard Web browsing functions well and has added a few impressive features of its own. In particular, the new Autosurf feature lets a user automatically access each one of a home page's links (up to a predefined depth) and load it to cache or an HTML log file. This will enable the user to then browse the documents off-line or show them to a group of people in presentation mode. This is particularly useful when limited by a slow connection or if paying hourly access fees. In addition, it has an attractive and intuitive interface and the toolbar offers intelligible icons with tooltips that make navigation simple. Even novices will have no trouble figuring out how to get around.\(^{38}\)

• *Netscape Navigator*, Netscape Communications Inc.: In the competitive browser market, this is the browser to beat. Version 2.0 pushes the outside of the envelope of Web browser technology in every way, from in-line multimedia support to advanced HTML rendering to security. The Netscape Navigator Personal Edition gives some of the most advanced features on

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the market including many new formatting tags proposed in HTML 3.0 and such novelties as
blinking text and frames. Frames allow the browser to be divided into multiple panes, each
devoted to a separate URL. The sizable panes are independent, so the user can have static
content in one and scrolling content from a different site in another. One of Navigator's most
innovative new features is its ability to view multimedia objects embedded in a page. Through the
use of plug-ins, the user can view objects such as Adobe Acrobat documents, Macromedia
Director files, QuickTime movies, RealAudio sound files, and VDOlive video without having to
load a separate helper application. Navigator also has in-line support for Java applets written with
Sun Microsystems' JavaScript. These platform-independent applications, which a Java-enabled
browser will automatically download and execute, make the Web more interactive than ever
before.39

- **PowerBrowser:** Oracle Corp: The 32-bit beta release of Oracle is in the early stages of
development. However, it offers an intriguing concept. As the name suggests, it is a Web
browser, but it also includes a personal HTTP server, graphical HTML page-creation tools, a
local Structured Query Language (SQL) – compliant data store, and language interpreters for
executing Java or Microsoft Visual Basic for Applications programs. The combination, targeted
at intranets, can turn any workstation into a Web content provider and a true client in Web-based
client/server applications.40

- **Quarterdeck InternetSuite:** Quarterdeck Corp.: The beta release of version 2.0 deserves
recognition because its complete set of Internet tools and intuitive design is impressive, and its
browser, QMosaic, keeps pace with its stiffest competitors. Version 2.0 of QMosaic supports

39 Giebel, Thomas W. "Netscape Navigator, Netscape Communication Inc's Web Browser is Editors Choice." *PC
most advanced HTML features and has added integration with Acrobat, CyberSitter, QuickTime, and RealAudio helper applications. QMosaic is available for free from Quarterdeck's Web site and will be included with the next release of InternetSuite.\textsuperscript{41}

- \textit{Spyglass Mosaic}; Spyglass Technologies: Spyglass Mosaic offers all of the usual controls, including navigational buttons, an editable hot list, an HTML source viewer, and a configurable cache. The user can peruse a history of previously visited sites or open multiple instances of the browser window. Navigation is made easier by a convenient set of right-mouse-click commands. While it cannot yet handle frames, blinking text, or Java, it covers almost all other popular options. Tables, background bitmaps, wrapping text, center and right alignment, headings, and lists are all flawlessly rendered. Spyglass cannot be purchased directly. It can be downloaded for a 30-day trial from the Spyglass Web site, or can be purchased from one of the many developers who license the product for a permanent copy. Companies such as AB Software, Datastorm, I-Link, InContext, Open Text, and O'Reilly & Associates offer unaltered versions of Spyglass Mosaic 2.1. Others such as Accent, CompuServe, IBM, and Ipswitch use Spyglass Mosaic code as the basis for their own browsers.\textsuperscript{42}

\textbf{Search Tools}

Once an adequate browser is selected, the next step in the research process is to acquire the software needed to actually retrieve useful information from the Internet. As of late 1995, the amount of information contained on the World Wide Web was only about one-tenth that of the

\textsuperscript{41} Hickman, Angela. "Quarterdeck InternetSuite; Quarterdeck Corp." \textit{PC Magazine}, March 27, 1996, p. 139.

Lexis-Nexis database, slightly over 1 percent as much as the Dialog database and less than one-half of one percent of the size of the Library of Congress.\textsuperscript{43}

However, if the Internet continues its exponential growth (doubling annually), the magnitude of the World Wide Web may overtake all the other databases within the next 8 years. But, searching for content on the Internet is further complicated by the random global distribution of the information. Consequently, the hunt for specific information becomes more difficult and the use of effective search software becomes critical to success.

Competition in this area has also become very heated, especially for World Wide Web based software. Search engines for the World Wide Web are popularly known as spiders and there is a wide variety of them from which to choose.

These spiders search for keywords in the title or the body of a digitized document, simultaneously scanning the entire universe of documents from the world's Web sites. Spiders can track down millions of cross-references, saving the researcher precious time on trips down dead ends to Web sites that have nothing to do with the search.

When a researcher conducts a search using a spider, it appears that the spider is actually searching through all the web sites of the world in real time. In fact, the spider is searching its own database. Scouring the World Wide Web is done off-line with end-to-end updates taking as much as a month. Each spiders database is constantly updated but can never be absolutely current.

Also, none of the spiders have mapped out the entire network due to the magnitude. Only Lycos claims to have mapped up to 90 percent.

The following list provides a brief description and addresses for the most popular spiders.

- **All4one**, (http://easypge.com/all4one/). Simultaneously runs Alta Vista, Lycos, Yahoo! and WebCrawler. Requires Netscape Navigator version 2.0 to enable multiple windows.

- **Alta Vista**, Maynard MA: (http://www.altavista.digital.com). The newest and hottest spider comes from Digital Equipment Corp. Searches the World Wide Web at a rate of 2.5 million pages per day and indexes every word of text.\(^{44}\)

- **Architext**, Mountain View, Calif.: (http://www.atext.com). Claims it can retrieve a million pages a day. A crew of editors reviews the most interesting pages. Plans to add on-site indexing, which should speed up Web indexing.

- **CyberSearch for Windows**, Frontier: Although not an online spider, the CD-ROM based bi-monthly subscription enables the researcher to search the Lycos database off-line. This may greatly reduce the search time for a user with access time constraints.\(^{45}\)

- **InfoSeek**, Santa Clara, Calif.: (http://www.infoseek.com). Searches the Web; also offers for-fee searches on proprietary databases.

- **Lycos**, Pittsburgh, Pa.: (http://www.lycos.com). Claims to have mapped 90% of the Web.

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• *McKinley Group, Inc.*, Sausalito, Calif.: (http://www.mckinley.com). Online since August 1995 with smart spiders preprogrammed to like some sites and shun others. Humans add some judgments.

• *MetaCrawler*, Seattle, Wash.: (http://www.metacrawler.com). Piggybacks on other spiders delivering very comprehensive searches. But can take up to 3 minutes to retrieve information.

• *Open Text*, Waterloo, Ont.: (http://www.opentext.com). Indexes every single word. Can search for phrases, not just words. Is currently collaborating with Yahoo!.

• *WebCrawler*, San Francisco, Calif.: (http://www.webcrawler.com) America Online's proprietary spider, but can be used for free by anyone on the Net.

• *Yahoo!*, Mountain View, Calif.: (http://www.yahoo.com). A menu-style directory to the Internet, more like a table of contents. Selective in searching only sites with a high likelihood of valuable information.\(^\text{46}\) Yahoo! is teaming up with Open Text to provide advanced search functions.

**Sources**

With the proper tools in hand, the researcher can begin to search for information. The spiders mentioned above will prove to be an invaluable aid. However, much time can be saved if the researcher already has an awareness of some good informational sites.

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The researcher should also be aware that most informational institutions are attempting to modernize and are moving toward the World Wide Web. As a result, many information sources that have FTP, Telnet or Gopher addresses will also have a World Wide Web address and it is possible that they are no longer updating the older systems. Effective use of a spider will often yield a World Wide Web site that is much more intuitive and user friendly. The researcher will have to decide which avenue to pursue; the text based interactions are often much faster than the graphically intensive web pages but the World Wide Web is much easier to navigate.

**Government**

Federal and State Governments as well as lower divisions of government are a valuable source of information. Unlike most other institutions, they have no profit motive and it is usually in their best interest to avail the majority of their information to the public. Of course, there are exceptions to that generous attitude but there is still a lot of data to be retrieved.

Perhaps the first place for a researcher to look is the U.S. Business Advisor (USBA) at http://www.business.gov/. The USBA exists to provide business with one-stop access to federal government information, services and transactions. Their goal is to make the relationship between business and government more productive. The categories of information available through USBA include

- Doing business with the government
- International trade
- Finance
• Labor and employment
• General business
• Laws and regulations

Once at the USBA home page, the researcher can navigate to wide varieties of different information via these paths:

• Frequently Asked Questions (FAQ) on a wide range of business related subjects.
• "How To ..." contains expert tools and step-by-step guides for conducting business with the U.S. Government.
• A search system for finding online resources and regulations.
• A browse option for searching for information by category.
• Current government related news of interest to the general business community.

There are several other valuable government sources that are linked to the USBA.

• The SEC’s Electronic Data Gathering, Analysis, and Retrieval system (EDGAR) (http://www.sec.gov/edgarhp.htm) performs automated collection, validation, indexing, acceptance, and forwarding of submissions by companies and others who are required by law to file forms with SEC. Its primary purpose is to increase the efficiency and fairness of the securities market for the benefit of investors, corporations, and the economy by accelerating the receipt, acceptance, dissemination, and analysis of time-sensitive corporate information filed with the agency.
• FinanceNet (http://www.financenet.gov/) provides listings of Government asset sales for the general public while providing electronic document libraries, mailing lists,
discussion forums and major related sources to link and inform public and private sector financial management professionals on issues of fiscal finance.

- Library of Congress (http://lcweb.loc.gov/) the Library's mission is to make its resources available and useful to the Congress and the American people and to sustain and preserve a universal collection of knowledge and creativity for future generations.  

- Commerce Business Daily (CBD), (http://www.ld.com/cbd/today/index.html-ssi) is a publication which lists contract opportunities with the federal government. With few exceptions, all federal agencies are required to post brief synopses of upcoming contract opportunities in the CBD if the ensuing contract is anticipated to exceed $50,000.  

- The Federal Yellow Pages (http://www.info.gov/Info/html/fed_yellow_pgs.htm) links a myriad of government information sources for such topics as business, computer/information technology, consumer information, employment, governing, health, human services, laws and legislation, money, military as well as science and technology.

There are too many government sources to list them all in this report. However, most government information is linked to the USBA either directly or indirectly.

**Academic Institutions**

The academic community is a prolific group of researchers. This is largely due to the “publish or perish” environment that many university professors and graduate students must live within.

Unfortunately, their information sources are not linked as thoroughly as the government sources.

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In addition, some of the research that is performed in universities is funded by private concerns that may wish to protect investments.

Again, despite the apparent barriers, there is useful information to be found. An excellent starting point is the Marr/Kirkwood Official Guide to Business School Webs (http://www.SSRN.Com/BSCHOOL/). It provides direct links to over 300 business school web pages. Navigating to each school, the researcher can learn of the areas of current research and review active working papers or current publications. Not all works of the university are made available for free; some universities may require a nominal fee to purchase their reports.

Another comprehensive link to business school web pages can be found in the Yahoo! directory at http://www.yahoo.com/Business/Business_Schools/.

Professional Newsgroups/Forums

Probably the most useful method for electronic interaction with professional peers is through the LISTSERV mailing lists. A mailing list is a topic oriented discussion group that uses email as its means of communicating. When a user subscribes to a mailing list, then all messages of that list are forwarded to the users email address. The user then has the option to respond to any of the messages back to the list community or personally to the originator if desired.

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An outstanding benefit of the mailing list is that the researcher can send a question or comment to the list. If the input is interesting or controversial, it often spurs considerable discussion and debate that can be very informative. Through this avenue, a researcher can query experts from around the world for free. Additionally, monitoring of mailing list discussions can keep the researcher in touch with the latest issues.

Currently, there are over 8,000 public mailing lists covering any subject imaginable. The researcher can search the list by subject or location at http://www.lsoft.com/lists/listref.html. A recent search on the keyword “business” yielded fifty seven different lists. Likewise, “finance” led to 14, “information technology” produced 13, “strategy” gave 5 and “marketing” offered 17. Of course, not all of these mailing lists will be useful, but several of them might prove invaluable.

Another potential source of useful information may come from corporate professionals who are involved in similar sorts of activities via the Usenet. Much like the mailing lists, the newsgroups enable interaction in an open forum with a community of people with similar interests. There are currently over 6,000 newsgroups. Of these, about 50 have the “biz” prefix which indicates a business subject. There are another 30 newsgroups listed under the “alt business” category. Again, not all 80 newsgroups will be of interest but several of them might be worthwhile.

Interaction with the newsgroups is similar to the mailing lists. Unfortunately, the newsgroups seem to be inundated with advertising and less specific. As a result, it may require a considerable amount of time to wade through the junk mail to find the useful postings.
Summary

Finding valuable business information on the Internet is time consuming and challenging task when compared to researching the commercial information services. However, with the right tools and an idea of where to look, there is considerable useful data to be found.
CHAPTER 5. COMPARATIVE RESEARCH EXERCISES

The previous chapters have given an indication of the sorts of information that can be gathered from the commercial information sources, the consumer online services and directly from the Internet. The purpose of this chapter is to illustrate, the process of gathering data from these sources and to indicate the relative value of each for business research.

The information sources utilized were:

- Commercial Information Service: Lexis-Nexis
- Internet Service: NetCom
- Consumer Online Service: America Online

South African Beer Brewing Industry

Consider as a first example, the beer brewing industry in South Africa. This example is complicated by the fact that it is outside the U.S. and information might not be as readily available. However, the global nature of business competition makes it important for a firm to be knowledgeable of activities anywhere in the world.

Lexis/Nexis

Starting with Lexis/Nexis, its business news library was selected as the broadest general-purpose option. The current news file was then searched using the following string:
HLEAD (BEER AND "SOUTH AFRICA")

The command HLEAD executed a search of the headings, titles and abstracts for the text strings BEER and SOUTH AFRICA. Within 30 seconds, Lexis/Nexis responded that 169 articles met the specifications, far too many for a practical evaluation. A quick perusal of abstracts revealed that a large portion of the articles are about de Beers, which is a leading diamond mining/distribution company.

In order to differentiate, the search command was modified slightly:

HLEAD (BREWERY AND "SOUTH AFRICA")

The new search led to 27 articles that met the specification. Quickly browsing the abstracts, 15 of the articles were found to have pertinent information. The articles were from such publications as The Financial Times, The New York Times, PR Newswire, The Economist and The Reuter European Business Report and they ranged in size from about 100 words up to 4,000 words.

A drawback to Lexis/Nexis is that the large selection of libraries and data files cannot be searched in a single step. Granted, combining all databases would make each search take longer, but repeating the search in several databases was annoying. Of the commercial information services described in Chapter 2, only EyeQ has the ability to search all of its databases simultaneously.
The same search string was then used in the ABI/INFORM file of Lexis/Nexis and 13 stories met the search criteria. Of the 13, seven contained useful information but two of those were repeat articles from the previous search.

Switching to the library for Middle East and Africa, the same search produced 432 documents. The search was refined to reduce the result to a manageable number:

**HLEAD (BREWERY W/20 “SOUTH AFRICA”)**

The W/20 parameter specifies that the terms BREWERY and SOUTH AFRICA be within 20 words of each other. The idea being that if the words were farther apart in the document, they probably are not strongly related. The modified search yielded 260 documents, again too many for practical analysis. The search was modified as follows:

**HLEAD (BREWERY W/20 “SOUTH AFRICA”) AND DATE (AFT DECEMBER 1993)**

The string DATE (AFT DECEMBER 1993) restricted the search to articles published after December 1993. This was a reasonable limitation since the business environment in South Africa was considerably different after the free elections in early 1994. With the date restriction included, 46 reports remained. Of the 46 articles, 27 were found to contain pertinent information and only 3 were repeats from the previous searches.
A final search was conducted to gather information on the economic climate in South Africa. Knowledge of the local economy should be an important factor for a firm that is considering investing or conducting any business in a country. A quick survey of the Business/Financial and Middle East/Africa libraries yielded another 39 reports on various aspects of the South African economy that contained useful and unique information.

To summarize this effort, 44 current reports specifically related to the South African beer industry were acquired providing details on mergers and acquisitions, market behavior, political climate, stock market performance, market demand, international investments, international competitors both in SA and abroad and many other aspects. In addition, 39 reports on the economic situation in South Africa were retrieved.

The most amazing fact about this search was that although this large volume of information would require an individual several days to absorb and analyze, it was all gathered in about 45 minutes.

Internet Search

A search of the Internet was conducted hoping to find comparable data to that found via Lexis/Nexis. NetCom was the Internet service provider and Netscape was used as the web browser. The first spider to try was Alta Vista, using the search string

"south africa" + brewery
This query resulted in about 10,000 documents. It is important to note that the research was done using a PC with a 28.8 kbps modem. At the time this research was conducted, 28.8 kbps was the fastest available. Many businesses have network connections that are much faster than this, but the majority of the population is limited to 28.8 kbps or slower. The point to keep in mind is that even with a "fast" modem, each web page would take from 30 seconds to 3 minutes to load onto the screen with an average of approximately 1 minute per page. Simple math indicates that it would take nearly seven solid days just to view each of the 10,000 web sites found in the search.

Unfortunately, there was no option to refine the search string and narrow down the field. Links to the top ten hits were displayed on the screen for perusal. There was also no option to review abstracts. Instead, a title (often meaningless) and only the first few lines of text from each web site was shown, regardless of whether the text was descriptive of the content or not.

Forging ahead, web sites that hinted at some useful information were explored. Almost immediately, a site was found that listed all the breweries in the country by city, with an indication of the volume of beer each produced. This was new information that had not been uncovered on Lexis/Nexis. Beyond that, web site number 99 was a report from the American embassy in Bucharest on the beer market in that country, it briefly mentioned South Africa. A home page was found for 1 South African brewery, and another report on South African brewers investing in Hong Kong was identified, however that report was only available with the payment of a $300 membership fee.
That was the extent of information found using Alta Vista, however there were many avenues explored that provided absolutely nothing. Dead-ends included such topics as yeast handling techniques, German beer news and South African crime statistics.

After Alta Vista was discarded, Yahoo! was tried. An advantage of Yahoo! is that the search can be narrowed considerably into minute categories thereby increasing the likelihood that the search results will be of value. The same search string as used previously was repeated, this time limiting the search to the business category. The search found zero matches. The search was repeated but expanded to include the entire Yahoo! data set. Again, the search found no matches.

Open Text was the next spider to try. The search string led to 487 matches, one of which was the same brewery list found by Alta Vista. None of the matches were interesting. In fact, for most of them, there was no clear relationship between the search string and the selected web pages. The same was true for WebCrawler. With 11,079 matches, not one was found to have anything to do with South Africa or Beer.

Unlike the other spiders, Lycos did come up with some information of interest. Through the Johannesburg Stock Exchange web site, some statistical information on the leading brewer in South Africa was found. No more on breweries was found, however a little investment and economic information was discovered.
A search of gopherspace using Veronica was just as fruitless as the spiders. However, in the process an interesting omen was observed. Attempting to access one server resulted in the message, “This Server Closed Down Forever.” Another server gave the reply “This Veronica Service Will End Soon.” Although many gopher servers still exist, many are being terminated and the data on most is not being updated.

Little or nothing of value was found on the Internet. Unfortunately, many hours were spent in the process. In retrospect, it is probably better to find zero matches up front, as was the case with Yahoo! than to find 10,000 matches that do not have the right information. In the former case, much less time is lost.

**America Online**

The emphasis at AOL has been to focus on the private sector rather than business, as a result the business information is geared toward the private investor rather than industry or corporate analysts. However, there are several interesting and potentially useful information sources to be found such as Hoover’s Business Sources and EDGAR, the SEC’s electronic filing data. A search of Hoover’s Business Sources produced 3 years of financial statements plus an interesting report on earnings estimates for South African Breweries Limited (SAB). SAB controls 94 percent of the South African beer market, but is also involved in many different businesses, leaving only a vague impression of the beer industry. EDGAR, did not provide any additional information since South African Breweries are not traded in any U.S. stock exchanges.
Online Information Sources

The research done for this report can serve as another good example. It was researched almost exclusively by the information sources described in this chapter. About 75 percent of the information was collected via Lexis/Nexis, 20 percent directly from the Internet, and less than 5 percent from AOL.

This breakout was largely the result of the nature of the information being gathered. Historical information and product or service information was more likely to be found on the Internet. The bulk of hard data on business activities, market trends and new technologies were found quickly via Lexis/Nexis however it was interesting to note that for a few publications, the Internet was more likely to have the most current issues available over Lexis/Nexis.

In defense of AOL, some of the current news-related information that was obtained from the Internet could likely have been found there as well but since the Internet was a major emphasis of the paper, it was the preferred method over AOL. Also, if stock market histories or trends were important, AOL would probably have been the best of the three from which to choose.

The main drawback of going to the Internet for magazine sources is that the researcher has to have a priori knowledge of the sites to search and then must invest a considerable amount of time searching. On the other hand, Lexis/Nexis allows for searching a very specific topic and/or time period over thousands of different publications in a matter of seconds.
An advantage that AOL and the Internet have over Lexis/Nexis is late breaking news. Both AOL and NetCom can deliver daily news reports on subjects selected by the researcher. This can be a valuable source for very current news, however, researching older issues of magazines is not practical since they are usually not retained on the World Wide Web for more than a few months.

Summary

It is apparent that the Internet and consumer online services are not the best source of crucial business information that can guide a company through strategic decisions. In fact, they are not even close. However, they do provide some useful information that may complement that of the commercial sources and may help to fill in background information for a clearer view of a given situation.

The Internet and COSs do provide important information of other types to businesses. Product information, expert contacts, travel and transportation, schedules and human resources and a myriad of other information services make them highly valuable. The list of useful information and applications for the Internet is increasing daily.

The kinds of business information that have been the focus of this report will continue to expand on the Internet, but it is unlikely that much of the information that has historically been sold will be given away in the near future. As advertising and pricing strategies are resolved, the information will become even more accessible, but probably still will not be free.
CHAPTER 6. ONLINE MARKET TRENDS

The growth of the Internet and the Consumer Online Services has exceeded all expectations over the last five years and continues to grow at a rate unmatched in recorded history. The growth has largely been a grass-roots process. The corporate world has only been involved or interested on a superficial level until recently. With the advent of the World Wide Web, the potential for business has become glaringly apparent and now everybody is scrambling for a piece of the virtual pie.

Most businesses in the modern world are aware (to some degree) of the arrival of the Internet. However, its anarchistic structure makes it enigmatic to the majority. The business community is struggling to comprehend its impact and how to climb onto this fast moving train. Understanding where the online market has been and is currently heading is central to guessing where it will go in the future. Having a confident estimate of upcoming trends in the market is crucial to sound investing.

The goal of this chapter and the next is to review the current status of the Internet and online services and to build a framework for predicting future behavior.

Online Industry Market Situation

Providing accurate numbers for Internet and COS users worldwide is risky business. Controversy seems to follow most announcements, as others challenge the methods used to estimate the
numbers. The report on Internet use in the U.S. by Hoffman, et al, does not attempt to give
total numbers of subscribers, but rather gives a breakout of active users. The active users are
classified into four categories.

<table>
<thead>
<tr>
<th>Category</th>
<th>number</th>
<th>frequency</th>
<th>recency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard Core Internet Users</td>
<td>3.1 million</td>
<td>once a day</td>
<td>within 24 hours</td>
</tr>
<tr>
<td>Regular Internet Users</td>
<td>6.0 million</td>
<td>once a week</td>
<td>within 1 week</td>
</tr>
<tr>
<td>Lapsed Regular Internet Users</td>
<td>3.8 million</td>
<td>once a week</td>
<td>more than 1 week</td>
</tr>
<tr>
<td>Infrequent Internet Users</td>
<td>3.6 million</td>
<td>more than 1 week</td>
<td>no limit</td>
</tr>
<tr>
<td>Total</td>
<td>16.4 million</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These numbers reflect total users as of December 1995 and are based on a statistical sampling
survey. Frequency is defined as the frequency of Internet access for each survey respondent and
recency is the time since each respondents last accessed the Internet. Interestingly, the same
survey concluded that showed 16.4 million users also reported that 28.8 million have potential or
actual access to the Internet.

Another important aspect of the population of users is how they access the Internet. Some users
have access only by an ISP, while others exclusively access the Internet via a COS and the
majority access the Internet both ways.

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12, 1996.
ISP Access 3.3 million
COS Access 6.1 million
Both 6.3 million
Don’t Know Access Method 0.7 million
Total 16.4 million

Other reports indicate that COS subscribers exceeded 11 million by the end of 1995. The problem of quantifying use becomes apparent as the preceding numbers are reviewed. What appear to be conflicting values are in fact consistent, there just happens to be considerable overlap with many users accessing the Internet by multiple avenues. Additionally, there is a large number of COS subscribers that do not yet use the Internet but should be considered potential users.

Some industry analysts forecast that more than a billion users could be using the Internet and World Wide Web by the end of the decade. Based on the current estimated level of 28.8 million users, that represents a staggering 100 percent annual growth for each of the next 5 years. It is no wonder that the business world is desperately trying to get involved.

Internet Service Providers

As previously mentioned, estimating the number of ISP subscribers is an impossible task. Beyond the difficulty of counting users, there are about 2,000 ISPs worldwide with new services starting every day while others are terminate their activities. Evidence of the magnitude of the Internet can be gauged more effectively by looking at other growth indicators.

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51 “Online Consumer Numbers Set to Double This Year in the U.S.” New Media Age, February 1, 1996.
Figure 6.1 shows the increase in the number of Internet hosts and domain names over the past 3 years. From January 1993 until January 1996, the number of hosts have increased by a factor of 7 while the number of domains have increased by 11 times. Most notably, the number of domains have doubled during the last 6 months.\textsuperscript{53}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure6_1.png}
\caption{Growth of the Internet Infrastructure}
\end{figure}

Another significant fact provided by the Internet Domain Survey of the Network Wizards is that during the last 6 months, the number of systems with the name "www" has risen from 17,000 to about 76,000. This gives an indication of the massive transition to the World Wide Web that is currently in progress.


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Figure 6.2 illustrates the global nature of Internet growth.\textsuperscript{34} The number of countries with Internet infrastructure has more than tripled over a 5 year period. There is no question that continued expansion of this nature will radically change the international character of the business world.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{internet_infrastructure_chart.png}
\caption{Countries with Internet Infrastructure}
\end{figure}

Historically, the barriers to entry in the ISP business have been very low. It is still quite inexpensive to acquire the hardware and software required and the knowledge level needed is also rather basic. As a result, the number of ISPs has grown at a crazy pace over the last 2 years, going from less than 300 at the end of 1994 to nearly 2,000 as of this writing.

Until recently, ISP subscribers have been relatively loyal to their providers, with cancellation rates only a fraction of that experienced by the COS community. However, that trend is beginning to change. As the customer base for each ISP grows, the ability of small home-operated businesses to maintain the pace and adequately serve their customers has diminished. Especially in the case of business customers that require a high confidence level in their access and depend on highly skilled technical support, the loyalty of the past has begun to fade. More and more subscribers are turning to the large-scale, professionally operated ISPs.

Industry analysts predict that the number of ISPs will greatly diminish while the demand for access continues to grow. This implies that after some brutal competition, only a few large-scale providers will survive.

The height of ISP competition is increased by the fact that the COS industry is expected to level off in the next few years. Consequently, the major COSs have all enhanced their services by adding Internet connectivity. In addition, they have all created ISP business units which will compete directly with the ISPs. These are the first steps toward the merging of two markets that previously were separate.

When considering the relative customer base of the COSs and the ISPs (the leading COSs have millions of subscribers while the top ISPs have subscriberships of hundreds of thousands), it is apparent that the even the largest ISPs are greatly threatened by this invasion. The competition
between these segments may be quite fierce and lead to some significant changes for future users. Pricing competition is already beginning and baseline access times are increasing. Additionally, much emphasis has been placed on enhancing information content and improving the quality and speed of access.

**Consumer Online Services**

It is much easier to quantify the number of COS subscribers since only three companies comprise more than 90 percent of the market which has recently surpassed 11 million subscribers. The leading consumer online services have enjoyed an unprecedented growth rate of 79 percent in 1995 and are expecting 100 percent growth in 1996.

Figure 6.3 shows the COS subscriber history for the last 18 months. It is clear that the market has been a 3 team competition with America Online leading, CompuServe close behind and Prodigy in a distant third place. However, it is important to note that MSN, which debuted in August 1995 is rapidly approaching Prodigy and threatens to become a major contender in the COS market.

Unlike the ISPs, the COSs are striving to add value to their service by providing niche information content to draw in large numbers of small interest groups. Despite their vast subscribships, they are literally trying to create a small group mentality in order to focus on specific customer interests.

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57 “BRP’s IISR Census Shows 79 Percent Increase in Online Households.” *Multimedia & Videodisc Monitor*, February 1, 1996
A Model for Market Growth Factors

Consider the simplified systems dynamics model for Internet market behavior shown in Figure 6.4. This diagram is by no means comprehensive. However, it helps to illustrate the interaction of several significant factors that have, and will continue to affect the growth of the Internet.

Before discussing the system, a brief explanation of the conventions used in the diagram will be given.

- A line pointing from one element to another indicates that the first element has some effect on the second. For example, potential revenue will have an effect on the level of competition.

- A positive sign at the head of the arrow means that the effect between the two elements is in the same direction. In other words, an increase in the potential revenue will lead to an increase in the level of competition. Also, a decrease in potential revenue may decrease the competition as participants lose interest.

- A negative sign at the head of an arrow means that the effect between two elements is in the opposite direction. For example, an increase in Internet use will lead to a decrease in system desirability as the system slows due to higher demand. Conversely, a reduction in Internet use will increase system desirability because the system will respond more quickly.
• A slashed line through another line indicates that there is a time delay between the cause and effect.

• A ring with a positive sign in the center means that there is a reinforcing loop in the system that will continue to increase (or decrease) unless the system is influenced by other elements.

• A ring with a negative sign in the center means that there is a loop which will tend to stabilize or dampen the system.

The elements of the model are simplified for discussion. A brief definition of each term follows.

• **External Influences** are the many factors besides Internet/online activities that affect the amount of computer use worldwide. These influences are many and are beyond the scope of this report.

• **Computer Use** is a relative measure of all worldwide computer use, in general. It is not limited to Internet/online activities but there is a definite interaction.

• **Internet Demand** is literally the demand access and use of the Internet. It can be positive or negative depending on whether the system drives and increase or a decrease in Internet use.

• **Internet Use** is a generalization for simplicity that includes COS usage as well as direct use of the Internet.

• **Potential Revenue** is a general indicator of the *perceived* potential income of the Internet. It is the perception of profitability the drives the competitive pressures in the market. It includes potential revenues from all market sectors within the Internet world.

• **Competitive Pressure** will vary from one market sector to another within the Internet community. Increased revenues from the browser creators will increase competition within that group but not from other sectors, such as network hardware manufacturers.
• **Infrastructure & Technology Investment** is a catchall for all enhancements to any aspect of the Internet. This could include faster connection rates, better software, more effective search engines, added features, new capabilities or any number of other improvements. The potential impact of many of these factors will be discussed in Chapter 7.

• **Information Content** includes all the information issues discussed in the previous chapters. It also includes any other information that may be of value to users.

• **Price Reduction** is a short term method used to draw customers and gain market share.

• **System Desirability** is an indicator of the value of the overall information system. It rolls together all elements of price, content, infrastructure, technology and the impact of increased numbers of users. Ultimately, it is the system desirability that will drive the success or failure of the Internet as a profitable and useful part of the business world.

The reader should keep in mind that the model is simplified considerably in order to explain the interaction of a few key factors. The model shows computer use as an external effect for simplicity. In addition, there is only a single loop for revenue, competition, content, infrastructure and technology when in fact, each different market sub-sector would have its own similar loop. Depending on the detail required, an analyst might also add loops for geographic or demographic groups but that is well beyond the scope of this document.

Another simplification has been done which omits the mechanism for gaining revenues from Internet use. It assumes that an increase in Internet use will automatically lead to increased revenues whereas this is not necessarily certain. Revenue generation has become a major issue for Internet investors because the industry has yet to establish effective methods for extracting money
from the system. In particular, there is a movement toward the Internet becoming an advertising based resource, much like television while at the same time there is a push toward billing users directly for access to certain content. Presently, both approaches (and others) are being evaluated and experimented upon. (Interesting note; a prominent industry analyst predicts the demise of the Internet during 1996 due to the inability to effectively advertise and gain revenue from the World Wide Web.)

Additionally, the effect of advertising is not included as are many other factors. A comprehensive model of the online/Internet market would be excessive for this discussion.

Rather than attempt to explain the whole system in one pass, the explanation will be broken down into smaller pieces. First, consider the two simple loops highlighted in Figure 6.5.

![Diagram of Computer Use and Internet Use Loops](image)

**Figure 6.5 Computer Use and Internet Use Loops**

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59 Stahlman, Mark. "Why the Web Will Die." Information Week, April 8, 1996, p. 100
The loop consisting of computer use, Internet demand and Internet use shows that each element reinforces the other. In other words, increased computer use tends to increase Internet demand which in turn, boosts Internet use. However, the external influences on computer use are the driving factor for this loop. Without modeling computer use in detail, it is apparent that it will continue to grow over the next decade and beyond. Recent estimates predict that in the U.S., more than 50 percent of all households will own a computer by the end of the century.\(^6^0\)

The second loop is very important to the survival and success of the Internet. As Internet demand increases, so does Internet use as it has over the last 5 years. However, the excessive growth that has recently been experienced tends to overload the system. Once this happens, the system becomes unresponsive and very slow. As the system chokes itself and comes to a near standstill, the benefits of information on the Internet become secondary to the extreme time requirements for using the system. As this worsens, the system desirability drops significantly and consequently the demand for the Internet drops as well. This scenario is a popular argument for analysts that predict the demise of the Internet.\(^6^1\)

The successful COS's and ISP's are all suffering from the unexpected, huge growth. Already, access to these systems is greatly slowed in the evenings and weekends when private users go online and also during weekday mornings as the business crowd checks their email.


Figure 6.6 shows the interaction of pricing strategies, competition and Internet use. Notice that there is a reinforcing loop where competitive pressure drives prices down for customers, which leads to a higher desirability and ultimately an increase in Internet use. However, the smaller stabilizing loop will minimize the effect of the larger loop. Logically, there is a limit beyond which lowering prices will not be in the interest of investors as profitability declines. Recent trends in the market show COS’s and ISP’s cutting prices in order to grab market share but the price competition has yet to stabilize.

![Diagram of Pricing Loops]

**Figure 6.6 Pricing Loops**

Figure 6.7 shows the most crucial elements for the continued growth and success of the Internet. There are two reinforcing loops that will both make the overall system highly desirable. Information content and infrastructure & technology investment are the factors that will make the Internet a useful tool for the corporate world. The danger inherent in these loops is the time delays associated with truly improving the system to the satisfaction of the users.
Upgrades to infrastructure, technology and information content take some time to achieve in and of themselves. But the delays are exacerbated by some understandable hesitancies of investors.

First, the market is very new and for most technologies involved, it is not clear what the industry standards will be. This leaves investors in the precarious position of deciding whether to push ahead with a concept that may soon become obsolete, or lose the "first mover" advantage by waiting for someone else to develop the standard.

In addition to the fear of obsolescence, investors are being cautious. Many do not really believe that the extraordinary growth of the Internet can possibly be sustained. There is an interesting analogy to the CB radio craze in the U.S. during the 1970's. After an explosive growth, the fickle public lost interest and the industry collapsed. There is the possibility of history repeating itself and no one wants to be the victim.
Unfortunately, this fear of a collapse may become a self-fulfilling prophecy. The time lags associated with improving the system desirability must be minimized in order to counter the negative effects of system overload. Once the cycle turns downward, the perceived potential for revenues will decline. Once revenues fall, the likelihood of additional investment in technology or information content are also diminished which reinforces the negative trend. If the trend still continues, business investors may pull out altogether ensuring the collapse of the Internet.

**Summary**

The Internet and related online services have grown from practically nothing 20 years ago to tens of millions of users today with most of the growth in the last 5 years. Its exponential growth has surpassed the expectations of even the most optimistic predictions, growing faster than any other event in business history. However, there is a nagging concern by some experts that it will not last. The market model discussed above does indicate that the future of the Internet might go in several directions.

The question remains as to how and when the market will turn down. Nobody believes that it can continue indefinitely at the present pace, but it is anybody’s guess as to what will happen next. Estimates range from total demise during the next 6 months to a gradual leveling off in 20 years as most of the modern world is saturated. It is certain that the Internet will never go away completely, the potential benefits to business are too great to allow that to happen. However, timing and decision making on the part of the business world will have a pronounced effect on the growth and final form of the Internet.
CHAPTER 7. NEW TECHNOLOGY AND CORPORATE STRATEGIES

The model presented in Chapter 6 has shown that business decisions and technologies that prevail will strongly affect the end result of the Internet market. In the life-cycle of the Internet, we are currently at a very early stage. Much like the early days of the PC industry when there were competing operating systems and architecture concepts, there are still many proprietary systems being promoted for the Internet and no one is sure which will become dominant. It is unclear who will reign supreme in the ensuing strategic battle, however it is clear that the victors will greatly impact the ultimate form of the network.

The Internet market model suggests that there are two crucial factors (albeit quite broad factors) that will make or break the system, information content and infrastructure & technology investment. Information content is expanding rapidly and will continue to grow, partly because small businesses or private enterprises are trying to establish their own niches in the market. Also, big businesses are striving to create value by communicating to current and potential customers. In addition, major information media such as television, radio, newspapers, sports, magazines and entertainment have already begun to develop a presence on the World Wide Web. The trend is clear, information content is growing.

This chapter will focus on the interactions of the second major reinforcing loop of the market model, that is the infrastructure and technology advances that will make the Internet a much more useful, practical and profitable environment. It is interesting to note that many of the technologies
that are discussed here already exist in some form today so the important question is which
technologies will be adopted and become the new standards.

However, one cannot consider the technologies independently of the market. Industry standards
have not been established for most of the new technologies and there is considerable competition
between the market participants. This competition is understandable since analysts predict that it
will become a multi-billion dollar industry. What that means is that those who are successful in
predicting or establishing the standards will have an early and profitable advantage.

So, in addition to addressing the technologies, this chapter will review the strategic positioning of
the competitors to help better understand the potential outcomes.

Data Rates/Speed

The market model discussed in Chapter 6 described a mechanism whereby increases in Internet
use reduce system desirability due to diminished system responsiveness (see Figure 6.5). This
problem has been identified by industry analysts as the Achilles heel that may lead to the ultimate
collapse of the Internet. Of all the shortcomings of the Internet, the sluggish behavior of the
system is the most critical.

Browsing the World Wide Web with even the fastest conventional modem (28.8 kbps) is
reminiscent of using an IBM PC in the early 1980’s. Traveling from one graphic intensive page
to the next is excruciatingly slow, sometimes taking many minutes or longer. Especially to one
who is accustomod to current PC performance. For a user who might have to sift through many pages to find something of value or interest, surfing the web can begin to feel like cruel punishment. In the case of a business researcher whose time is expensive, it might still prove more cost effective to utilize a commercial information source and pay premium prices.

There are other alternatives currently available. An ISDN phone line may be almost 5 times faster (up to 128 kbps) but it will also cost considerably more. Getting a T1 link will yield another order of magnitude of speed over ISDN but the cost is perhaps 2 orders of magnitude higher. Unfortunately, even with the fastest connection on the users end, there are several elements of the Internet itself that prevent the rapid movement of data. The current infrastructure limits the overall system performance such that service still might not be adequate for some users.

There is a symbiotic relationship between corporate and private Internet interests. A large part of the appeal to business is that many millions of private individuals are accessing the Internet and the potential exists for a large portion of the affluent population to gain access. If the population has access to the Internet, then businesses will have access to them. In order for business to willingly invest in improvement of the Internet, they must perceive that the general population will embrace it as well. This means that it is not sufficient to avail high speed access to large corporations, it must also be available to the general public.

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Several approaches are emerging as viable solutions. Cable television, electric utility, satellite and other networks are all potential alternatives that may satisfy the needs of the populace. ISDN is experiencing a resurgence and may also be a contender as may other approaches on conventional telephone lines. The competition is picking up as the new standards are beginning to solidify. Of the access methods mentioned, only one will ultimately emerge as the leader. The others will be relegated to niche markets or extinction.

Conventional Telephone Distribution

ISDN allows faster data rates using existing telephone lines. It is currently the most readily available, depending on ISP and local telephone company. ISDN will allow two channels with up to 64 kbps each or a single channel with up to 128 kbps. A simple ISDN modem costs about $400, ISDN service with an ISP may cost 50 to 100 percent more than conventional phone access. An ISDN telephone connection may be comparable or somewhat more expensive than conventional phone service.

ISDN is gaining support. Modem manufacturers, ISPs and telephone companies are lowering prices while promoting new hardware and services. However, the ultimate data rates are still not adequate for the most demanding uses such as real time video. ISDN is an intermediate solution that may gain popularity only to be replaced by higher bandwidth options as they become available.

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There are two other alternatives using conventional telephone lines which may eventually surpass ISDN; Asymmetric Digital Subscriber Line (ADSL) and High-hit-rate Digital Subscriber Line (HDSL). ADSL and HDSL technologies were developed in the early 1990s for the interactive TV market. U.S. West and other phone companies are pursuing these technologies as a competitive thrust against cable TV firms. However, they are both at least an order of magnitude slower than cable TV.

An ADSL modem can receive data more than 10 times faster than ISDN while matching the slowest ISDN transmit rate. HDSL can transmit and receive 6 times faster than the fastest ISDN modem. If successful, pricing for these technologies will be consistent with ISDN by 1999.

Cable TV

Cable TV promises to provide a much faster connection (500 kbps to 10 Mbps) with an existing distribution infrastructure. Although having high potential, cable TV has not been widely accepted. Early attempts in 1994 met with difficulties indicating that there are still some technical challenges to be resolved before it becomes a viable solution. For instance, cable TV networks are currently designed for one-way traffic only. Full two-way capability will require major investments to upgrade the cable infrastructure.

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Another obstacle is the price of hardware. A cable TV modem costs from $500 to $1000 which puts it beyond the reach of most individuals. But considerable attention has been placed on this by the modem manufacturers. Prices are expected to come down considerably.

Within the last year, competitive positioning has risen to a frenzied level. Major players are positioning themselves to take advantage of a technology that may be available to the general public in the next few years. Continental Cablevision teamed with Performance Systems International, Inc. and are currently testing commercial access in the Cambridge Massachusetts area. Another player, Online Systems Services is marketing a turnkey Internet service provider package to cable TV operators. Other contenders include the alliance of Fundy Telecom and iStar Internet Inc., who are providing high speed Internet services to New Brunswick, Canada.

Motorola recently announced a deal with Sun Microsystems Inc. to allow major cable TV operators such as Denver-based Tele-Communications Inc. (TCI) to start selling cable modems this summer. TCI and Kleiner Perkins Caufield & Byers started a joint venture last year. TCI's @Home service is scheduled for preliminary introduction in 1996.

Due to the frenetic pace of competitors, the reality of cable/Internet may be much closer than previously anticipated. There has been much discussion, developing and testing of cable TV

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66 "Cable Veteran Teams up to Market First Turnkey Internet Service to Cable Industry." PR Newswire, April 18, 1996.
67 "Fundy Cable Ltd./Ltlte and iStar Internet Inc. Team up to Develop Advanced Business Internet Services." Canada NewsWire, April 22, 1996.
68 Coates, James. "Devices Speeding Change, Cable Modems, Network Computers Target Internet." Sun Sentinel (Fort Lauderdale), March 4, 1996.
systems. Considering the aggressive strategic positioning and the large increase in investments, it appears that the Cable TV approach is gaining momentum and may well become the next major step in Internet access. Forrester Research predicts that by the year 2000, almost 7 million homes will have cable modems.60

**Satellite**

In May of 1995, Hughes Network Systems released a new DirecPC Turbo Internet service. The unorthodox system requires a simultaneous telephone and satellite link. The user transmits via conventional telephone and receives from the satellite at rates of up to 400 kbps with access averaging 200 to 300 kbps.

Unfortunately, this system is fast in only one direction. The cost of building individual satellite transmission systems would be prohibitive. The conventional telephone link would make 2-way video impractical unless the faster digital systems were used, in which case there would be little justification for the added expense of the satellite communication.

The new service has experienced a disappointing customer response, with only several hundred customers by the third quarter of 1995. This is due largely to the high initial equipment cost of about $1,000 and a higher than average monthly service charge.

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69 "Forging Cable, Internet Connection with 'a Home." Information & Interactive Services Report, October 6, 1995.

However, there are some advantages that may turn things around for Hughes. Unlike any of the other fast access methods, only the satellite connection will work anywhere in the U.S. or southern Canada. Also, the same system that provides DirecPC also provides DirecTV. Recently, Microsoft and Intel have made agreements with DirecTV aimed at enhancing the potential of the Internet to carry voice, video and data.\(^1\)

**Electric Utility**

Access through electrical and wireless networks mostly remain in the idea phase although MCI has announced a test of Internet access at 2 Mbps over the Glasgow, Kentucky municipal electricity network. This alternative is likely to be lost in the shuffle, being slower and later than cable TV approaches.

**Software**

Discussions regarding Internet software development are as likely to cover mergers and acquisitions or teaming alliances as source code or new programming languages. Although not as critical as high data rates, new software development is the most visible and competitive. It might well be the most profitable as well.

Along with the market created by a new, huge PC population, new software made the advent and explosion of the World Wide Web a reality. It was software that made surfing the net fun and attractive. More importantly, it was GUI software that made Internet access feasible for nearly

\(^1\) Reuters, “Microsoft in Deals with Intel, DirecTV.” The Boston Globe, March 12, 1996.
everyone, regardless of computing skill or knowledge thereby opening the Internet up to the whole world.

Every aspect of the Internet and World Wide Web, such as security or video telephony, has some sort of software development associated with it. Any software considerations for those areas will be addressed in subsequent sections of this chapter.

**Browsers and Search Software**

Considerable attention was given to the current state of browser and search software in Chapter 4. There are many new features and capabilities being added to these products due to several new software languages and standards. In particular, the new browser features are focusing on multimedia (sound, animation, video) 3-dimensional web pages, embedded software and speed. Search engines, or Spiders, will become faster and more powerful but more importantly, they will become much more capable of finding specific information.

The advances in browser and search software will be evolutionary rather than revolutionary over the next few years. The software will gradually become easier to use and more tailored to individual preferences and will follow the basic trend of growing in size and complexity as the computing power and data transfer rates increase.

Of the many browsers available, the two fighting to establish the industry standard have been Microsoft Internet Explorer and Netscape Navigator. When browsing the World Wide Web, it is not uncommon to see notes such as “works best when viewed by Internet Explorer”, or “best if
viewed with Netscape Navigator 2.0 on various web pages. However, it appears that Microsoft’s efforts to control the browser market have fallen short. Recent agreements between Netscape and the two leading consumer online services, America Online and CompuServe, have made the leading browser available to an additional 9 million users.

Microsoft has not given up the battle yet. One day after the announcement of the AOL/Netscape arrangement, Microsoft announced a reciprocal agreement with AOL whereby AOL will build Internet Explorer into future versions of their software and Microsoft will include AOL software with future shipments of Windows 95.

On the Spider front, Yahoo! has created a partnership with Open Text to dramatically increase its ability to search the entire World Wide Web by keyword search. Keyword searching has been a deficiency in Yahoo! that has enhanced the position of Lycos and InfoSeek.

In addition to joint ventures and alliances, many smaller companies are being acquired by larger companies. The large firms are attempting to rapidly build specific capabilities to enhance their competitiveness. During 1995, AOL purchased Global Network Navigator (GNN) for $11 million and also acquired WebCrawler for just over $1 million. These transactions were the first acquisitions of World Wide Web related content for significant sums of money but not the last. Later in the year, Netscape purchased Collabra for about $108 million. Shortly thereafter,

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75 "Online Digest." Consumer Information Appliance, June 1995.
Lycos purchased Point Communications Corp. to improve the usefulness of their search engine. These were the first of a steady stream of acquisitions that will persist as long as the competition continues.

Languages and Standards

An element of the software battle that is closely related to the browser and spider competition is the fight for standards in the software languages that are used to write applications and create web pages. Some of the most important new languages are:

- **HTML** – Hypertext Markup Language is the basic programming language used to create World Wide Web pages. In order for all users worldwide to be able to properly view all web pages with whichever browser they choose, it is essential that HTML be based on a global standard. Unfortunately, this is not the case yet as competitors position themselves to lead the market on HTML editors. Microsoft recently abandoned plans to build proprietary extensions to HTML which is an indication that Netscape is gaining an advantage.\(^77\) However, Microsoft purchased Vermeer Technologies in January 1996 for $130 million to gain a leading contender for HTML editing software.

While Netscape is apparently controlling the future direction of HTML, the Internet Engineering Task Force (IETF) is seriously considering handling future HTML standards as part of a feature registry instead of as a versioned standard. The official goal of the

IETF is to optimize client/server negotiations, however, it may also help to curb Netscape's use of proprietary HTML extensions.\textsuperscript{78}

With the huge demand for firms and individuals to get onto the World Wide Web, many vendors are releasing HTML authoring software to get in on the action. Here are a few:

* RoboHelp 95 HTML Edition by Blue Sky Software turns Microsoft Word for Windows 95 into a full-featured authoring tool.\textsuperscript{79}

* TAG-Extender by TAG Systems, Inc. is an HTML extension package that reduces authoring time and web page maintenance.

* CorelWEB.DEIGNER by Corel Corp. is an inexpensive package with a large library of clip-art and templates to speed up the creation process.\textsuperscript{80} It also enables the conversion of many word processing documents into HTML.\textsuperscript{81}

* Internet Assistant for Microsoft Excel is a free utility from Microsoft Inc. that will guide a user through the process of converting spreadsheets to HTML.\textsuperscript{82}

* HTML Transit by InfoAccess is an HTML publishing tool that automates the process of converting and formatting a variety of word processing formats into HTML.\textsuperscript{83}

\textsuperscript{78} Hudgins-Bonafield, Christine. "HTML May Become a Mix and Match." \textit{Network Computing}, April 15, 1996, p. 28.


\textsuperscript{81} "CorelWEB.Designer \textsuperscript{TM}: The First Complete HTML Authoring Toolkit." \textit{Canada NewsWire}, March 19, 1996.


\textsuperscript{83} "A Transit Lounge for HTML Files." \textit{PC Magazine}, March 26, 1996, p. 76.
* ReVol Web Worker is a shareware HTML editor for Windows 95 that includes support for HTML 3.0, Netscape 2.0, and Java, plus features drag-and-drop text editing, wizards, code builders, long filename support, and an integrated Web browser.  

* Textbridge Pro 96 from SoftQuad Inc. converts scanned documents to HTML.  

* Netscape's Navigator Gold is a version of the popular browser with the addition of an HTML editor.  

* FrontPage from Microsoft is designed to work with Object Linking and Embedding (OLE) and will allow users to publish all or part of documents from other Microsoft applications.

* **Java and Javascript** – These two related (but not identical) languages are the products of Sun Microsystems Inc. and Netscape Communications Corp., respectively. The language syntaxes are similar to C and C++ and can be used to write operating system-independent client/server applications in which code is executed by a Web server, a Web browser or both in tandem. One way of differentiating between Java and Javascript is that Java is typically used by programmers to create new objects and applets, while Javascript is used by HTML page authors to dynamically script the behavior of those objects.

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84 "ReVol HTML Editor." *Newsbytes*, April 9, 1996.
87 Glass, Brett. "Help Desk: How are Java and Javascript Codes Different?" *InfoWorld*, March 25, 1996, p. 44.
The main strength of these codes is also their biggest weakness. Java applets are small programs that can be included as part of a Web page. These applications can then be executed once the page is loaded, greatly improving the appearance or benefit of that page. Unfortunately, that opens up opportunities for viruses or security violations that can operate unbeknownst to the user. Sun agrees that any complete programming language has the potential for abuse. But says that turning Java toward destruction is much harder than writing a DOS virus. Java also has some built-in defenses to prevent harmful code.

Sun and Netscape have teamed up to create these easy-to-use programming languages in a bid to thwart rival efforts by Microsoft Corp. They are both offered free of charge. Many other major players also support the effort to establish an Internet programming standard, including AT&T Corp., Hewlett-Packard Co., Apple Computer Inc., Oracle Corp. and Silicon Graphics Inc.

- **VRML** – The Virtual Reality Modeling Language (VRML) is an emerging standard for describing navigable and interactive 3-dimensional worlds. Its goal is to bring a new dimension into visualization and perception of data on the World Wide Web and to create a new basis for participant interaction. VRML is not yet widely used but it is a promising new development to track. Two competing groups have submitted proposals to the VRML Architecture Group (VAG) for consideration, Moving Worlds from Silicon Graphics.

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Graphics, Netscape, Sony, WorldMaker and others is going up against Active VRML from Microsoft. Both proposals include such innovations as timed events, 2-D and 3-D animation, user interaction with objects, sound effects, collision detection and automatic frame generation.92

As with most other software technologies that are in early stages of development, Moving Worlds is supported by a large number of companies (more than 50) in order to overwhelm Microsoft's attempt to control yet another aspect of the software industry.93

The most obvious application for 3-D technology is for games. However, other industries such as real estate are likely to take advantage of it once the details are solidified. The draw of bringing a customer into a virtual location will become too powerful an advertising technique to disregard.

Audio/Video & Communication

Once the technological challenges of simultaneously transmitting real-time audio and video are overcome, face-to-face meetings via the Internet will transform the way business is conducted. Primitive systems are already available today, however, high bandwidth data transmission must be accomplished before this is widely accepted. In the meantime, products exist that provide some multimedia capabilities today.

Audio

Audio playback in the form of Microsoft wave files (*.wav) have existed for years, providing a user the ability to playback digital sound files. However, the data files tend to be quite large even for relatively short duration sounds (a 5 second file requires over 400 Kb). Due to their large size, transfer times over the Internet are unreasonably long and as a result, this type of audio playback is more of a novelty than a practical device for World Wide Web pages. More recently, Netscape audio files (*.au) are considerably smaller (a 7 second file is slightly over 50 Kb). Unfortunately, with current data transfer rates for the typical consumer, this is still too large to be practical.

A new alternative, audio on demand, has become feasible with the growth of the installed base of fast PCs and modems. Progressive Networks has pioneered this approach with their Real Audio (RA) software. With RA, the user selects prerecorded material on a server, but instead of downloading the entire file, it is sent in a continuous stream. After a few seconds of buffering, the program begins to play, and the user can pause and resume or jump forward and back at any time.⁹⁴

National Public Radio and ABC News have integrated RealAudio into their home pages, allowing users to listen to their favorite news broadcasts at any time.

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Internet Telephony

Internet Telephony, also referred to as Voice Over Network (VON) is in its infancy but is gaining momentum. VON enables two or more people to talk directly to each other via the Internet utilizing multimedia computers. The appeal for VON is that there are no long-distance telephone bills, regardless of wherever in the world the speakers might be. The only costs are those associated with the ISP and local telephone connection fees, which are typically much less than the cost of long-distance or international phone calls.

The obvious attraction to VON stems from the huge savings to be experienced, however there are several obstacles that must be overcome before it is widely accepted

- **Hardware Requirements** – In order to take advantage of VON, all participants must have, as a minimum, a personal computer with a sound card and microphone (and an Internet connection as well). The overall performance of the computer system also effects the VON performance so an expensive system is more desirable. Although this represents several thousand dollars, a growing portion of the population is acquiring adequate equipment. As time progresses, hardware prices will continue to fall while computer performance improves so this restriction should all but vanish by the end of the decade

- **Communication Standards** – As yet there are no standards established for VON. Consequently, in order to use it, the participants must all use the same software package. With more than a dozen different software sources to choose from, the odds that two users are
compatible is fairly low. In addition, current limitations require that calls be prearranged which reduces its usefulness for business interactions.\textsuperscript{95}

- **Telephone Company Resistance** – Not surprisingly, the American Carriers Telecommunications Association (ACTA) is not too supportive of the success of VON. ACTA has requested that the Federal Communications Commission (FCC) regulate the use of VON technology, arguing that VON is able to bypass access charges or taxes thereby creating an unfair advantage.\textsuperscript{96} An initial decision by the FCC is not expected until the summer of 1996. Clearly, a negative ruling by the FCC will either terminate or seriously slow the progress of VON.

Although VON has not been widely accepted, quite a few companies are already marketing products with proprietary communication protocols. Due to the very early stages, there is little information available as of this writing, however the following list is provided to give the reader an idea of the competition already developing.\textsuperscript{97}

- Digiphone by Third Planet Publishing
- Enhanced CU-SeeMe by White Pine Software
- Internet Global Phone *
- Internet Phone by Vocaltec
- Maven by Charley Kline *
- NetPhone by Electric Magic
- PowWow by Tribal Voice *

\textsuperscript{95} "Internet Phone: Talk is Cheap." *Yankee Group*, White Paper Vol. 13, No. 4, February 1996.

\textsuperscript{96} "FCC Extends Deadline on Voice Petition." *Internet Week*, April 8, 1996, p. 3.

- SoftFone 2.2 by SilverSoft
- Speak Freely by John Walker *
- TS Intercom by Telescape *
- VideoPhone by Connectix
- WebPhone by Internet Telephone Company
- WebTalk by Quarterdeck

* indicates freeware

VON is still a novelty, audio quality is poor, few users are available with which to interact and equipment is relatively expensive. However, if VON overcomes the legal hurdles. It will become a normal part of business interaction.

**Video**

The final element (besides higher data bandwidth) required to make video teleconferencing via the Internet a feasible alternative is video itself. With the current level of technology available to the bulk of the population at 28.8 kbps or slower, even large still images are too slow to be practical on the Internet. The need to transmit many high quality images per second is totally out of the question. However, with a compromise on quality, some level of live video is possible. Of the 13 web phones listed above, only CU-SeeMe and VideoPhone even have limited capability of simultaneous audio and video.

Besides reducing the number of images, or frames, transmitted each second or diminishing image resolution, video performance can be improved by data compression techniques. The firm,
Iterated Systems, has developed a compression technique that they are promoting as a viable solution for video with present-day data rates. The technology is based on fractals. Instead of using pixels to create graphics, the solution uses a mathematical formula to shape and color portions of an image. The formulas use less data than traditional pixel technology, allowing it to compress files to smaller sizes.98

Iterated Systems is trying to establish its technology as the next video and graphics standard. As a first step, their viewer has been made available for free by direct download. Also, a limited-distribution commercial version of the image compression software has been competitively priced to encourage adoption.

In general, Internet video has not been aggressively competed yet. However, it is expected that with higher speed data rates, video will become a major consideration for the Internet industry.

Security

Although not as visible or active as the other technology areas, the protection of corporate and personal interests has become an extremely important requirement for the Internet. With the recent push towards the use of the Internet for electronic commerce, including personal banking, market trading and credit card transactions, the importance of effective security is more critical than ever before.

98 "Iterated Introduces Graphic/Video Compression Technology." Internet Week, April 8, 1996, p. 1.
Beyond safeguarding commerce, businesses are hesitant to expose themselves to the inquisitive or malicious activities of hackers and crackers. By definition, hackers are computer system explorers that see computer security systems as a challenge but typically do no damage, on the other hand, crackers are computer security masters that have malicious goals. All manner of sensitive or proprietary business information may become accessible to unwelcome computer experts once a firm links into a global network such as the Internet. Personnel records, corporate strategies, financial records and internal email communications might be compromised if proper security measures are not taken.

Unfortunately, in the rush to gain a presence on the World Wide Web, many firms have overlooked the risks and have bared their throats to the world. One less serious example of the work of a cracker can be seen at the MGM/UA World Wide Web site advertising the movie "Hackers." The site URL is http://www.mgmuahackers.99 In this instance, the cracker replaced the movie poster graphics with a grotesquely edited version and also replaced the advertising text with some unflattering comments about the movie.

There are three major areas of network security: firewalls, encryption and authentication. A firewall is a device or group of devices placed between a secured and unsecured networks. Its many tasks include limiting incoming and outgoing traffic, logging traffic information, printing traffic reports and preventing unwanted access to the secure system.100 Most firewalls also have

built in capability or options for encryption and authentication as well which would then provide a complete security package.

Some of the leading firewall products are:

- **ANS Interlock by ANS CO+RE Systems Inc.** – ANS Interlock ships with all of the most common proxies as well as generic gateway TCP and UDP proxies to accommodate future applications and protocols. It also offers strong user authentication options, including Enigma Logic’s DES Gold Card and Kerberus and Security Dynamics’ SecurID. Access can be limited according to various parameters. However, it is relatively expensive and more difficult to use than comparable systems.

- **Black Hole 2.02 by Milkyway Networks Corp.** – Offers a wide range of proxies plus provisions for future applications. Its intuitive interface gives easy access to a broad selection of authentication techniques, including Bellcore’s S/Key, Enigma Logic’s Safe Word, Security Dynamics’ SecurID, and Unix’s select password. In addition, Milkyway provides a number of tools to assist in the event that an intruder does break through. A system administrator can set up an external program to halt all traffic across the firewall while the system alerts via email or paging.

- **CheckPoint Firewall-1 by CheckPoint Software Technologies Inc.** – Firewall-1 is a very user friendly product, with an intuitive GUI that is easy to use and navigate. Unlike all the other firewalls mentioned in this paper, it does not use proxies as part of its solution. Instead it employs a hybrid packet filter and application-level gateway that is readily adaptable to an ever-increasing number of services. Encryption is done either with RSA Data Security’s DES or CheckPoint’s own proprietary software.
• **Eagle by Raptor Systems Inc.** – Eagle is relatively inexpensive and easy to use while providing effective security services. It is somewhat limited in proxy options but has a generic proxy provision for accommodating new applications and protocols. For authentication, Eagle allows for Belcore’s S/Key and Security Dynamics’ SecurID card.

• **Gauntlet Internet Firewall by Trusted Information Systems** – Gauntlet was selected as the 1996 PC Magazines Editor’s Choice for Firewall systems. Along with a wide selection of proxies and authentication options, Trusted Information Systems includes free on-site installation, testing and training. In addition, Gauntlet includes easily configurable alarms and reporting procedures.

Encryption, is a two-part process of encoding information prior to sending outside the secure network, and then decoding it for use at the receiving end. Data can be encrypted at many levels. An application such as Northern Telecoms’s Entrust encrypts data at the application layer. The Secure Sockets Library from Netscape encrypts data at the session layer so that all information sent to the browser, from pictures to text, can be encrypted. For companies that want to automatically secure traffic between nodes on the Internet, a number of vendors are starting to offer IP level encryption products.\(^{101}\)

In order for Encryption to be effective, it is essential that the identity of each participant in a data transfer be absolutely certain. That is the mission of authentication.\(^{102}\)

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One rather frightening group that is actively promoting increased Internet security is known as Cypherpunks. The goal of the Cypherpunks is to develop cryptography that is so secure that absolutely no one – not even the government – would be able to decode an electronic message, thereby ensuring the privacy of the public. This vigilante organization of computer hackers also strives to educate the world that the Internet is not a secure environment by less orthodox methods. Two members recently demonstrated that thousands of credit card numbers could easily be obtained over the Internet by breaching security barriers at Netscape. 103

Although Cypherpunks have little regard for the security of business interests. Their efforts to force security issues for personal privacy will unintentionally assist the corporate world by accelerating the development of effective security measures.

Summary

Emergence and acceptance of the technologies discussed in this chapter will have a pronounced impact on the appearance and use of the Internet by the end of this century. Although most of the problems being solved by these technologies can be purchased today for exorbitant prices, they are only affordable by the deep pockets of the corporate world. Until they become cheaper and simpler, they will not be embraced by the bulk of the population. However, success and survival of business on the Internet depends on acceptance by the masses to make it profitable and cost effective.

CHAPTER 8. PREDICTIONS AND CONCLUSIONS

Although the future is not certain, it is the authors' opinion that the Internet, in some form is here to stay. There will be setbacks along the way as the industry stabilizes, but within the next 10 to 15 years online connectivity will become an integral part of our business and personal lives, almost as common as television is today. Unless of course, it replaces television.

Business will come to depend on network communications, both within an organization and more importantly, as a conduit to reach customers and potential customers. By the time use of the Internet becomes widespread and becomes standard practice, the method of conducting business will be radically different than we perceive it today.

The form and methodology will also be quite different from today. Technologies only now being defined in detail will form the interface to a truly global network that will bring the whole world onto a local video screen.

Some significant changes that will take place within the next decade (author’s predictions)

- Relevant business information and data will become much faster and easier to acquire. While probably never being entirely free, it will be significantly cheaper to gather than today.
- There will be little or no difference between the three major information sources. The commercial information services, the consumer online services and the Internet service providers will eventually all operate on the same open medium. Differentiation between the competitors will be driven more by the market sector that each targets and pricing strategies.
• There will be a major paradigm shift in the business world regarding the open distribution of information. Processes will be radically different from today and hence will require new ways of conducting business.

• Besides just the information services, several major industries will merge into a single multi-segmented industry. Communications, television, computing and some entertainment sectors will blend together and become indistinguishable.

• Hardware, software and communication protocols will all subscribe to industry standardized, non-proprietary formats.

• Some order will be established from the chaos and confusion of the millions of Internet and World Wide Web sites.

• Global data transfer rates, or bandwidth, will rise by several orders of magnitude while costs will drop.

• Higher bandwidths will enable the use of real time audio and video to make global face-to-face interaction a commonplace, daily event.

• User/Account security will be greatly improved. However, just like any system, security may never be perfected.

• Once security is raised to an adequate level, online commerce such as banking and credit card transactions will become standard practice. Online commerce is now beginning to make a presence, however it will not grow rapidly until users are confident of the security.

• Obstacles such as affordability for the masses will be overcome. Current use of the Internet requires an investment of several thousand dollars for equipment plus monthly fees for access, making it an elitist system. Concepts for inexpensive “Internet Only” computers and other
devices that utilize a television for display are in early stages of development. These make the Internet available to a much larger percentage of the world.

- Societal changes that will come from individual world wide communications may strongly affect the global social/economic/political environment as the world grows seemingly smaller.

The Internet is in an infant stage of development. As the pressures of competition and rapid response to changing requirements continue to mount, the Internet, or its successor, will be driven by the corporate world to grow and evolve with society until it is an integral part of our lives.
ACRONYM GLOSSARY

ACTA – American Carriers Telecommunications Association
ASDL – Asymmetric Digital Subscriber Line
AOL – America Online, Inc.
ASCII – American Standard Code for Information Interchange
ATM – Asynchronous Transfer Mode
CD-ROM – Compact Disk, Read Only Memory
CGI – Common Gateway Interface
CIX – Commercial Internet Exchange
CSLIP – Compressed Serial Line Internet Protocol
DNS – Domain Naming System
EDGAR – Electronic Data Gathering, Analysis, and Retrieval system
EDI – Electronic Data Interchange
FAQ – Frequently Asked Questions
FCC – Federal Communications Commission
FTP – File Transfer Protocol
GNN – Global Network Navigator
GUI – Graphical User Interface
HDSL – High-bit-rate Digital Subscriber Line
HTML – Hypertext Markup Language
HTTP – Hypertext Transport Protocol
IETF – Internet Engineering Task Force
IRC – Internet Relay Chat
ISDN – Integrated Services Digital Network
ISP – Internet Service Provider
IT – Information Technology
kbps – kilobytes per second
LAN – Local Area Network
Mbps – Megabytes per second
MIME – Multipurpose Internet Mail Extensions
MSN – Microsoft Network
MSO – Multimedia and online Service Offerings
NAP – Network Access Points
NCSA – National Center for Supercomputing Applications
NNTP – Network News Transfer Protocol
OLE – Object Linking and Embedding
PC – Personal Computer
POP – Points of Presence
PPP – Point-to-Point Protocol
PSI – Performance Systems International, Inc.
PVC – Permanent Virtual Circuit
RA – RealAudio
SEC – Securities and Exchange Commission
SLIP – Serial Line Internet Protocol
SMTP – Simple Mail Transfer Protocol
SNMP – Simple Network Management Protocol
SQL – Structured Query Language
TCP/IP – Transmission Control Protocol/Internet Protocol
URL – Uniform Resource Locator
USBA – U.S. Business Advisor
VAG – VRML Architecture Group
Veronica – Very Easy Rodent-Oriented Net-wide Index to Computer Archives
VON – Voice Over Network
VRML – Virtual Reality Modeling Language
WAIS – Wide Area Information Server
WIRL – Web Interactive Reality Layer
WWW – World Wide Web