STRATEGIC OPPORTUNITIES FOR SYSTEM OPERATORS
AND INFORMATION PROVIDERS
IN THE ELECTRONIC
INFORMATION SERVICES INDUSTRY

by

SHARON BETH SINSKY

B.A., JOHNS HOPKINS UNIVERSITY
(1980)

Submitted to the Sloan School of Management
in Partial Fulfillment of
the Requirements of the Degree of
Master of Science in Management

at the

Massachusetts Institute of Technology

May 1984

ⓒ Massachusetts Institute of Technology

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May 11, 1984

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ABSTRACT

This thesis explores the actions and motivations of firms
pursuing opportunities as system operators and information
providers in the United States electronic information services
industry. Although few companies have yet to make money in
this industry, it has attracted the attention of both small
and large United States firms.

By electronic information services, I am referring to the
combination of computer and communications technology that
allows users at personal computers, terminals, or modified
television sets to access remote data bases and information
services. The realm of potential services includes electronic
shopping, electronic banking, electronic investment
information, and electronic newspapers. Users might be at
home or at work.

In an electronic information services system, information
providers are those firms that provide the end user services,
i.e. the banks, retail marketers, and newspaper companies.
System operators organize and manage a group of information
services provided by multiple information providers on a
central computer system.

On the basis of company literature and interviews of
system operators and information providers, this thesis tries
to identify the opportunities and competitive environment for
firms functioning in these roles. Although some firms are
pursuing opportunities as both system operators and
information providers, the thesis first analyzes these
functions separately. Besides looking in general at what
opportunities exist, the thesis explores why in particular the
interviewed information proividers have made the decision to
enter the electronic arena. Also discussed is the way that
information providers have integrated their electronic
activities with their other business segments.

Thesis Advisor: Michael S. Scott Morton
Title: Professor of Management

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INTRODUCTION

To many, the potential promise of the electronic information services industry represents the goal of information technology. The combination of telecommunications technology and computer science could lead to an era in which the electronic pipeline is the distribution channel for all news, information, banking, shopping, and entertainment into the home. Simultaneously, the electronic pipeline will deliver all needed external information as well as intracompany information to the worker's desk.

Details about what these electronic pipelines will look like are uncertain. The format in which these communications will take place, i.e. text and/or graphics and/or voice is subject to debate. The medium for transmission, cable versus telephone versus direct broadcast satellite is unclear. The choice of communications device to be used by the home user or worker, i.e. personal computer or dumb terminal or modified television set, is another variable to be determined. Even the terms used to describe and identify the electronic information services are ambiguous. Readers may be familiar with the "electronic data base" marketplace, the forerunner of the proposed mass market electronic services. For some years, professionals and academics have used terminals and telephone communications to consult business and academic data bases such as Lexis's law data base or Dow Jones' News Retrieval

Service. The term, or industry name most heavily promoted now is "videotex," although as will be seen in a later chapter, this term means different things to different people.

What seems clear about this industry, regardless of its name, is that organizations of small and large scale believe there are opportunities for profit. They see opportunities for producing communications equipment, for designing software, for establishing communications networks, for supplying information for on-line data bases and transactional services, and for managing systems of these services. The list of United States companies involved includes giants such as American Express, Knight-Ridder, Chemical Bank, and AT&T as well as small organizations such as Quazon Corporation, Plenum Publishers, and General Videotex Corporation. Most recently, IBM, Sears, and CBS stirred the industry by announcing a videotex joint venture. Link Resources Corporation estimates that United States electronic information sales totaled $1.047 billion in 1982 (FORTUNE : 1984). Booz, Allen, and Hamilton forecasts that home information services will be in 30 million homes by the mid-1990's, accounting for $10 billion in advertising revenues, $50 - $60 billion in electronic retailing, and $2.5 billion in financial services (Friedman :October, 1983). The anomaly is that thus far few companies have turned any profit.

The purpose of my thesis is to evaluate more specifically

how certain companies are attempting to exploit opportunities in the electronic services industry. All the firms discussed are pursuing opportunities as systems operators and/or information providers. The functions of system operators and information providers will be more thoroughly discussed in Chapter 1, but brief definitions are provided here.

> Information providers are firms that provide the specific information/service that the end user is interested in. Examples of information providers are banks, newspapers, and retail marketers.

> System operators are in a sense the brokers, or intermediaries, for the information providers. The system operator organizes and manages a group of information services provided by multiple information providers on a central computer system. The end user accesses the central system in order to select a specific service.

This thesis does not discuss intraorganizational systems, systems in which companies distribute internal information within the organization.

The purpose of my evaluation is twofold. First, by examining the actions and plans of firms within the industry, I hope to derive some of the key issues that will drive this emerging industry. Analysis of these issues may lead to predictions about the future structure and future participants in electronic services.

Secondly, the intent of this thesis, as part of a larger MIT study entitled "Information Technology in the 1990's," is

EXTERNAL ENVIRONMENT
SOCIAL, ECONOMIC,
POLITICAL

EXTERNAL
ENVIRONMENT

ORGANIZATION
STRUCTURE
AND THE
CORPORATE CULTURE

THE ORGANIZATION'S
STRATEGY

MANAGEMENT
PROCESSES
Planning,
Budgeting, Reward

TECHNOLOGY

INDIVIDUALS
AND
ROLES

7
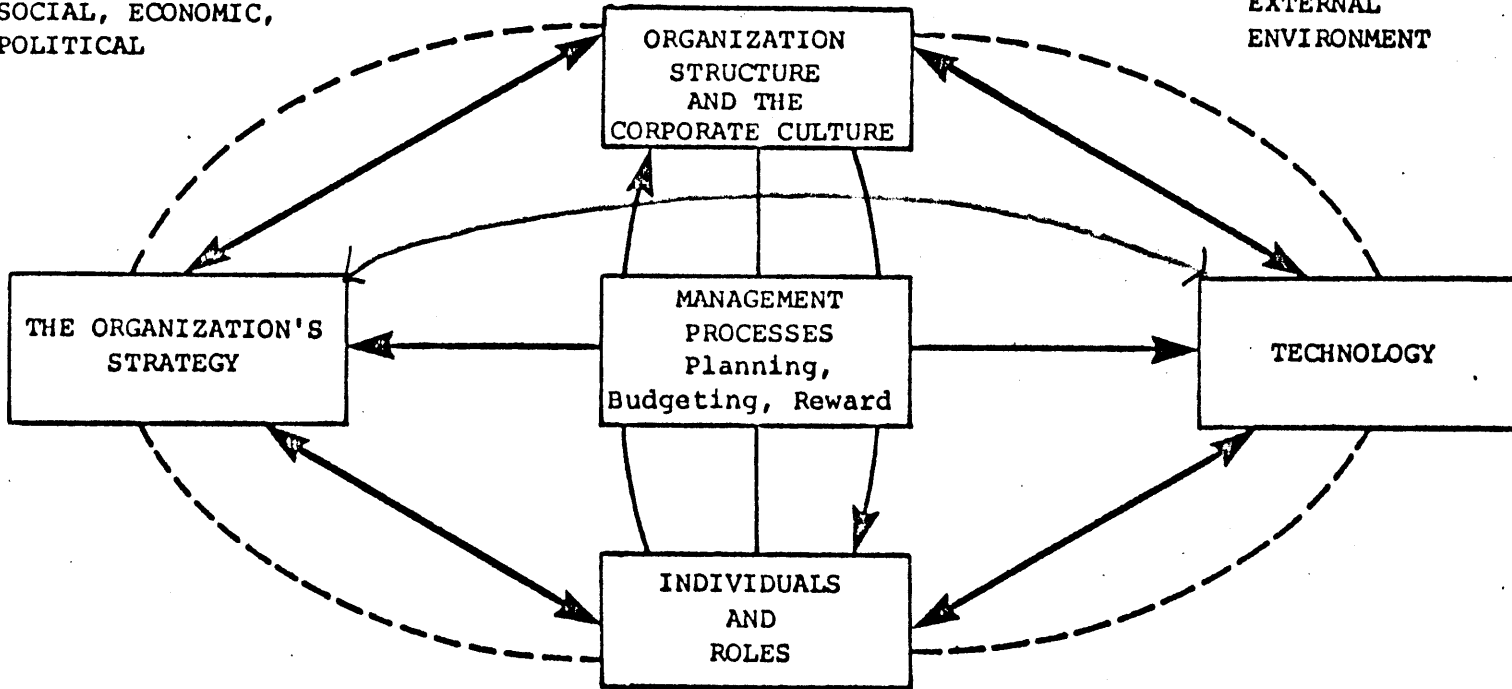
to evaluate how organizations can best use information technology in pursuing corporate objectives. Technology allows firms to pursue new strategic options; technology also impacts the way organizations can be structured and managed. A model based on the work of Harold Leavit and Alfred Chandler, shown on the next page, illustrates the bidirectional relationships between technology, the firm's strategy, and the firm's management structure and processes. This model serves as a framework to guide all research that is part of the 1990's study. Drawing upon the model, particularly in my study of information providers, I hope to analyze what combination of technical developments and internal circumstances lead to a company's decision to enter new strategic areas. The thesis will also describe and discuss how firms re-organize in order to incorporate their new activities. It is my hope that the model will provide insight into understanding of the electronic services industry and also that my empirical study will help flesh out and further develop the framework.

My research approaches the electronic services differently than many previous studies. Most of the research done thus far has been market research or market tests done by organizations considering entry into the industry. Other market studies have been sponsored by consultants. As a result of these studies, some firms have decided to venture into the electronic arena; others have withdrawn. Because

much of the venturing has taken place within the last year, it is difficult to assess the validity of the market research or to predict the success of the venturers. This thesis focuses little attention on market research. Furthermore, it does not only examine the recent entrants but also experiences of companies that have been somehow involved in electronic services for some time (meaning more than several months). The 'oldtimers' in the industry do not necessarily utilize the latest improvements or innovations. Some of the insights realized from my research result form analyzing oldtimers' responses to the actions of the newest entrants.

This thesis is divided into three chapters followed by a conclusion. Because the electronic information services industry is new, and rather unwieldy, Chapter I is devoted to defining and explaining the technology and potential opportunities for electronic services. This chapter draws heavily on previous literature. At the end of chapter 1, I describe my research methodology in more detail. Chapter 2 discusses opportunities for system operators, emphasizing the competitive environment. Chapter 3 presents the experiences of a series of information providers. In addition to analyzing these providers' individual efforts, the chapter seeks to draw conclusions about common characteristics and experiences of the information providers described.

CHAPTER 1 : BACKGROUND INFORMATION

It's 8:00 A.M., Monday, July 15, 1993. For Tom Benson, it's the start of another work week.

Waking up is still the hard part, but after that things get easier. Tom has coffee, prepared while he slept by a coffee maker controlled by his personal computer. Later he sits down at his computer and simply pushes one of its keys to download the electronic mail sent to him from various other computers during the night.

He reads through the mail and answers those messages requiring immediate responses. One includes a roughly drawn picture of a person on skis, speeding down a slope. Beside it are the words, "Will you make the ski weekend? Signed Carol." Response: "You bet."

Tom remembers he has to get some new skis for the weekend. He calls up a service offering ski equipment, picks out his skis, states size, model, and color and confirms the charge request. A drawing of the skis even appears on the computer screen. The computer tells him he can pick up the skis at the store or they will be sent to him by the next week. He gives instructions to have them sent.

Tom looks through more important mail. A friend George asks, "Should I sell such and such stock today at 452?" This requires a response, but Tom doesn't have the latest information on the stock. He logs on to his stock service, where he finds that the company may soon announce yet another update of one of its incredibly successful products, a move that should prove quite profitable. Under his instructions the electronic service automatically searches out all articles and information that my affect certain stocks. He leaves a message for George not to sell.

Tom then switches to a newsletter service that provides instant coverage of events in his industry. Tom works in telecommunications, and at one time he had to read through several trade journals each day before he went to the office. Now his newsletter service can give him a brief review of each article, or if he wants more than the encapsulated information, he can tell his computer to display the entire article on the screen or print it out. Later, at the office, Tom logs on to another

personal computer. Much of the paperwork that he previously had to deal with is gone now, and Tom has more time to think and plan, and more tools to help him make faster, more informed decisions. (<u>BYTE</u>: 1983)

The computer and communications system used by Tom Benson in the above scenario represents what I am referring to as electronic information services. Sitting at a terminal, personal computer, or modified television set connected into a telephone or cable network, users can access a variety of information, perform shopping and banking transactions, or communicate to neighbors or co-workers via electronic mail. These activities are coordinated by software running on a remote mainframe computer also attached to the network. Electronic information services systems as sophisticated as those available to Tom are only beginning to become available in the United States, but the technology is ready and many companies are exploring opportunities to participate in the offering of these services. The next two chapters in this thesis discuss some of these companies' explorations more thoroughly. This chapter provides background material about electronic information services. Topics included are a brief history of the electronic information services industry, a description of potential users and uses of these systems, and an explanation of the different kinds of opportunities that exist for potential industry participants.

HISTORY OF ELECTRONIC INFORMATION SERVICES INDUSTRY

The technological capability to deliver electronic information services is not new. Experimental systems that delivered information into the home were developed as far back as the 1960's. These experimental systems, most of them sponsored by governments, failed because of the high computing and communications costs involved. However, these experiments proved the technical feasibility of electronic information services (Martin : 1982).

In the mid-1970's, commercial on-line data base services appeared in the United States. The operators of these services prepared on-line data bases of specialized information such as patent records, economic data, and bibliographical indices needed by businesses and government agencies. Search languages were written by the service operators which allowed information specialists employed by the businesses and government agencies to access the remote data bases from computer terminals equipped with modems. In the late 1970's, additional on-line services were established to serve the needs of personal computer hobbyists. "Information utilities," as this second class of services is sometimes called, featured general interest data bases, games, and financial programs accessible to owners of modem-equipped personal computers.

Interest in electronic information systems aimed at the mass market began in Europe. Motivated by the desire to utilize excess telephone capacity, the British postal and telecommunications authority (PTT) introduced the Prestel system in 1979 (Finney :1979). (The PTT ran a trial system prior to the commercial introduction of Prestel.) Prestel offers access to multiple publications, teleshopping, electronic banking, and travel and entertainment ticket reservation systems. Users access Prestel via special terminals that attach to television sets or other monitors.

Since the introduction of Prestel, the French PTT developed its system Antiope, the Canadian Department of Communications developed the Teledon system, and the Japanese developed a system called CAPTAIN. Germany, Belgium, Italy, the Netherlands, Austria, and Norway have all built systems based on the Prestel software. What distinguishes the mass market systems from the specialized electronic data base services and the information utilities is emphasis on ease-of-use, low cost, and the transmission of graphics.

It is ironic that although the United States has been characterized as being ten years ahead in the development of information technology, it is characterized as years behind in development (Morse: 1982). I believe that the deployment of mass market systems in the United States has been slow precisely because of the early development of electronic data

base services and information utilities.

Prior to the introduction of the mass market systems, there was little European activity in the on-line services area. The efforts to introduce the mass market systems have been sponsored by government communications agencies, leading to national standards for the communications software. The standards define the code used to transmit text and graphics and the frame format characteristics. European companies wishing to pursue opportunities in electronic information services design their services and equipment to meet their countries' standards.

In the United States, the prior existence of specialized electronic data base services and information utilities complicated matters. As will be discussed in the next chapter, these services are now trying to look more like the mass market systems of Europe. Within the last few years, other firms too have begun to experiment and introduce systems like the ones in Europe. The United States systems have not been sponsored by any central government communications agency. (Public phone networks, cable networks, or private phone networks owned by the system operators are used for information transmission by the United States systems.) In fact, the government has declined to support a communications standard. The result is the proliferation of non-compatible systems. This non-compatibility means that a company wanting

to build user terminals or design information services for multiple systems has to adapt its product for each system. I think that it is the lack of standards which has discouraged rapid introduction of mass market systems in the United States.

In 1981, AT&T developed a communications software system called NAPLPS (North American Presentation Level Protocol System), and has been pushing this system as a standard. During the last three years, industry participants have debated and argued the merits of this system. Mr. Bob Smith, director of an electronic information services industry association, indicated to me that most United States operators are now willing to adopt NAPLPS.

The name most commonly given to the mass market electronic information services systems is "videotex." As I alluded to in the introduction, however, not everyone concurs about the meaning of this term. The most limited definition is a technical one: it defines videotex as the communications code used to transmit the text and data through the electronic network. Most broadly, videotex is defined to be any or all interactive computer applications. USA Today recently defined videotex as "communicating computers (USA Today : 1984)." Closest to the most common usage, Byte Magazine defined videotex as low cost, easy-to-use computer services that display textual and graphic information on remote video

screens (<u>Byte</u> : 1983). Because the term videotex is ambiguous, I prefer to use the phrase "electronic information services system" instead. This phrase is as broad as the broadest definition of videotex, but will at least prevent someone from thinking too narrowly. For clarity in this thesis, I use "electronic information services" to refer in general to ·either specialized electronic data base services, information utilities, or the new mass market systems. I use "videotex" when referring to the newer services only.

To avoid confusion, the user should be acquainted with a companion term to videotex: "teletext." Unlike the interactive videotex systems, teletext refers to one-way information services. Teletext was originally devised as a method to provide subtitles for deaf television viewers. The teletext signals were interwoven into the blank intervals (VBI's) which exist in standard television transmission. The more general teletext opportunity is to beam electronic pages to users of modified televisions or terminals via TV signals, cable TV, radio, or microwave. The broadcaster sends a ·series of repeating pages. Using a keypad mechanism, the user "grabs" the desired page as it cycles through. Then the page is displayed until the user chooses to "grab" another.

The applications of teletext are generally considered to be the transmission of news and advertising, a subset of the applications of videotex (Lindquist and Sinsky :1983). It is

important for the reader to be aware of teletext because the future of this technology is often compared with the future of videotex. Although teletext promises less functionality, the lower costs of equipment needed lead some analysts to predict that teletext will penetrate the marketplace before videotex (Prince :1982). This assertion may be true, but I believe that the interactive nature of videotex makes it significantly more powerful and distinct from teletext. This thesis addresses interactive systems only.

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POTENTIAL USERS AND USES OF ELECTRONIC INFORMATION SERVICES

Why are United States videotex operators ready to give up fighting over the standards issue and adopt NAPLPS? Until videotex systems are up and running, it will be impossible to answer the question of who will actually use videotex systems for what purposes. And this question is of course key to the overall success of electronic information systems. There has been a tremendous amount of marketing research done to try and determine demand for the various potential applications of electronic information services. But until users actually gain experience with electronic information services, researchers can only really guess at which applications will develop. To quote James Martin, author of <u>Viewdata and the Information Society,</u> "to ask how it will be used is almost like asking Gutenberg how printing would be used. He would have said printing had several possible applications, but would have been unable to think of most of those that actually developed (Martin: 1982)."

Like the other researchers, I can do no more than guess about the future applications of electronic information services. And like the other researchers, my potential applications are just electronic replacements for information processing functions done other ways today. A thorough evaluation of the suitability of any one videotex application would merit an entire thesis in itself. Because the purpose

of my research is to attempt to understand the electronic information services marketplace through interpreting the actions of participating businesses, I largely ignore any of the marketing research results. As will be seen later in the thesis, my conclusions do not assume or hinge upon the success or failure of particular applications. However, if the reader is not familiar with the potential customer base and the proposed applications, it will be difficult to appreciate the discussion of market participants. Therefore, brief descriptions of the customer base and proposed applications follow.

To begin, I would like to divide the customer base into two classes: the home user and the business user. This classification may seem ambiguous because it is very possible that users at home and users at businesses will want to take advantage of some of the same applications. For example, Tom Benson looked up industry information while at home. He could have just as easily waited to get to work to call up this information. But although home versus business use can not be entirely separated, the distinction will prove helpful in understanding some of the company actions described in the next two chapters.

The distinction is important for several reasons. First, some applications probably will be relegated to primarily either home or business use. It is unlikely that someone at

work would use an electronic information system to shop for clothes. Second, the communications/terminal devices found today in homes differ from those found in businesses. In general, homes contain a larger percentage of television sets per household member than businesses have television sets per employee. (Businesses may have a few television sets, but generally not nearly as many television sets as employees.) Conversely, businesses have many more computer terminals and personal computers than homes. The kind of terminal device supported by an electronic information services system will influence the probability of penetrating either the home or business market. Third, business users and home users may have very different tolerances for paying for electronic information services. Thus far, I have not mentioned how services are supported financially. Until recently, all systems have been supported through end-user fees. Now, some systems are experimenting with displaying advertising in conjunction with other information services (this subject will be discussed further in the next chapter). Businesses tend to be willing to pay for services that will help them be more effective. Consumers, on the other hand, are much more price sensitive when buying information goods (Martin: 1983). It is interesting to realize that 75 percent of newspaper revenues are derived from ads, only 25 percent from subscription fees. An electronic information services system's success in penetrating the home market may be very dependent upon the system's fee structure and its ability to

attract advertising support.

The following chart lists and briefly describes the categories of potential services. Each author who writes about electronic information services categorizes the applications differently. I, too, have chosen my own categories, although my classification scheme is based largely upon that described by Marc Yagjian in his 1983 thesis "Potential Teleservices and Industry Activity." Following the list of categories, I briefly present reasons why the applications are potentially suitable for electronic distribution. The discussion is by no means comprehensive. I totally ignore any evidence or reasons why these applications might not be suitable. The sole purpose of the discussion is to acquaint the reader with potential uses.

Potential Videotex Services

Investment Information : Financial data and stock market
reports useful to investors

Industry Information : Information serving work-related
information needs of particular
industries, professions, or interest
groups, i.e. chemical patents, market
data, economic data, references to
literature about zoology

Special Interest   : Information of interest to special
Information   non-work-related groups, i.e.
                            articles from Sports Illustrated

General Reference   : Information of potential interest to a
Information   variety of people, i.e. information
                            from encyclopedias, national
                            newspapers

Local Information   : Information concerning local news and
                            services, i.e. restaurant guides,
                            health care facilities listings,
                            weather

Education   : Self-paced courses with computerized
                            testing

Communication   : Electronic mail, electronic
                            conferencing, electronic
                            bulletin boards for special
                            interest groups

Entertainment   : Games, pay television programs

Banking   : Capability to pay bills, transfer
                            funds, obtain account balances

Goods and Services   : Advertising, electronic catalog
Exchange   shopping

Software   : Downloading of software to users'
Distribution   personal computers

Home Management   : Appliance control, security monitoring

Discussion of Applications

Information Retrieval Services : Investment, Indusrty, Special Interest, General, and Local Information

The first five categories revolve around information retrieval. Advantages of electronic information distribution include the ability to update information much more frequently, the potential for powerful indexing systems, and the capability to provide more information than fits the space constraints of printed documents. For example, the investor can follow the stock market throughout the day; electronic newspapers can provide more 'up to the minute' reporting of current events. Indexed retrieval systems allow researchers to search multiple sources for references to specific topics more quickly and thoroughly than through a manual search. Editors of printed newspapers discard many articles of perceived limited interest because of space constraints. With electronic editions, all articles could be included; using

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indexing, readers can select the articles of personal interest.

Education

Electronic education can include general knowledge 'self-help' courses for children or adults and vocational training. The advantage of electronic education is that it can be entirely self-paced yet monitored. The difference between electronic courses on interactive systems and self-contained personal computer courses is the capability to have instructors monitor student progress.

Communications

Electronic communications allow people to efficiently communicate with each other when spacially and temporally separate. I can leave an electronic message for someone knowing that when this person next signs on to the information network, he/she will receive my message and be able to respond, regardless of the time of day and his/her current location (.i.e. at home or business). Electronic bulletin boards can allow dispersed persons with a special interest to post notes for each other. For example, nationwide members of a club can easily have common access to relevant information. Electronic bulletin boards can allow the handicapped within a region (or nationwide) to share information of mutual

interest. Electronic conferencing can reduce travel costs.

Entertainment

Electronically distributed entertainment includes services similar to pay television as well as computer games. As will be discussed later, the quality of currently available videotex graphics is not even close to the quality of television. At this time, therefore, pay television services are not viable. On-line games include games that contestants can play to 'beat the computer' as well as games that contestants can play against other contestants located elsewhere on the information network. The ability to play games with people at multiple locations differentiates games on information services systems from personal computer games.

Banking

Electronic banking can be convenient for home and business banking customers. From the bank's perspective, electronic banking reduces demand for branch office services and eliminates paper work.

Goods and Service Exchange

This category is broad. It encompasses advertising and actual transactions. Advertising services include classifieds,

infomercials - long information-packed commercials, and spot ads - ads shown in the midst of other services. The electronic medium suits these kinds of ads for different reasons. An electronic indexed classified system can allow buyers to rapidly locate items meeting their purchase criteria, i.e. blue Chevrolets built in 1979 or 1980 costing less than $2400. Infomercials allow advertisers to provide more information to interested customers than can be shown in the sixty second slots available on network television. Interested system users will select infomercials to be viewed (potentially,these ads could be paid for either by the viewer or the sponsor). Spot ads are similar to ads in newspapers and on network television. Advertising revenues from sponsors of spot ads support the other services, reducing the cost to the end-user. Because of the financial implications, the success of advertising on information networks may influence the fate of electronic information systems.

Electronic shopping resembles catalog shopping except that the catalog is electronic and ordering can be done on-line. Both national and local vendors can participate. Electronic shopping offers customers convenience and the ability to easily compare prices. For the vendor, electronic shopping reduces the need for retail outlets and potentially expands the accessible customer base.

Software Distribution

With electronic distribution, software vendors can download software onto customers' personal computers. Electronic distribution allows more frequent updating than is normally possible when floppy discs must be mailed out. Electronic distribution can also be more reliable than floppy disc distribution.

Home Management

Electronic home management services would allow the consumer to 'start dinner' form a remote location or check the status of home security devices. Because home management services require connections with other home devices, I foresee these services having less immediate potential than the others.

Again, the above descriptions of potential applications have been brief. More thorough discussion of potential applications can be found in Marc Yagyian's thesis.

COMPONENTS OF ELECTRONIC INFORMATION SYSTEMS

The wide array of potential services and functions provided by electronic information services systems suggests that a variety of different businesses may be involved in the delivery of these services. I find it useful to think of these systems as 'electronic town centers' or 'electronic malls.' Following this analogy, the information retrieval services might be viewed as libraries, the shopping services as stores, the games as video arcades, the electronic banks as physical banks, etc. In a mall, the mall owner chooses to house those stores or businesses that will attract customers. The mall owner designs the facility so that it is easy for customers to access the services they need. The mall owner charges the stores rent based on the amount of space used, and sometimes, a percentage of the stores' revenues. In electronic lingo, each of the stores and businesses is referred to as an 'information provider.' Each information provider offers some service, i.e. banking, that is of value to the end user. The mall owners are called 'system operators.' System operators manage the computers which 'house' the electronic services. The system operator chooses to 'house' those information providers whose services will appeal to the operator's intended customer base. Just as the mall owner designs a pleasant environment for customers, the system operator designs a user interface language, or software environment that makes it easy and enjoyable for end users to

access the services. The system operator charges information providers fees based on computer storage space used and additionally captures part of the fees paid by the users to access the services.

Customers visit malls by travelling over the community roadways in cars, bicycles, or busses. Customers access the electronic services system via an electronic network, either a telephone network or a cable television network (or potentially, a microwave or satellite network). Customers connect to the network via terminals, personal computers, or enhanced television sets.

The chart below illustrates the components of electronic information services system, suggesting the opportunities that exist for industry participation:

ELEMENTS OF ELECTRONIC PUBLISHING SYSTEMS

INFORMATION   SYSTEM   COMMUNICATION   USER
PROVIDERS   OPERATOR   CARRIER   TERMINALS
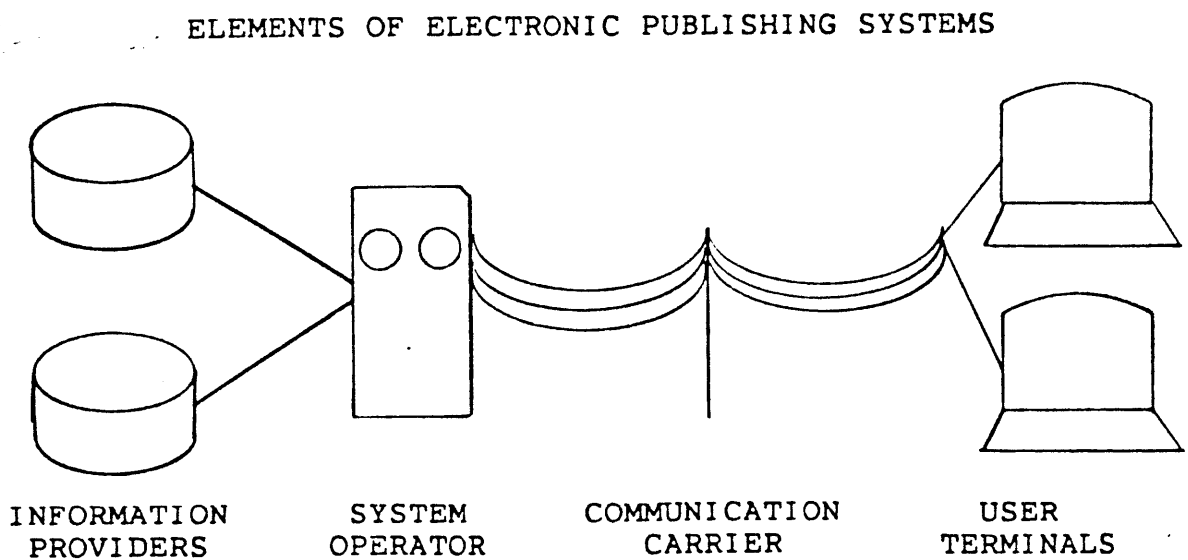
Diagram copied from Zur-Spiro, 1983

A firm might choose to function as an information provider, a system operator, or a communications carrier, or, choose to manufacture end-user devices. Alternatively, a firm my choose to function in several capacities. For instance, a firm with experience in a particular service area, i.e. banking, may choose to operate its own system, possibly 'renting' system space to other information providers as well. A system operator may acquire its own network, perhaps a cable system, and serve as a communications carrier as well. Joint ventures are arising in which each venturer brings expertise in one or more function.

RESEARCH METHODOLOGY

Chapter 2 discusses in detail opportunities being
explored by firms as system operators. Chapter 3 describes
activity in the information provision arena. Although some of
the firms discussed serve in multiple capacities, the chapters
try to isolate these firms' roles in one function only in
order to assess the competitive factors affecting the
individual functions. My research does not address
opportunities for communications carriers or manufacturers of
terminal devices. It will become apparent, however, that the
network and device characteristics influence the capability,
versatility, and costs of systems. Chapter 2, in its
discussion of system operators' choices of technology,
addresses this influence.

The primary sources of information for both chapters are
industry participants' company literature and interviews. A
list of the names and organizations of the people I spoke to
is found on the next page. One of the interviews was with Mr.
Bob Smith, director of the Videotex Industry Association. Two
of the interviews were with managers of CompuServe, a former
information utility now billing itself as a videotex system.
The other seven interviews were all with managers of
information providers. Two of the information providers,
Comp-U-Card and another provider wishing to remain anonymous,
offer electronic shopping services. Grolier's Publishing

COMPANIES INTERVIEWED

PERSON/   COMPANY/
TITLE   ADDRESS

Industry Association

    Mr. Bob Smith   Videotex Industry Association
                               1901 N. Fort Myer Drive
                               Suite 200
                               Rosslyn, VA 22209

System Operator

    Mr. Barry Berkov   CompuServe Information Services
    Vice-President   5000 Arlington Centre Blvd.
                               Columbus, OH 43220

    Mr. Dave Eastburn
    Marketing Manager

Information Providers

    Mr. Harry Allcock   Career Placement Registry, Inc.
    Vice-President   302 Swann Avenue
                               Alexandria, VA 22301

    Mr. Jeffrey Hall   Comp-U-Card International, Inc.
    Director of Marketing   777 Summer Street
    Electronic Services   Stamford, CT 06901

    Mr. Ted Mendelsohn   Grolier's Publishing Company
    Marketing Manager   95 Madison Avenue
                               New York, NY 10016

    Professor Jean Pierce   Midwest Education Research
    President   Association
                               Fifteenth Street
                               St. Charles, IL

    Ms. Carol Lehrman   Official Airline Guides
    Marketing Manager   Dun & Bradstreet Corporation
                               2000 Clearwater Drive
                               Oak Brook, IL 60521

    Mr. Bob Sterenson   Value Line, Inc.
    Manager Electronic   711 Third Avenue
    Products Data   New York, NY 10017
    Services

Company electronically distributes its encyclopedia the Academic American. Official Airline Guides provides an electronic version of its schedules. Value-Lines, Incorporated provides financial statement and stock price information on major corporations. Career Placement Registry provides an on-line job recruiting service. The Midwest Education Research Association makes members' research articles available electronically.

Information gathered from the information providers is used in the chapter about system operators as well as the chapter about information providers. Referring to the mall analogy, store owners rely on the mall as a channel of distribution. Similarly, the electronic systems can be viewed as channels of distribution for the information providers. Therefore, the effectiveness of these distribution channels for information providers will affect the success of system operators. Because of this, I found the perspective of information providers very useful for understanding system operators' competitive environment.

My method for selecting companies to interview was rather arbitrary. I contacted CompuServe because of a contact with the school. The information providers were selected because of their accessibility. I did choose information providers offering different services than the others chosen. Because the selection process was so arbitrary, I don't claim to have

any 'statistically provable' conclusions. However, I think
that the interviewed firms' opinions are useful in trying to
gain some insight about what is going on in electronic
information services.

CHAPTER 2: OPPORTUNITIES FOR SYSTEM OPERATORS

A COMPETITIVE ENVIRONMENT

This chapter assesses the competitive environment for United States system operators. Understanding the competitive environment of system operators in other countries, European countries in particular, is straightforward; in fact, the environment is not really that competitive. Most European electronic information services systems are sponsored by government communications agencies. Each system is 'the' system for its country.

The United States environment is much more confusing. The United States government has not participated in the sponsorship of a nationwide electronic information services system. A variety of business entities have established electronic information systems, some of them regional, others nationwide. Different United States system operators use different communications protocols and equipment, provide different services, and target different markets. There are three major categories of systems: the electronic data base systems, the information utilities, and the new videotex services.

Trying to more clearly understand the United States electronic information services market, I attempted to determine whether the three kinds of systems compete with one

another, or whether the three kinds of systems comprise three separate industries. As I began my research, it became apparent that the systems are not static. The earlier established system operators are expanding their capabilities, adding to their service selection, and repositioning their marketing. My conclusion is that the three types of systems are similar, and becoming more similar. The value of the analysis needed to reach this conclusion is that I was forced to identify key strategic aspects surrounding system operators' businesses.

The majority of this chapter is a comparison/contrast between electronic data base systems, information utilities, and videotex systems. For each type of system, one particular system operator is profiled. The electronic data base company chosen is DIALOG Information Services. The information utility chosen is CompuServe. The videotex system is Knight-Ridder's Viewtron. Following a description of each of these services (as they looked when originally introduced) is a discussion of those strategic factors which appear to distinguish the systems. This discussion addresses the significance of these factors as well as how many of the differences may be becoming less pronounced. The conclusion of the chapter discusses competitive implications for system operators.

PROFILES OF THREE SYSTEM OPERATORS

Specialized Electronic Data Base Systems:

DIALOG Information Services

DIALOG, the world's largest online information system, has been described as the "ultimate on-line library (PC World :Volume 1,#6). A pioneer of the data base industry, the DIALOG system contains more than 180 data bases with more than 80 million pieces of information (DIALOG :October, 1983). Subjects covered are science, chemistry, technology, medicine, law, business, finance, social sciences, humanities, the arts, public affairs, and general news. The information is in the form of references and abstracts to technical reports, conference reports, newspapers, journal and magazine articles, patents, trademarks, and statistical data. As can be seen from the subject matter, DIALOG serves users of specialized information. (Exhibit 1 includes a complete list of DIALOG data bases.)

DIALOG is a subsidiary of Lockheed Corporation of Palo Alto, California. The service is an outgrowth of an internal information retrieval system developed within Lockheed's Advanced (Missile) Systems Division. In 1966, the company won a NASA contract to organize a quarter million aerospace documents into a data base. Following success with the NASA data base, the firm won contracts from other government agencies including the Atomic Energy Commission and the US Office of Education. Increasing experience with large data

bases enabled the Lockheed staff to develop a powerful search command language called DIALOG. Lockheed introduced DIALOG as a commercial service in 1972. DIALOG became a separate subsidiary in 1981. In effect, DIALOG is a clearing house for data bases. The firm integrates data base information collected by other organizations into an indexed format which allows interested persons to access the data bases using the DIALOG search language.

DIALOG's users include government agencies, large corporations (a majority of the Fortune 500 companies), educational institutions, public libraries, small businesses, and professionals. According to DIALOG literature, over 500,000 people have accessed the files since the service's inception. Estimated 1982 revenues are $30,000,000 from a subscriber base of 19,000 (Standard and Poor's Industry Survey :1983). Profit information is not publicly available.

DIALOG users can access the system using any ASCII terminal connected to a telephone network. Traditionally the dialers have been information specialists or librarians seeking out the needed information for end-users within their organizations. DIALOG's literature promises to help them find more information more quickly and more precisely than through manual searches through library catalogs or printed indices.

DIALOG is the largest electronic data base system; it is not the only system. Other prominent systems are Bibliographic Retrieval Service (BRS), a system of academic indices; Mead's LEXIS, which contains texts of laws for all fifty states plus federal statutes and court cases; Mead's NEXIS system which provides bibliographic and text coverage of leading news publications; and Chase Econometric's economic forecasting data bases. Specialized data base are big business; in 1981 total estimated revenues were estimated to be $680 million (Sigel :1983). The market grew eighty percent year between 1977 and 1982; growth slowed down to forty percent year in 1981.

While DIALOG's system is a huge 'supermarket' compared to the single subject system, specialized data base systems have many features in common. First, almost all provide information used for business purposes. Because the information is important to the users they are generally price insensitive. The DIALOG system is not cheap. Users are charged for connect time; charges vary from $15 to $165 per hour depending upon the data base. The prices for specific data bases are set jointly by DIALOG and the information provider. The fee is shared. A typical search takes from ten to fifteen minutes with average charges of $1 per minute because most data bases are in the $35 to $90 range (PC World :Volume 1,#6). There is an additional $1 per page charge for users to print information. Volume discounts are available.

Customers must find the specialized services worthwhile; many spend several hundred dollars each month (Sigel :1983).

The user interface to specialized data bases is not in general user friendly. DIALOG teaches courses to train users on its complex command language. However, the complex command language allows powerful searching. DIALOG users can search references by author, title, subject, and words or combinations of words anywhere within the text. Boolean logic can be used to specify complicated search criteria. It is because of the language complexity that information specialists, not end users, access the system. A well thought out search strategy is helpful for minimizing cost while obtaining maximum information (PC WORLD :Volume 1,#6).

As mentioned previously, users can access specialized data base systems through any ASCII terminal connected via modem to the phone system. All transmission is in textual format. Dialers do not have to use AT&T; Telenet, Tymenet, and Uninet offer users the choice of calling via the distance-independent phone networks. The current charge for these networks is $6 - $10 per hour. DIALOG also has an in-WATS number.

Information Utilities

CompuServe Information Services

From a nationwide network based in Columbus, Ohio
CompuServe Information Services offers users of personal
computers and terminals services including news, financial
information, stock market reports and commodity news, general
reference material, shopping and banking, travel services,
games, financial software, and electronic mail. Compared with
the specialized electronic data base systems previously
discussed, most of the information utilities' data bases
appeal to a generalized audience, not only a specialized
group. Other major differences are the availability of
transactions-oriented services, electronic communications, and
games. Communications services on CompuServe include Citizens
Band, an electronic system resembling a CB radio network,
electronic mail, and bulletin boards and electronic
conferencing for special interest groups. Examples of special
interest groups (SIGs) are the Midwest Education Research
Association, environmentalists, and persons interested in
cooking. The special attraction of the games is that players
across the country can compete with one another. A complete
listing of CompuServe's services is found in Exhibit 2.

CompuServe Information Services was begun in 1979 as
outgrowth of CompuServe's computer service bureau activities
for corporations and government clients. The system, which

was devised to utilize excess computer power during non-business hours, allowed users to run financial programs and electronic messaging. In 1980, after CompuServe was purchased by H&R Block, the service was expanded. Through a retail agreement with Tandy, CompuServe literature was distributed to purchasers of Radio Shack Computers. Mr. Barry Berkov, a CompuServe vice-president, explained that CompuServe continues to rely upon distribution of literature and special offer notifications at computer stores as a marketing tool.

Although CompuServe has targeted its services towards home users, originally personal computer hobbyists, a large number of the users are businesses and business professionals (which group may include some computer hobbyists). A 1982 survey showed that 94 per cent of the users were male (Editor and Publisher :August, 1982). Most had completed 4 years of college, were 22-49 years of age, and had white collar jobs. Over one-third of those surveyed earned more than $50,000 per year. The number of users has increased dramatically over the last few years. Compared with 25,000 subscribers in mid-1982 (Sigel :1983), CompuServe boasted 89,769 subscribers in January 1984 (Arlen :January,1984). Despite the business orientation of a majority of subscribers, the most frequently used services are the communications activities (particularly CB) and the games, commented Mr. Berkov. At the end of 1983, CompuServe launched a new service, an Executive Information

Service, which features more business information and decision support software in addition to its previous services.

Other information utilities include The Source, owned by Reader's Digest and Control Data Corporation, and the Dow Jones News Retrieval System. Although Dow Jones is by far the largest information utility with 115,000 subscribers (Arlen :January,1984) in January 1984, I did not choose to profile it because of its primarily business-oriented services. Dow Jones does not fall in the class of specialized data base systems, though, because since 1982 the firm has been adding consumer-oriented services also. Frost and Sullivan, in their report The Personal Computer Communications Market, predicts that revenues of general purpose on-line information systems will reach $42 million in 1987, up form $9.3 million in 1983 (Arlen :February, 1984).

The cost to the user varies across different information utilities. For 300 baud users (a slow communications speed), CompuServe charges $12.50 per hour during working hours and $6 per hour during off hours. 1200 baud users pay $15 per hour during prime time, $12.50 during evenings. Surcharges per hour or per item of information are charged for some of the services (the amount to be charged appears on the user's screen before he/she commits to using the services). A total list of surcharges was not available to me. Several examples follow:

Grolier's Encyclopedia $5/hr

Official Airline Guides .... $32/hr prime time
                                  $21.50 evenings

Value Line ....$.50/financial statement
                                  $1/forecast

Access to the information utilities is not cheap, but it is cheaper than access to the electronic data bases. Individuals, not companies, pay for a significant portion of the services.

While the interface to information utilities is simpler than that to electronic data bases, the user often must learn different dialogues for each information product used (i.e. the command syntax for shopping is different than the command syntax for reading the encyclopedia.) The indexing capability varies. In general, the search languages are not as flexible as those used to access the specialized data bases.

Users of information utilities access these services from terminals and personal computers through phone networks. Transmissions are in textual format. CompuServe subscribers can call via AT&T, Telenet, Tymenet, or use CompuServe's own network system (which is cheaper). CompuServe has experimented with interactive cable systems but has not found them attractive to users. People expect video other than text when watching cable.

Videotex Systems

Knight-Ridder's VIEWTRON

Knight-Ridder's VIEWTRON is the first of the new videotex services to go commercial in the United States. Since October 1983, Knight-Ridder has offered VIEWTRON to residents of South Florida. Persons willing to purchase (or lease) AT&T's SCEPTRE terminal can access news; information about local services such as health care, dining, entertainment, and consumer tips; games; shopping services; banking services; and, in the future, electronic mail. These services are similar to those offered by the information utilities; the difference is the local focus.

An operator of regional newspapers, Knight-Ridder is oriented to the local information market. The company has plans to introduce VIEWTRON in ten more localities by 1985. In cities in which Knight-Ridder does not own a newspaper, these system will be joint ventures with the local newspaper companies. Five joint venture agreements have already been signed. Knight-Ridder has been experimenting with videotex since 1972, at which time it established a subsidiary Viewdata Corporation of America, to research the technology. The company originally thought that videotex would be simply an editorial vehicle. While researching the British videotex system PRESTEL, Knight-Ridder became aware of its home potential. The company envisioned that news and advertising

would be the focus of the system, but market tests indicated that consumers were more willing to pay for games, teleshopping, and banking (Yankee Group :1982).

Knight-Ridder's intended audience is the consumer. Knight-Ridder is not the only firm attracted by the potential profit of electronically reaching the mass consumer marketplace. Field Enterprises, owner of the Chicago Sun Times, plans to offer a similar service in Chicago this spring. Times Mirror's first GATEWAY videotex system is scheduled to go commercial this summer in Orange County, California. Like Knight-Ridder, Times Mirror plans to serve additional markets after gaining some early experience with its first system. Without providing specifics, IBM, Sears, and CBS announced plans to enter the videotex market in the next several years.

No actual data has been released yet, but Knight-Ridder hopes to sell VIEWTRON to 5000 Florida residents within the first year of operation. These consumers are expected to be 'upscale.' The cost of purchasing the AT&T terminal is $600. To use the service, residents pay a $12/month subscription fee plus $1 in telephone charges per hour of use. The service charges are less than those for the information utilities and electronic data bases. Consumers are more price sensitive than businesses. Knight-Ridder hopes to support its service largely through advertising revenues. Ads are inserted on the

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menus and information screens seen by VIEWTRON users. Knight-Ridder's continued success in attracting advertisers and ad agencies remains to be seen. International Resource Development, a Norwalk, Connecticut market research company forecasts that videotex ad revenues could amount to $1 billion by 1992 (Brenner :1983). Unlike the electronic data base systems and the information utilities, the user interface to VIEWTRON is quite simple. No previous computer experience is necessary. Menus appear on the screen prompting the user to specify what information he/she is looking for. The menus, or frames, are organized in a tree structure, leading the user from more general menus to more specific menus until the desired screen is reached. The drawbacks of this easy interface are a lack of flexibility and powerful indexing capability. An experienced user may become frustrated by the number of menus that come up before the desired information is reached. Indexing is primitive.

The SCEPTRE terminal through which users access the system is basically a keyboard that attaches to the viewer's television set and to the phone system. The television serves as the terminal's monitor. At first, users had to use the BEll system to access VIEWTRON; Knight-Ridder plans to allow access through TYMENET and TELENET. In addition to textual information, the videotex systems transmit color graphics. In fact, the graphics capability is being marketed as a key selling point over the information utilities.

COMPETITIVE DISCUSSION:

STRATEGIC FACTORS FOR SYSTEM OPERATORS

The purpose of this section is to evaluate the significance of the differences between the three types of systems. Also discussed are actions being taken by the system operators that have the potential for erasing these differences. Comparing the systems, I distinguished three areas into which the differences can be categorized. These areas are:

> o the market segment being targeted
>
> o the communications technology and hardware
>
> o the services offered

This section is divided into three parts, corresponding to these areas. The discussion on Services Offered is last because, as will be seen in this chapter's conclusion, the range of services offered can continue to differentiate systems that address similar markets and use the same technologies.

TARGETED MARKET

Discussion of the targeted market covers three issues. The first issue concerns whether the system serves businesses or consumers. Related to the first issue is a second - is the system designed to serve casual users or computer-literates? A system designed to reach the mass market consumer must have an appropriate interface for the casual user. The third issue is whether the system serves customers nationwide or only a specific locality.

Business versus Consumer Markets

The business versus consumer issue is rather cloudy. Originally, the sole purpose of the specialized electronic data base systems was to serve business customers; the price is high and the information is targeted for specific business segments. My description of the traditional role of electronic data base systems did not even mention the consumer as a possible customer. But, in December 1982, DIALOG introduced Knowledge Index, an after hours service for the home personal computer user. This service offers access to a subset of the DIALOG data bases via a less powerful search language at a cheaper price.

The targeted market of the information utilities is not clear either. After having successfully penetrated the business market (Dow Jones was the first system known to be profitable), Dow Jones now wants to exploit the consumer market. CompuServe aimed for the general consumer market, but has found a large percentage of its use coming from businesses.

Knight-Ridder, representative of the videotex systems, is clearly aiming at consumers. However, local businesses have been requesting access to VIEWTRON.

From a system operator's perspective, it makes sense to want to penetrate as large a market as possible. The primary costs for system operators are the costs of computer facilities, data base maintenance, and administration. A large portion of the computer facilities and data base maintenance costs are fixed regardless of the number of users. Adding users adds to profits. It is fascinating to me that certain sources (literature and interviewees) indicated that penetration of the business market will lead to penetration of the home market while other sources indicated the reverse.

Casual User versus Information Specialist

The casual user versus information specialist issue is of course related to the home versus business question. The system profiles indicated that both the electronic data base systems and the information utilities have interfaces inappropriate for computer novices, the electronic data bases more so than the utilities. Again, my description did not bring the state of these services up to date. DIALOG is in the process of rewriting its software to allow simplified searching of multiple files. Having more impact today, however, are software packages written by independent software developers to act as a user-friendly front end to DIALOG for personal computer users. One such package, the Institute for Scientific Information's Sci-Mate Universal Online Searcher, provides a single interface to DIALOG, BRS, and several other

data base systems. Dr. Roger Summit, president of DIALOG, announced his intention to cooperate with independent software vendors (DIALOG :October, 1983).

The data base companies are in general making an effort to convince corporate end users to dial the system directly rather than rely on information specialists. Capturing the interest of market researchers, R&D personnel, and planners, often quantitatively-oriented groups, is thought to be a first step in capturing more general management interest (Martin :1982).

CompuServe , representative of the information utilities, has also designed a new front-end interface. Personal computer users of the Executive Information Service have the option of using a front-end which leads the user through the logon to easy-to-use system menus. Personal experience tells me that it would be difficult to get lost using EIS.

The drawback of the particularly easy-to-learn, easy-to-use interface to Knight-Ridder's system is the limited indexing capability. Implementing an identical tree-like structure for every information service reduces the flexibility to design an interface most suited for the particular service. It has been suggested that as society becomes more familiar with videotex, and computers in general, it will be possible to vary the interfaces and command

languages without fear of confusing the average consumer.

Although the casual user versus information specialist issue has significance today, I see this issue disappearing. My prediction is that all systems will offer an interface lying somewhere between the complex DIALOG language and the tree-structured interface.

The home versus business issue, then, appears to have no easy answer. All three types of systems approach both marketplaces (although it may not have been Knight-Ridder's original intention to sign up business subscribers). Even if all systems reach both markets, though, different information services seem more likely to attract different users. For example, how many consumers wish to look up chemical patents? I will return to the home versus business question again when discussing services offered.

National versus Regional Customer Base

The electronic data base systems and information utilities target customers nationwide (and in some cases internationally). Thus far, the videotex services are regionally based, and in fact feature regional information as well as information of national interest. (It is rumored that the Sears-CBS-IBM venture will sponsor a nationwide system.) There are two questions which the national versus regional

question brings to mind. First, can both national and regional systems coexist? Second, if not, which will be more successful?

Crucial to these questions is the value of the local information and local shopping. No empirical evidence is available; VIEWTRON has not yet announced any usage data. Trying to assess this issue, I hoped to gain some insight by talking to the national competitors. Mr. Barry Berkov of CompuServe indicated that he did not think that the local services would make a difference, although the movie reviews and local restaurant coverage might be successful. However, he said, CompuServe could and would enter the local market place if local services did prove popular. I also discussed this issue with Mr. Jeff Hall, Director of Marketing for Electronic Services at Comp-U-Card, whose shopping service is national. Mr. Hall does not think that the local stores will find the electronic marketplace large enough to justify the cost of creating electronic stores. He explains that part of Comp-U-Card's value to customers is the ability to order and receive goods from alternate locations if local outlets are out of stock.

Mr. Berkov's and Mr. Hall's comments are of course biased because of their firms' positions in the nationally-base market. I have no evidence to further evaluate the value of local versus national electronic

shopping. but would like to present some research that might add insight about the value of local information. For Knight-Ridder's and Times-Mirror's systems, local information is being gathered by the local newspapers, whose traditional products will be the loser if local electronic information becomes the accepted medium. In his book The Future of Videotex, Knowledge Industries Consultant Efrem Sigel illustrates that the cost per newspaper word is significantly less the the cost per electronic word, $.00025 per thousand New York Times words versus $.282 per thousand words on the Source (Sigel :1983). The supposed value of the electronic newspaper is that it will include the multitude of stories that do not make it into the limited number of pages of the local newspaper. Also, the local service information will be more comprehensive than a single day's issue. Additionally, the current information can be updated more quickly. At this point in time, the jury is still out. I would not want to predict the popularity of the local services.

Assuming that local information will be well-received, does it make sense to store national data bases on every local system, especially data bases that are frequently updated? Or, will users need to call both regional and national systems to satisfy their information needs? Already on the national systems, some data bases are stored on only one system with other systems having a "gateway' to the data base. Comp-U-Card's data base, for example, is maintained on a

computer owned by CompuServe. But Comp-U-Card is also available to subscribers to the Source. Unknown to Source users, their requests to use Comp-U-Card temporarily connects them through the Source computers to a Comp-U-Serve computer (see diagram below). A person requesting access to the Official Airline Guides' schedules from any system providing this service is unknowingly connected to Official Airline Guides' computer systems in Oak Brook, Illinois.

```
                                                                    USER

COMP-U-CARD          COMPUSERVE          SOURCE
DATA BASE            COMPUTER            COMPUTER
```
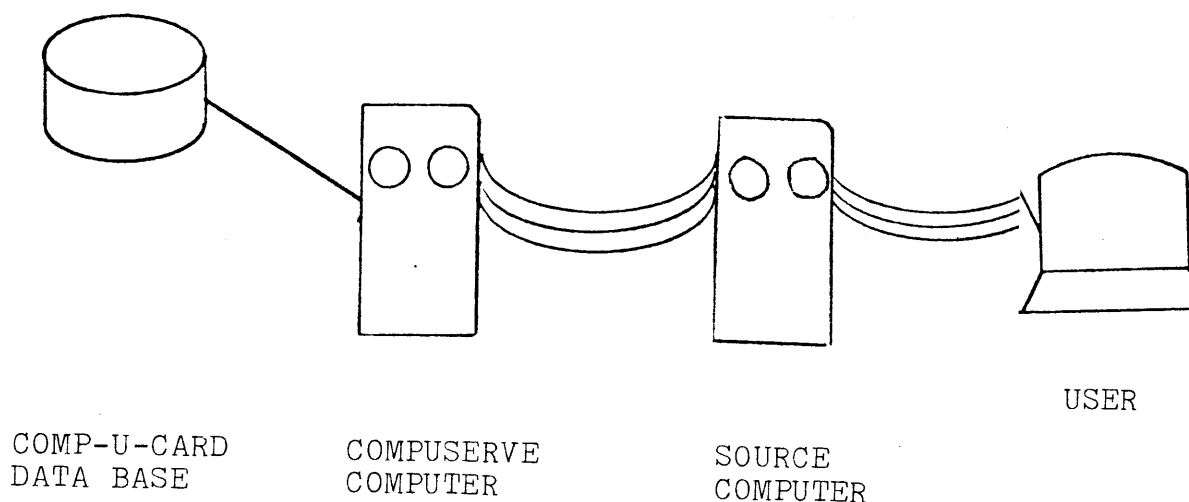
When I first learned about gatewaying, I immediately concluded that this concept implied disaster for national systems. Users would call their local systems and be gatewayed to national data bases residing on the information provider's computer upon a request for national information. In this way, long distance phone costs and data base

maintenance costs would be minimized. It surprised me to read
that others, notably CompuServe vice-president George Minot,
reached quite the opposite conclusion (<u>Editor and Publisher</u>
:June, 1980). Users would call a national system and be
gatewayed to newspaper companies' local data bases for
regional information.

Further thought on the national/regional issue led me to
realize that one function not available on the local systems
is nationwide communications. As noted before, CompuServe's
most widely used services are the communications products
which include electronic mail and the special interest forums.
The games which involve participants at different locations
are also popular. And these services are particularly
profitable for CompuServe because the connect fees do not have
to be shared with information providers (with the exception of
some game royalties.) It is noteworthy that DIALOG recently
announced its intention to introduce electronic mail (DIALOG
:October, 1983).

The issues surrounding the targeted markets of the
different types of system operators are not easily evaluated.
With regard to serving homes versus businesses, all three
types of companies are stabbing at both marketplaces, either
by design or accident. This distinction does not appear to
significantly differentiate the systems, although the relative
proportion of home versus business users each system will

eventually attract based on the services offered remains to be seen. Again, differences in particular information service offerings will addressed later in the chapter. The relative proportions could also depend on the relative costs of the systems to the user, which may be dependent on the success of advertising, also discussed later.

The existence of gatewaying somewhat nullifies the distinction between national and regional systems as far as the user is concerned. Gatewaying can even be used to transfer electronic mail and game moves between regional systems, although this would require close cooperation between system operators. A key question, however, is the profit making potential for national versus local systems. My communications argument suggests that national competitors might have an advantage even if some of their profits result from gating communications between regional systems. I do not want to overemphasize the importance of national communications because this study leaves out a host of competitors, the value-added networks hoping to compete in the electronic communications marketplace.

Another competitive factor on the side of national systems is the ability to penetrate a much larger customer base. Perhaps the regionals discount this argument since it is likely that there will be only one regional system per region whereas the nationals have other national competitors.

For cities in which Times-Mirror and Knight-Ridder have newspapers, some of their expected profits will result from fees earned as information providers. Perhaps, therefore, these companies are willing to earn less in their function as system operators.

To conclude, although nationwide communications services may offer advantages for the nationwide systems, this fact does now allow me to deduce that the three types of systems serve very different market places.

COMMUNICATIONS TECHNOLOGY AND EQUIPMENT

This section addresses issues concerning three aspects of the communications technologies used by the system operators:

        o the user's communication device

        o the transmission medium: phone versus cable

        o the transmission format: text versus

          text and graphics

User Communications Device

For both the electronic data base systems and the information utilities, the user communicates via a terminal or personal computer. Dr. Roger Summit of DIALOG hopes "that the DIALOG computer will become [the] micro's favorite peripheral (DIALOG :October, 1983)." For Knight-Ridder's system, the users hook AT&T's SCEPTRE terminal into their television sets. Although

there is no authoritative evidence, I believe that the personal computer will be the device used in most electronic information services applications. At $600, the SCEPTRE is too expensive not to have any function beyond accessing videotex. It seems unlikely that the consumer would by a $600 dumb monitorless terminal when relatively powerful personal computers are available for not too much more. There are vendors working to develop cheaper videotex terminals but I still wonder whether the personal computer age consumer will purchase plain terminals. Another argument supporting personal computers over TV-hookups is that consumers would rather not tie up their television sets.

Actually, it appears that the popularity of the personal computer contributes to the popularity of electronic information services. Substantial subscription increases to the Source and CompuServe coincide with increased personal computer purchases. Burt Helfinstein, president of the Source, is one of the people who attributes the "staggering rate" of new members to the strong personal computer market (Arlen :February, 1984). Helfinstein observed that the membership growth curve tracks personal computer sales 9 to 12 months earlier. He believes that the lag occurs because many personal computer owners do not immediately purchase a modem). DIALOG's home service was recently written up favorably in PC World, a magazine for IBM and compatibles.

As I said, I have no proof that the regional videotex system operators will adopt the personal computer as a user interface device. There are rumors, however, that IBM and other personal computer manufacturers are developing special videotex boards to fit inside their personal computers. These boards will allow the systems to understand the graphics/text protocol NAPLPS. It is also rumored that Times-Mirror may be awaiting AT&T's introduction of a videotex-compatible personal computer before launching GATEWAY.

Of the information providers' representatives I spoke with about this issue, four of the six expect the personal computer to eventually be the mainstream user device. Information providers are not authorities, either, but their experience with electronic information services allows them educated guesses. Objectors to the personal computer model of videotex, including the two interviewed information providers as well as others quoted in literature, believe that connection with the television is the only way to get into the consumer's home. Both objecting information providers agreed that the connecting device must be inexpensive.

Ms. Carol Lehrman, a marketing manager at Official Airline Guides, was one of those objecting. Most Official Airline Guides users are businesses, who often access Official Airline Guides through inexpensive terminals purchased for some other organizational purpose. Consumers do not have

terminals on hand; televisions, as produced today, require attachments like the SCEPTRE terminal to be used for electronic information services. I wonder if Ms. Lehrman's perspective would be different if the Official Airline Guides' customer base was different.

Before moving on to the graphics question, let me state that my primary goal is not to predict what terminal device will be used, but to show that trends affecting one type of system will probably affect the others.

Text versus Graphics

A selling point of the videotex systems is their use of graphics. The electronic data base systems are textual in nature, traditionally the information utilities have been also. But facing competition from the next videotex services the information utilities seem to feel the need to deliver graphics as well. Actually , the information utilities appear to feel ambivalent. Mr. Jeff Wilkins, CompuServe's chief executive officer, was quoted as saying that what users want now are information services, not fancy graphics :"In testing done with high-quality graphics, it has been found that graphics have a high initial interest factor, but shortly thereafter, the interest drops (Arlen :January, 1984)." However, Mr. Wilkins agrees that NAPLPS, the AT&T system for the transmission of text and graphics, is really the protocol

standard. He said, "We'll support it. I think it's terrific." The Source's management appears to concur. According to Mr. William Lucas, vice-president of corporate development for the Source, NAPLPS data bases will be on the Source sometime this year (Arlen :January, 1984).

Again, the jury, in the form of customer behavior, is not in. The information providers had varying opinions. Those with inherently textually based services such as Official Airline Guides and Grolier's think that the splash of some color graphics screens prior to the text is attractive. However, because currently implemented technology paints graphics on the screen slowly, these same people predict that users will become bored of the graphics after several viewings. These slowly appearing graphics will be particularly annoying if users are charged for connect time. It should be noted that the quality of videotex graphics is nowhere near the quality of full video. (The reason for the limited graphics capability is described several paragraphs below.) But the videotex systems have been the first to display any graphics at all.

The two interviewed information providers involved in shopping services, Comp-U-Card and the unnamed service, believe that graphics could affect their services more seriously. Shoppers like to see what it is they are buying. But both agreed that the current graphics probably hurt more

than they help since the quality is not as good as that of catalogs, against which electronic shopping often competes. The manager of the unnamed service is not as concerned as Comp-U-Card about graphics because its main wares are gifts which people often purchase unseen at the last minute, an ideal application for midnight electronic shopping. Current Comp-U-Card customers usually know exactly what they want; they use electronic shopping to perform comparison pricing. Primitive graphics would not aid these customers or attract others.

Most of the information providers (and industry analysts) agree that graphics could play a more important role if the quality was that of full video. Technologically, full video videotex is possible, either through interactive cable or an enhanced telephone network.

Transmission Medium

Currently, all three types of systems rely on the phone system. CompuServe has experimented with interactive cable in the Columbus area. Other experimental videotex systems have also transmitted through cable. The problem with either interactive cable or an enhanced phone network is that these systems require expensive improvements to the infrastructure before they will be available to large percentages of the population. Many cable companies promised to install two-way

cable when they won their franchises but very few have yet to install these expensive systems. The needed enhancements to the telephone system require the installation of digital switching and transmission equipment estimated to be a $50 billion proposition (Martin :1982). To some degree, a chicken or the egg problem is present. Neither phone companies or cable companies want to make the capital investments until videotex offers significant profit potential; videotex might not significantly take off until full video capability is in place.

Bob Smith, executive director of the Videotex Industry Association, said that there is not yet a strong focus on the phone versus cable issue. As long as this is true, the use of phone versus cable, or graphics versus no graphics, will not effectively distinguish the three types of systems. When full video does become more available, system operators' choices of whether and/or how to implement graphics may differentiate the systems. Most probably, system operators' decisions will depend on their selection of services. At this point, it seems reasonable to predict that videotex systems and information utilities will choose to use graphics. Electronic data base system operators may not. Services offered by the different system operators is the next topic of discussion.

SERVICES OFFERED

I saved the services section for last because it is the selection of services offered that may continue to differentiate the systems. Even if all three kinds of systems use the same technology and reach both homes and businesses, even if all three offer nationwide electronic mail, the selection of information provided can influence which homes and which businesses use which systems.

Referring back to the categories of service defined in Chapter 1, the chart on the next page illustrates which categories are currently served by DIALOG, CompuServe, and Knight-Ridder.

Several differences stand out on the charts, the most interesting being those in which only one type of system offers a particular service:

The electronic data bases are the only systems whose services primarily serve specialized work-related needs. CompuServe has some data bases designed specifically for the aerospace industry but these data bases are a minority of CompuServe's services. Specialized services do allow the electronic data base systems to lock in the specialized users.

	DIALOG	CompuServe	Knight-Ridder
Investment Information	x	x	x
Industry Information (Work-Related)	x		
Special Interest Information (Non-Work-Related)		x	x
General Reference Information	x	x	x
Local Information			x
Education		x	
Communications			
Electronic Mail	x	x	x
Forums		x	
Entertainment		x	x
Banking		x	x
Goods and Services Exchange		x	x
Software Disribution		x	
Home Management			

Within the communications area, the information utilities have been the only systems to offer Special Interest Group bulletin boards and conferencing. DIALOG is moving into this area, but primarily to serve users interested in its data bases. With gatewaying, the regional videotex systems could allow access into the national SIGs; it seems unlikely that a regional system would host a national data base.

Knight-Ridder's system is the only service to offer the local shopping and information services. Gatewaying can allow national users to access the local information; it seems unlikely that a national system would host local data bases.

In the services arena, therefore, all three systems now have at least one unique area. The information utilities have the least protectible competitive position, though, because a move on the part of DIALOG to generalize its audience, or a move by videotex vendors to establish national networks linking their local systems, would remove that advantage.

On this issue also I consulted information providers. The information provider's representatives were asked how they chose which systems to participate in. The responses were expected to be useful for two reasons. One, they would provide information about service differentiation on the different systems. Two, because information providers rely on system operators to deliver their services, their choices

would reflect their confidence in the staying power of the different systems. Based on service category, four of the seven services: Value Line, Grolier's, Official Airline Guides, and the Career Placement Registry could conceivably serve all three types. The additional information services, the Education Research SIG and the two shopping services, could serve two of the three system types.

The answers surprised me. Of all seven services, only two limited their activity to one system. Mr. Harry Allcock, Marketing Vice-President of Career Placement Registry, explained that Career Placement Registry is on DIALOG because DIALOG has the largest number of business users. He did not consider the possibility of serving multiple networks, probably because IFI's (Information for Industry (IFI) is Career Placement Registry's parent company.) other data bases are all specialized. The Education Research SIG is on CompuServe because it was the only system offering SIG forums and electronic conferencing at the time president Jean Pierce investigated varying systems. It would not make sense for a SIG to be on multiple systems.

The other five services, however, are on multiple systems, four of them on multiple system types. Most expressed interest and indeed have plans to serve as many systems as possible. Official Airline Guides is on eight systems now and will be on twelve more by June. The 20

systems fall across all three types . The Official Airline Guides marketing manager was only free to specifically name the eight current systems; CompuServe and Knight-Ridder are on the list. Not all the systems are major; several were unfamiliar to me. Grolier's is on six systems with plans to be on six more; all three profiled systems fall within Grolier's twelve. Comp-U-Card is on three information utilities and is contracted to join at least one videotex system.

Why do these systems wish to spread their wares? The answer should not have surprised me. Electronic publishing is just another distribution channel. Just as most manufacturers sell their goods through multiple retailers, information providers want to sell their goods through multiple system operators. Grolier's Ted Mendelsohn believes that the encyclopedia is a general purpose reference of potential interest to users of all systems. Similarly, Ms. Lehrman of Official Airline Guides believes that the airline guide is of value to any service. Exclaimed Mr. Sterenson of Value Line, "We have a good reputation. All of the systems want us."

The information providers answers responded to my second purpose as well. Shake-outs!! The information providers expect a shake-out among the system operators but do not feel comfortable placing bets. Ms. Lehrman expects mergers to occur. Mr. Mendelsohn also suspects that the electronic

information services industry will not end up "looking the way it does now." Comp-U-Card's Mr. Hall agrees. Nobody would predict who the shaken players will be.

The competitive implications of the information providers' responses can be interpreted in several ways. That generalized information providers wish to be on all systems within a system type,, i.e. to be on multiple information utilities, implies that within one system class different users will use different systems. This conclusion makes sense; a user would have little reason to access both the Source and CompuServe since their product offerings are not very different. Although Dow Jones is more business focused, many of the Source and CompuServe data bases appear on Dow Jones 's system as well.

Information providers' wishes to serve systems of different types, i.e. to be on information utilities and videotex systems, could be interpreted similarly. Information providers may feel that presence on all system types will allow them to reach everyone. Value Line actually plans to offer differentiated services on the various systems, matching its service to the needs of systems' audiences. This line of interpretation, the multiple distribution channel story, implies that all three types of systems can co-exist.

Alternatively, once could attribute the shake-out expectation as information providers' motivation for joining different system types. This attribution implies fierce competition between the three types.

The last services-offered issue returns focus to the home-business issue. Ads are being used to cover much of the cost of the Knight-Ridder system, reducing the cost to the user. For example, access to Official Airline Guides costs users $32/hour premium on CompuServe. Viewtron users pay only five cents per minute, or $3/hour to access Official Airlines Guide. Official Airline Guides charges CompuServe and Knight-Ridder the same price. On Viewtron, Alamo Car Rental is footing the rest of the tab in exchange for spot ads on the Official Airline Guides screens.

As with graphics, the jury is out on advertising. The interviewed information providers are skeptical. It remains to be seen whether advertisers will find videotex ads effective. Again, there is a chicken-or-the-egg question. Ad agencies will want to place ads on videotex if the videotex audience is large enough to justify the cost. Videotex may not have a large audience unless ad-sponsored services keep the price down.

If ads are successful, a system's decision to use them, and the effect upon prices, will affect competition among the

three types. Assuming that consumers are more price sensitive than businesses, use of ads will most strongly influence the attraction of consumers. The specialized data base systems may be largely unimpacted with respect to use of their specialized data bases. But a price-sensitive user will probably not access Grolier's encyclopedia on DIALOG if the cost is several times that of accessing it some other way.

Until recently, the information utilities had not displayed ads. As of April 1, CompuServe began an advertising experiment in join venture with L.M. Berry and Company, the largest publisher of yellow pages (Arlen :November 1983). This experiment will last for three months, testing three different advertising approaches: spot ads on menu pages, infomercials, and an electronic catalog. A third party, possibly Nielsson, is hired to evaluate the project.

CONCLUSIONS

The purpose of this chapter has been to evaluate whether the electronic data base systems, information utilities, and new videotex systems are in the same business. I conclude that they are. Because of their specialized information, the electronic data base systems do not compete head-on with the other two types. But these systems share many of the same technological and user issues as the information utilities and videotex systems. The differences between the information utilities and the videotex systems are less pronounced. The significance of these differences is difficult to discern. Comments by representatives of the information utilities illustrate mixed feelings about calling themselves videotex operators. One reference (Arlen :February, 1984) described the Source as "grudgingly" admitting to be videotex. Mr. Berkov of CompuServe clarified that CompuServe is unlike the new videotex systems because they are television oriented but recent CompuServe ads refer to the company's product as videotex. Perhaps the best way to describe the differences is found in the February edition of International Videotex and Teletext, which asserts that information utilities and the Knight-Ridders of the world are approaching videotex from opposite ends. The information companies are picking up videotex technology, meaning the graphics and ads, while the Knight-Ridders are picking up the information services (Arlen :February, 1984).

The competitive implication of the narrowing differences between the information utilities and the videotex systems is that it will become more and more difficult for system operators of both kinds of systems to differentiate their systems. In the short run, there may be some technology related differences that certain operators can take advantage of, i.e. use of graphics, support of personal computers, or support of a 'better' interface language. In the long run, however, these advantages are not protectable.

I have already put forward the national operator's ability to offer nationwide communications as an advantage. This advantage is tempered, though, by the ability of the regional operators to tie into the national systems. It could be asserted that the national operators could prevent the regional tie-ins. Even if the national systems could prevent the tie-ins, and I am not sure that antitrust law would permit this (Can CompuServe, for example, disallow a Knight-Ridder system operator from subscribing to CompuServe's service?), the regionals could overcome this barrier. To begin with, many of the planned regional systems, i.e. the Knight-Ridder and Times-Mirror systems, will be owned, or at least partly owned, by national companies. It seems logical that the national owners would establish electronic mail tie-ins between the regionals. Secondly, I expect that the value-added network carriers will forward integrate into the electronic mail arena. (MCI has already done so with MCI

Mail.) To some degree, the carriers will actually be competing with the system operators for the electronic mail market. In order to capture as much of the market as possible, it seems likely that the carriers would be willing to handle the transfer of mail between the regional systems. It is true that the cost of nationwide communications capability may be greater for the regional systems, leading to decreased profits from this application. However, I foresee so much competition in the electronic mail arena that nationwide communications may not be a truly differentiable feature for national system operators.

The only long term sustainable competitive advantage appears to be the ability to offer different information services than other operators. As discussed in the chapter, at this time few, if any, information providers seem willing to offer their service to any one system exclusively. It is understandable that information providers prefer to have multiple channels of distribution; manufacturers of retail goods generally prefer to sell through multiple stores. I also understand information providers' fears about possible system shake-outs, another reason for them not to rely on a single system operator.

If exclusives are unavailable, a niche strategy might be the next best bet. Just as information providers are anxious to be on as many systems as possible, many of the system

operators are trying to get as much diversity as possible in their selection of information providers. In my opinion, much of this desire for diversity stems from the current lack of knowledge about which end-user applications will be successful. Over time, there will be a much better understanding of which applications will be popular. Diversity as a means of 'hedging bets' will not be necessary. An operator that then concentrates on one area of informational interest will have an advantage in attracting users with that particular interest. As evidence, Dow Jones has been successful in pursuing the business information market through its Dow Jones News Retrieval Service. I would suspect that Dow Jones's stated intention to pursue more of a consumer orientation is a reaction to other systems' attempts to move more into the business area. I predict, however, that if all systems pursue all informational areas, the high degree of competition will lead to a situation in which price is the sole differentiable factor.

Up to this point, I have perhaps implicitly assumed that an individual would subscribe to one electronic information system only. It is foreseeable that individuals would call multiple systems depending upon their interest in multiple information niches. For example, a sports minded business person might be willing to subscribe to a sports-oriented system and a business-oriented system.

A niche strategy is perhaps more difficult to envision when considering very generalized consumer services. The regional systems may be considered to have focused on niches, though, their niches being their local areas of service. Thus far, multiple operators are not trying to establish regional systems in the same locations. If local services do prove popular, this local information niche strategy could provide differentiable advantage, perhaps enough advantage to seriously threaten the very generalized national systems. The ability to maintain this advantage will depend upon whether the first regional operator to penetrate a locality can maintain somewhat exclusive control over the locality's information.

Thus far, I have ignored the backgrounds of the owners of the various systems. In order to focus on the competitive aspects of systems operation, I have separated out the systems operation function from the rest of the owners' businesses. Examining the owners' backgrounds is important, though, for two reasons. First, it is interesting to understand why certain companies have decided to enter a market that appears to be highly competitive. Relatedly, it is important to know whether a system operator's background will help the system be successful in such a competitive environment.

One category of owners participates in business areas considered to be suitable for electronic distribution. In

other words, these companies are information providers as well as system operators. Both banks and newspapers have aggressively pursued videotex system operation. Newspapers are interested in electronic systems because these systems threaten to replace newspapers. Banks perceive home and office banking as a logical next step following the introduction of automated teller machines. In effect, both bank and newspaper system operators have exclusive rights to their own information services. Going back to the local niche discussion, most of the local systems are at least partly owned by the locality's major newspaper. The local newspaper has expertise and experience collecting information for its locality, a fairly defensible expertise.

Bank-owned systems, in particular Chemical Bank with its Pronto system, do not seem to be attempting generalized information services. Chemical is using its expertise in the financial area to create a system with a financially-oriented niche strategy. Pronto currently serves the New York area, Chemical's home base. Chemical plans to license the Pronto software to banks in other geographical areas (Tandem Update :Spring 1983).

Thus, control over information may be able to provide a sustainable competitive advantage to system operators. This advantage will depend, of course, on the market popularity of the owner's information. It remains to be seen whether either

local information and/or at home and office banking prove to be popular.

Not yet mentioned is the fact that two of the interviewed information providers, Comp-U-Card and the Official Airline Guides, make their services available to customers that dial them directly (from personal computers or terminals). In effect, these information providers are system operators for their own information services only. Customers that have no interest in using other information services can save money via this direct access - they do not have to pay any kind of subscription fee for services they do not want. I have ignored mention of these single service systems because I think that more potential users will be attracted to systems offering multiple information services and communications capability. Because both the Official Airline Guides and Comp-U-Card aggressively serve many systems, I perceive that these information providers are not relying on direct access for the bulk of their distribution.

Some of the system owners have experience in computer management. CompuServe's background is the management of a timesharing service. Lockheed entered the specialized electronic data base market because of its powerful DIALOG search language. While I do not mean to underestimate the value of computer management experience for effectively operating systems, I contend that this experience can be more

easily bought than control over information.

Other system operators own communications networks. Warner-Amex, owner of multiple cable systems, has dabbled in the electronic information services area. CompuServe, in conjunction with its timesharing business, has established a private telephone network that reaches 300 United States cities. The Source is now thirty per cent owned by Control Data, a corporation also owning a private phone network. AT&T is a joint partner in the Knight-Ridder systems. DIALOG plans to install a private communications network (DIALOG :October, 1983). For the network owner, system operation is a way to capture more value from the network. From the systems operation perspective, ownership of a network can be competitively advantageous if this ownership reduces the system's cost to customers or excludes other potential system operators from access to a network.

With respect to telephone networks, the cost factor can feasibly provide competitive advantage. Government regulation of common carrier systems, specifically AT&T, makes it unlikely that any potential system operator could be prevented from setting up a system.

The cable network situation is possibly more interesting. Until now, cable-based systems have not been too successful, partly because of the limited installation of interactive

cable, partly because the developed systems have not taken advantage of cable's full picture video capability. Cable company ownership of systems is interesting because cable owners have much more control over what passes through their networks than does AT&T over its network. Potentially, a cable owner could be the sole operator of a system using its network. Notably, there is only one cable network per locality. (Local cable networks could be interconnected for nationwide communications.) Therefore, if cable operators follow through with their commitments to install interactive cable systems, they could conceivably have defensible positions as system operators. Of course, control over a cable-based system does not prevent competition from phone-based systems, but until broadband digital phone switching equipment is installed, only cable systems have the potential to offer full video. The primary threat to the cable owner's position is government regulation, both from the local governments which award cable franchises and the Federal Communications Commission.

In summary, the background of a system's owner may prove to be critical to a system's success. Because the system operation function itself is not very differentiable, control over either the information services provided or the network gives strength to the system operator's competitive position. At this point, I would like to comment on the proposed videotex joint venture between CBS, Sears, and IBM. Sears

owns a number of businesses in the financial services arena as
well as its retail and catalog store operations. CBS owns
multiple cable systems. IBM manufactures personal computers
and terminals, end-user devices for electronic services.
Plans for the joint venture's videotex system is currently
unannounced. I suspect it will be a system (or systems) to be
reckoned with.

A MORE GENERALIZED PERSPECTIVE

SYSTEMS OPERATION PORTRAYED AS AN EMERGING INDUSTRY

Michael Porter's model of emerging industries characterizes many of the issues surfacing in the system operator market (Porter :1980). A list of Porter's structural forces affecting new industries is on the next page.

According to Porter, many of these issues relate to the "absence of established bases for competition." Relating Porter's model to electronic information services, both technological and strategic uncertainty are present. I predict that the personal computer will become the most popular user device, but the terminal question as well as the issues of cable versus phone and NAPLPS video versus full video present uncertainty for industry participants. A wrong choice could leave a competitor's system obsolete. Strategically, system operators seem uncertain whether to target businesses, consumers, or both. The strengths and weaknesses of competitors are difficult to assess. The ownership of the systems, to the degree that it provides control over information or a network, could be critical. Initial entry into the market is expensive; the cost of computer facilities is considerable. Some of the operators own their own networks too; establishing a network is a major capital investment. H&R Block, Lockheed, and Knight-Ridder are not small competitors, but the impending market entry of

Common Structural Characteristics in Emerging Industries

Technological Uncertainty

Strategic Uncertainty

High Initial Costs but Steep Reduction

Embryonic Companies and Spin-Offs

First-Time Buyers

Short Time Horizon

Subsidy

IBM, Sears, and CBS has all competitors alert. Customers are unfamiliar with videotex. The success of videotex may largely depend on the success of marketing efforts designed to convince customers to modify their current shopping and reading habits. If customers are not converted quickly, it may be some time before full video is implemented and advertisers retained. Government decisions affect this industry also. The deregulation of AT&T threatens to destabalize telephone costs. Cable regulation could greatly affect this industry.

The implication of Porter's model is that it is difficult to compete in emerging industries. The key competitive variables are unclear. Furthermore, competitors do not want to compete too fiercely since a primary task is to convince customers that the industry as a whole has value. To conclude, Porter observes that the overriding strategic issue in emerging industries is the ability of the firm to shape the industry. It is this issue which compels the system operators to experiment, to market aggressively, to try and lead the way in implementing new information technology.

CHAPTER 3 : OPPORTUNITIES FOR INFORMATION PROVIDERS

In chapter two, the experiences and perspectives of information providers were used to gain insight about system operators. The purpose of this chapter is to gain some insight about the information providers themselves. It is rumored that when the British PTT announced the Prestel system, much bar room discussion turned to the topic of how to strike it rich as an information provider (Martin :1982). This chapter takes a look at some of the information providers that have gotten involved in the United States systems, the same information providers interviewed for the last chapter (excluding the information provider that wished to remain unnamed). These information providers are not those pursuing opportunities as system operators; they are looking to make money soley through the provision of information services.

In this chapter, I explore the opportunities that have enticed these firms to enter the electronic market. In a sense, information providers (and system operators, too) can be called technology leaders. These firms have ventured into the electronic arena while it is still very experimental in nature. I would admit that some of the firms providing specialized information do not fit into the 'venturer' category because their audience is somewhat certain, but firms without an assured customer base are indeed innovators. The individual experiences of the interviewed firms are examined

but I also attempt to discover any common experiences or characteristics that might explain why these firms are the ones who have ventured. Unlike the previous chapter, this chapter is not oriented around competition between firms. Each firm discussed provides a different service.

Information for this chapter was gathered through the interviews with information providers. The questions had two themes. First, the information providers were asked why they entered the electronic arena. Secondly, the firms were asked to describe how they had managed their entrance into the electronic arena. (Refer to Exhibit 3 for the specific questions asked.) I pursued this second theme because I thought it would be interesting to discover how the organizations incorporated their electronic activities into their previously existing businesses, if in fact they had previously existing businesses. The chapter is organized along these two themes.

DISCUSSION OF INTERVIEWS

Motivations for Entering the Electronic Arena

The Career Placement Registry was begun for a most interesting reason. Information for Industry (IFI), Career Placement Registry's (CPR's) parent, has been a provider of specialized information since the introduction of the IBM 1401 in 1961. At that time, the newly born company prepared an indexed data base of chemical patents. IFI sold magnetic tape copies of this data base to chemical and petroleum companies. In 1973, as a provider to the DIALOG system, IFI distributed the largest on-line patent data base. In 1980, the son of IFI's general manager was graduating from college with a degree in engineering. Tired of dressing up for on-campus interviews, he remarked to his father the need for an on-line data base that would help recruiters better identify those students who fit their needs. Intrigued by the idea, IFI management discovered that the College Placement Council had once prepared files of indexed resumes of college seniors and alumni. Funding for the service had been halted in 1971, a recession year. Despite resistance from placement officers, who felt threatened by the idea of computerized recruiting, IFI launched CPR in mid-1981. CPR was set up as a separate subsidiary.

Through calls to some responsive college placement offices and ads in college newspapers, 82 student resumes were received the first year. CPR had planned to wait to index resumes of experienced personnel until 1983. With the severe recession in 1982, high demand influenced the firm to start this service early. CPR now has approximately 10000 student resumes and 4000 experienced employee resumes. Firms can search the files by occupation preference, geographical preference, educational background, and skills. Between five and six hundred companies search the data bases each month, pulling off approximately 1200 resumes. Peak seasons are April to July and October to December.

The other interviewed information providers could not boast such a unique reason for starting an electronic business. For the other organizations, however, the entry into the electronic market place was much more significant. IFI was the only company already in the electronic on-line business. For the other information providers, the electronic pipeline was a new channel of distribution. And it was for the purpose of exploring a new channel of distribution that several of the information providers entered the electronic arena.

For Grolier's Publishing Company, which began distributing its Academic American encyclopedia electronically in late 1981, electronic distribution provides the opportunity to offer more comprehensive and more current information to its readership. Political events, for example the 1982 Falkland Islands crisis, are described in detail in the printed version of the encyclopedia the year of the event. In following years, space constraints require that the no longer 'current' event receive only brief mention. In the electronic edition, articles are never removed, only added. Also, while the print edition is updated once a year, the electronic edition is updated every six months. And the electronic edition, unlike the print edition, never becomes out of date.

The Official Airline Guides, a subsidiary of Dun & Bradstreet which has published air flight information for over fifty years, also found electronic distribution a way to better serve customers. It takes thirty-eight days for the Official Airline Guides (OAG) to prepare and publish its printed air schedule. With 100,000 schedule changes and 1 million fare changes each month, the printed version is always out of date. Because of the large number of fare changes, OAG actually stopped including fare information in its printed materials several years ago. Now, OAG advertises its electronic edition, available since May 1983, as a fare-based system which can help customers save twenty to thirty percent on air travel costs. On the electronic system schedules are

updated within one week; fares are updated overnight. The system is easy-to-use and more accurate than the printed version. Ms. Carol Lehrman, an OAG marketing manager, described the electronic edition as a natural transition for the company. She said that OAG had no choice but to offer an electronic edition. If OAG did not, someone else would. TWA has already announced a competing service.

Electronic distribution has also allowed Comp-U-Card International to expand its service offering. Since 1972 Comp-U-Card has been in the business of taking orders for appliances and other goods over its 800 number. When Comp-U-Card (CUC) subscribers call to place an order, they know they will receive the cheapest available item from CUC's nationwide network of vendors. CUC does not itself own inventory; the firm simply acts to bring buyers and sellers together. Because wholesalers, retailers, and distributors have little overhead costs selling through CUC, subscribers are often able to receive up to a forty per cent discount on name brand appliances, home entertainment equipment, luggage, cameras, watches, personal computers, and housewares. Subscribers to CUC's phone service heave to know exactly what item by what manufacturer they want before calling. Subscribers to CUC's on-line shopping service, available since 1979, can browse. The on-line system allows users to investigate the available products and prices in the category of goods, i.e. television sets, that they're looking for.

Grolier's, OAG, and CUC have all found that the
electronic channel provides the opportunity to serve customers
better. For several of the information providers, including
OAG, the electronic medium not only allows better service for
existing clientele but also the opportunity to attract
clientele not normally attracted to the firms' traditional
services. Subscribers to the print version of OAG pay
$144/year to receive monthly schedules. Eighty percent of the
subscribers are businesses whose employees fly regularly.
Persons who do not fly regularly do not find the guide
worthwhile. Consumers, who fly only for vacations, almost
never buy the printed product. But with the electronic
edition, users need pay only when they access the system.
Therefore, people not willing to pay $144 to get help
scheduling three flights a year can now pay only for the fare
information they do use.

The ability to capture infrequent-usage customers makes
electronic distribution appealing to Value Line, Inc. also.
Value Line is in the business of publishing stock and
financial information about S&P 500 companies. The
information is used primarily by investors, both professional
and casual. Many of the subscribers are retirees. A
subscription to the Value Line survey costs $365 per year.
Electronic access allows users to pay by hit, only for the
information actually used.

Talking to the information providers about the possibilities electronic distribution provides for expanding their services and clientele, I wondered whether the information providers expected the new medium to replace their traditional products. So far, electronic distribution has only expanded OAG's customer base. However, Ms. Lehrman does expect attrition in demand for the printed product as electronic information services gain popularity. Value Line expects the opposite to occur. Value Line's electronic products data service manager Mr. Bob Sterenson expects that the electronic edition will promote the printed edition. People learning about the Value Line product through electronic use will be tempted to buy the more complete print version. Because of screen size constraints, the amount of information per company on the electronic edition is much more limited. At Grolier's, both the printed and electronic editions are expected to stand on their own.

CUC's electronic marketing manager Mr. Jeff Hall observed that users of the CUC on-line version have very different demographics than users of the phone service. Consistent with the demographics of personal computer owners, the on-line users earn incomes between $30000 and $40000, are predominantly male, and hold managerial or technical positions. Phone users, on the other hand, earn median incomes between $20000 and $30000. Because there are still many more phone owners (or lessees) than personal computer

owners (or lessees), CUC's first major ad campaign, scheduled for this year, will focus on the phone service, not the on-line service.

CUC's advertising plans point out the experimental nature of electronic distribution for all the information providers. Mr. Sterenson explicitly stated that the on-line service is experimental for Value Line. Grolier's Mr. Ted Mendelsohn predicts that in 1984 many information providers, including Grolier's, will start to earn profits. This comment emphasizes that, thus far, very few if any information providers have made money. CUC's entire business turned a profit for the first time in late 1983(Arlen :February, 1984). CUC measures success in the electronic market by the number of subscribers. Mr Hall exclaimed that it is unrealistic at this point for anyone to consider profits a primary goal. None of the information providers, or anyone, is quite sure exactly what potential the electronic medium will have, nor the effect upon current distribution channels.

Because profit potential is so unpredictable for information providers, it would seem that firms might be risking substantial financial investment to participate in the electronic arena. Several of the firms did. Prior to setting up its electronic business, CUC maintained its product and vendor information manually. Operators on the 800# lines read the pricing and product characteristics from catalogs. In

1979, CUC automated its data base and designed a software interface for the 800# operators and future on-line users to access the information. OAG spent several years developing the software interface to make its already computerized data base interactive. OAG also redesigned its system to allow indexing by fare.

For the other firms, however, the investment was not significant. Value Line's data base had been computerized since 1971, at which time the information was computerized to make it easier to produce the galleys for the print edition. Value Line has sold magnetic tapes and allowed access via timesharing since 1973. It was CompuServe's idea to develop an easy-to-use interactive Value Line system. Few Value Line resources were required. Mr. Sterenson indicated that Value Line thinks of the on-line services as a by-product. If they were not a by-product, he does not think it would be possible to earn much profit.

Grolier's introduction into the electronic arena resulted from its purchase of the Academic American from Dutch publisher VNU. VNU, through an American subsidiary, had created the Academic American to fill the market gap it perceived between readers of the relatively simple World Book and the relatively complex Encyclopedia Britannica. The American subsidiary decided to build the encyclopedia electronically. The cost of the electronic editing and

production process was so expensive that VNU was unable to make money selling the printed product. Exploring the possibility of electronic distribution, VNU promoted a videodisc version of the encyclopedia and also distributed an on-line version through QUBE, an on-line cable service. Unable to rescue its investment, VNU sold the encyclopedia to Grolier's. Grolier's purchased the Academic American because it fit perfectly between its lower end product the New Book of Knowledge and its upper end product the Americana. Realizing that the electronic form of the books could be an asset, Grolier's too explored electronic distribution. Mr. Mendelsohn stated that at this time Grolier's does not plan to convert its other encyclopedias into electronic format unless it would be useful for enhancing the printed side of the business. Like Mr. Sterenson, he looks at the electronic distribution as an option made possible by the prior existence of the electronic data base.

CPR's Mr. Harry Allcock related that IFI did not consider the introduction of CPR expensive. IFI's primary costs are data input and service bureau fees (IFI does not own its own computer facilities). Because service bureau fees have been reduced so radically in the last few years, the firm was able to launch CPR with little expense. Because any expenses were funded internally, the firm considered the venture fairly risk-free.

Of the five information providers, then, three consider the investment in electronic distribution minimal. Two of the firms, Grolier's and Value Line, implied that their decisions to enter the on-line services market were dependent on the investment required being minimal. Relative to the investment that might be required for other firms to enter the electronic arena, I wonder if the costs for OAG and CUC might be considered somewhat minimal as well. Although OAG's investment in developing a user interface was substantial, the data base itself was already in place. CUC indeed invested significantly to automate its system. I speculate, however, that automation improved its telephone operation and was perhaps necessary for the firm to continue on its path of rapid expansion. Although I have no evidence that explains why certain firms have not entered the electronic arena, it appears that those entering the market have many of the required elements in place already in order to support their traditional businesses.

Management of Electronic Distribution Activities

The primary resources that the interviewed firms did need to acquire to compete in the electronic market were human resources. Even for the firms with electronic data bases ready to be distributed, people were needed to market through the new channel of distribution. As Mr. Mendelsohn said,

converting to the electronic format is alone not enough to make money. The new medium must be treated as a new marketing tool.

It was striking that rather than market the electronic business through their existing marketing organizations, each firm added a new marketing organization to promote the new segment. Grolier's created a new division, hiring four new people. Three of these people were from VNU; the fourth, Mr. Mendelsohn, had experience with the New York Times Information Services. Mr. Mendelsohn was familiar with the Academic American because of a New York Times agreement with VNU to promote the encyclopedia. Value Line hired Mr. Sterenson as Manager for Electronic Publishing Data Services. Mr. Sterenson had previous experience with Forbes Magazine's electronic publishing efforts. Several programmers were hired as well. At OAG, 12 people, including Ms. Lehrman, are involved with the electronic system from a marketing standpoint. One hundred programmers are involved in testing and telecommunications. One of CUC's four senior vice presidents has responsibility for the electronic business. Mr. Hall, Director of Marketing, reports to this senior vice president.

The organizations set up by firms to support electronic distribution are not only involved with on-line services but with other electronic products too. Grolier's Electronic

Division is experimenting with personal computers and videodiscs. Mr. Mendelsohn believes that it will be some combination of on-line services, personal computers, and videodiscs that will prove popular. At Value Line, a sister division to Mr. Sterenson's has developed a personal computer software product that allows investors to manipulate information about a subset of the Value Line companies. Subscribers to the software edition receive updated discs. CUC is beginning to market a product called video Comp-U-Store. Through a kiosk incorporating a terminal, a video disc, and a hook-up to CUC's ordering system, customers at stores and shopping malls will be able to view products on the screen before placing orders. The experimental version of this system featured J.P. Stevens' full product line. Set up in the bed and bath department of several department stores, customers were able to see all of Stevens' products, not only those the store was able to stock. Commissions were shared between Stevens and the stores.

Before concluding this section, I want to discuss the one non-profit organization interviewed. President Jean Pierce described to me the Midwest Education Research Association's SIG forum on CompuServe. The purpose of the research organization is to share information among midwestern researchers studying the process of education, for example learning cognition. The organization's primary activity is publication of a journal containing researchers' articles.

The journal comes out three times a year; it often takes researchers a full year to get feedback on their articles. Professor Pierce set up the electronic forum last October to allow researchers to make their articles available much more quickly. Researchers can type their articles into the forum's data bases; other researchers can reply via electronic mail. Professor Pierce also plans to use the forum for electronic conferences, a substitute for the current telephone or in-person meetings. This spring, Professor Pierce hopes to enlist the support and participation of the American Education Research Association, a national group. Eventually, Professor Pierce would like to see the electronic journal replace the printed one.

It cost nothing except personal time for Professor Pierce to set up the forum. CompuServe provided free of charge all the computer time needed to load the necessary information into CompuServe's pre-formatted forum data bases. All the disc space is free of charge. The only fees are CompuServe's standard connect time access charge for users of the system At $6 per hour during evenings, Professor Pierce believes that the system is a cheap solution for improving communications. The research association even gets a five percent rebate of the access charge. For CompuServe, the forum is a way to increase membership.

CONCLUSIONS

The organizations described in this section perceive the application of information technology as an opportunity to expand their current businesses by offering enhanced services and/or attracting a new customer segment. Even the non-profit organization, the Midwest Education Research Association, sees the electronic medium as a way to increase the organization's functionality.

In this chapter's introduction, the profiled firms were referred to as technology leaders. They have adopted electronic on-line distribution before many other organizations. Furthermore, these same organizations are experimenting with other electronic distribution technology as well. Although none of the organizations believe that the electronic medium will imminently replace their traditional products, OAG's Ms. Lehrman believes that it would be a matter of survival five years from now if her firm was not involved in the electronic medium. Grolier's Mr. Mendelsohn commented that by "being in step with technology, you don't feel like technology will leave you behind." He added that by being actively involved in the on-line industry, it is much easier to keep up with all the developments.

Regarding these organizations as technology leaders, it was interesting to note that several firms would not have

explored the new technology if the required investment had been greater. The firms faced minimal investments because electronic data bases were already used to support their existing businesses. For a company, especially a small company, that does not already have its information in electronic format, entrance into the electronic arena might require raising additional capital. Raising outside capital may not be particularly easy considering the unknown potential of electronic information services. More firms might choose technology leadership in this industry and others if the required capital expenditures and costs of financing were less significant for them. Notably, despite the British bar room chatter mentioned in this chapter's introduction, most Prestel information providers are large firms, not individual entrepreneurs (Martin : 1982).

This chapter did not address the competitive environment of information providers. At this time, it is unknown which potential applications will prove popular. For applications that do prove popular, the success of particular information providers in these application areas will depend upon their abilities to serve successful systems. An information provider will not have to worry about competing to serve systems if it is the only information provider with access to certain information. For information providers that do not have exclusive access to information, I am unsure what actions will best enable them to penetrate systems. OAG is hoping

that its actions to be the first on-line air schedule service will discourage competition. In other words, OAG believes that there is an advantage to being first. Mr. Mendelsohn's comments about keeping abreast of technology perhaps implicitly suggest that timing is important. If timing is important, then those firms that do not choose to be technology leaders may find it difficult to make up for lost time.

Lastly, the interviewed firms are marketing this new technology through a distinct arm of their organizations. Several have brought in outside expertise. As the firms' experiences with information technology grows, it will be interesting to observe how this new segment interacts with the previously existing segments and/or how the segments become more or less separate.

CONCLUSIONS

In the introduction to this thesis, I said that I hoped to gain some insight about the the electronic information services industry. This industry is interesting to me because it has caught the attention of many firms although few firms have yet to turn a profit. Following an introductory chapter, I explored opportunities for system operators and information providers in this industry.

System Operators

I found that the environment for system operators of generalized information services systems will become increasingly competitive. As computer management skills, graphics capability, communications capability, and a larger computer-literate market place become more accessible to all system operators, the only way that system operators will be able to differentiate their systems is through the specific information services, or end-user applications, provided. In an environment in which information providers are unwilling to distribute their products through one system exclusively, it is difficult for system operators to differentiate their systems unless they have control, or ownership, of information sources. Alternatively, a system operator could muster competitive advantage through control over the electronic network serving particular communities (similar to the way a

mall has competitive advantage by obtaining premium locations). While it is legally impossible for a system operator to have exclusive control over the telephone system, cable network operators could potentially operate the only cable network information services system in an area.

I would like to make clear that my comments are less applicable for operators of specialized electronic data base systems. By virtue of the specialized nature of the information services, the operator has differentiated the system. Of course, the specialized operator will compete with any other specialized operators that decide to go after similar information services,

Information Providers

For information providers, electronic information services provide a new channel of distribution. This new channel allows these services to target new customers as well as to better serve existing customers. For example, through electronic distribution publishers of large printed volumes can easily sell small subsets of information to persons unwilling to buy entire volumes.

The popularity of the different information services applications remains to be seen. The recent rapid growth of personal computer ownership as well as the introduction of the

more mass-market oriented services are making electronic information services available to large numbers of people in the United States for the first time. If an application area proves to be successful, a particular information provider in that area will be successful depending upon its abilty to have exclusive access to information and its ability to penetrate successful systems. At this time, information services are in such demand by system operators that penetration is not an issue. Penetration could be an issue for information providers wishing to distribute information on systems owned by competing information providers.

The market for information providers' services reminds me of the market for personal computer software. In the personal computer software market, companies of large and small scale are designing application programs. Some of these application programs 'make it big;' others suffer obscurity. I think that the same thing will happen with information providers. Also, just as personal computer hardware vendors compete to get popular software vendors to write programs for their machines, system operators pursue potentially popular information services. Both the hardware vendor and the system operator know that it is the end-user application which makes their products successful.

At this point, I would like to step back and look at the electronic information services industry in light of the model based on the work of Leavit and Chandler described in the introduction.

First, I would like to more carefully examine the relationship between technology and strategy. In chapter 3, I explored the reasons why the interviewed information providers decided to enter the electronic arena. The objective of these firms, as stated above, was to exploit a new channel of distribution. But while there are large numbers of firms currently trying to exploit this channel, there are many more firms that could potentially do so. Trying to discover why the interviewed firms had made the decision to go ahead with the new technology, I came accross two themes:

1) The information provider's existing business would be seriously threatened if electronic distribution proves popular, e.g. OAG.

2) The costs of exploring electronic distribution are relatively small, e.g. Value Line and Grolier's.

My research did not explore why particular firms decided to operate systems. I would like to speculate that the reasons are similar. Newspaper stores and adviertising are considered potentially significant applications of videotex. If these applications prove successful, newspapers will be threatened. Newspaper companies are aggressively pursuing

videotex. Before entering the electronic information services business, both Lockheed and CompuServe had experience with computer systems. In fact, until this year, CompuServe did not have to purchase any additional computers to handle its information utility business. For both CompuServe and Lockheed, I would guess that the costs of entering the electronic information services market were minimal.

In congruence with the Leavit-Chandler model, it appears that firms' decisions to pursue new technology depend upon their current strategies and business operations. More specifically, a firm appears to more aggressively pursue new technology if this technology threatens the firm's current strategy of if the firm's current business position makes it inexpensive to pursue the new technology.

In chapter 3, I also discussed how firms integrated their electronic distribution activities into their existing businesses. In terms of the model, this issue surrounds the relationships between technology, strategy, organization, and management processes. Notably, most of the interviewed information providers established a new group to market electronic products rather than bring additional personnel with electronic expertise into their existing marketing organizations. In the system operator arena, both Lockheed and Knight-Ridder set up new subsidiaries to handle their electronic information services.

As mentioned in the conclusions to chapter 3, I am curious to see how these separate organizational structures evolve, especially if the new technology becomes a growing part of their firms' businesses. If the electronic business continues to be held separate from existing business, it is possible that two different corporate cultures could evolve within the same company. I think it would be interesting to study how firms in other industries integrate new technology ventures into their organizations.

An organizational issue which my research did not address is that of 'technology champions.' In his paper "Champions for Radical New Inventions," Donald Schon wrote about how a firm's decision to pursue new technology often results fromthe efforts of a strong-willed individual who is behind the technology. It would have been interesting to discover whether such a technology champion existed within the interviewed companies.

My final reference to the Leavit-Chandler model addresses the relationship between the organization and its environment. Organizations introducing electronic information services into the market place face an uncertain environment. Although there has been market research and market testing of electronic services, the potential for these services is really unclear. I have heard critics describe videotex as a solution without a problem. Firms that introduce electronic

services, or any new technology, into an unproven market place, take the risk that this technology will not be accepted. However, as stated by Mr. Mendelsohn from Grolier's, firms that do not take this risk instead take the risk of being left behind by technology.

In a 1976 study, Cooper and Schendel studied a series of once successful firms that suffered losses in profitability following the industry introduction of a new technology. The study showed that these firms lost out because of their determination to hold onto the old technology rather than shift to the new.

Based on this study and others, current philosophy seems to encourage firms to leap on to new technology as soon as possible. Some of the interviewed information providers' comments suggest that being first in that market may be competitively advantageous. However, by being first to produce a particular application, the information provider risks that the application will prove unpopular. Thus, while a follower strategy may not be successful, the technology leader is not guaranteed successs. This is an anomoly that I suspect applies to other technologies as well. Furthermore, my findings indicate that firms pursuing opportunities as system operators are going to face a competitive environment. While I do not at all mean to discourage companies from looking towards new technologies, it is interesting to note

that the technology bandwagon does not necessarity imply high profitability.

At this point, the end of my thesis, I would like to be able to eloquently predict the future of mass market electronic information services. Unfortunately, I can not. Like other industry analysts, I am waiting for the results of the first few commercial United States videotex systems. While I do not believe that these first systems, with their limited capabilities, will entirely prove or disprove future potential, they "will begin unlocking answers to many of the nagging questions perplexing thousands of ....companies ...curious about the commercial potential of the technology involved (Brenner :1983)."

Exhibit 1

CompuServe
Information Service
Subject Index

The CompuServe Information Service subject index is updated constantly. For the latest list of subjects and services, access main menu, CompuServe User Information, or GO IND.

This subject index is current as of October 1, 1983.

(GO IND-54 for quick access to page numbers in this index.)

AAMSI Medical Forum	GO SFP-6
AKO calculations	GO PCS-72
AMEX prices (MQUOTE)	GO FIN-20
AS/WD SIG	GO SFP-7
ASI Monitor	GO ASI-10
AirSIG	GO SFP-4
Academic American Ency.	GO AAE
Access	GO PCS-45
Access phone numbers	GO CIS-177
Adult education	GO TCR-13
Adventure game	GO GAM-11
Advertisers, TODAY	GO EBB
Advertising	
For sale	GO HOM-24
Services	GO HOM-24
TODAY Magazine	GO EBB
Want ads	GO HOM-24
Advertising, classified, St. Louis Post-Dispatch	GO SPD-1002
Advice	
A.I. Network	GO NET
African weather	GO CNS-17
Agribusiness	GO SFP-10
Agricultural news	GO CNS-14
Air travel	
Firenze Travel Club	GO TVL
Official Airline Guide	GO OAG
Pan Am	GO PAN
Travel Fax	GO ESC
Air travel delays	GO POG
Aircraft	GO ASI
Airline guide	GO OAG
Airport delay guide	GO POG
Alternative Education	GO AES
Aircraft reports	GO ALT
Amateur Radio	GO HCM-11
Analogies test	GO TMC-15
Annual reports	GO FIN-10
Apple programs for	GO PCS-45
Apple User's Group	GO PCS-51
Appliances for sale	GO CUS
Arcade (SIG)	GO HCM-118
Art Gallery	GO HOM-121
Articles, computer	GO PER
Aspen weather	GO CNS-17
Assoc. Press Access	GO IND-12
Associated Press Wire	GO APV
Astrology game	GO GAM-45
Astronautics	GO HCM-127
Atari Forum	GO PCS-132
Athletics, Gumtree	GO GAM-45
Athletic equipment	GO CUS, HAN
Area shopping service	GO THV
Attorneys	GO SFP-40
Author's (SIG)	GO PCS-117
Auto information	
General calculations	GO GPO-6
Investors diversified	GO IDS
Product science	GO MSC
Aircraft	GO ATO
Autos, buying	
Autonet	GO ATO
St. Louis Post-Dispatch	GO SPD-1002
Aviation	
ASI Monitor	GO ASI-10
Flight Planning	GO FLM
NWS Aviation Weather	GO AWX
Official Airline Guide	GO OAG
Pilots' information	GO POG
Aviation Rules & Reg	GO ATR
Aviation history, misc.	GO ASI
Aviation (SIG)	GO SFP-4
Aviation weather	GO AWX
Benchmark Data Services	GO VIN
Banking, electronic	GO HOM-45
Banking	
Huntington National Bank	GO HNB
Shearson/American Express	GO SHW
Investor information	GO MSC
Benefits, group	GO GAM-30
Basic CompuServe	GO PCS-73
Beef prices	GO CNS-12
Bermuda Soft Association	GO BFL
Bermuda's golf (SIG)	GO HCM-129
Billing, general	GO CIS-6

Billing, renewing	GO CIS-176
Biorhythms	GO GAM-26
Blackjack game	GO GAM-3
Bit language	GO PCS-74
Book reviews	
AAMSI medical journals	GO AAM
Hollywood Hotline	GO HHL
Paperback best sellers	GO WIT
Books, ordering	
Fine American Ency	GO FTH
Paperback best sellers	GO SAM
Boston Shearson Bank	GO SHW
Bridge game	GO GAM-18
Brokerage	GO UMC, TKR
Brokerage, diamond	GO RDC
Budgeting, home	GO HOM-80
CompuServe	GO HOM-80
Graph publication	GO GPO-4
Bulletin Board	GO HOM-23
Business, farming	GO SFP-10
Business Information Wire	GO BIW
Business news:	
AP Videotext Wire	GO APV
Business Wire	GO TBW
Canadian U.S. Int'l	GO BIW
CompuServe	GO FIN-10
St. Louis Post-Dispatch	GO SPD-1005
Washington Post	GO TAP-2
CB Interest Group	GO HOM-6
CB Radio simulation:	
CB Etiquette	GO CB-40
Direct access to	GO CB-1
Instructions	GO CB-15
Introduction	GO CB-10
CB Society	GO CUP
CEMSIG	GO CEM-450
CP M Users group	GO PCS-47
Cameras for sale	GO CUS
Canadian	
Business news	GO BIW
Currency exchange	GO FIN-14
Stocks	GO FIN-4
Camping, home	GO GPO-11
Car care	GO PSC
Career planning	GO AES
Cars, comparison	GO ATO
Cattle prices	GO CNS-12
Changing password	GO CIS-175
Changing terminal type	GO CIS-9
Charges, monthly	GO CIS-175
Checking, banking	GO HOM-45
Child care	GO GPC-8
Children education	GO AAE
Children's games	GO TMC-27
Cinema news	GO HHL
Clarke School for Deaf	GO CSD
Classified Ads	
St. Louis Post-Dispatch	GO SPD-1002
Clinical advice	GO HSX
Clothing, fashion	GO GAN
Clothing, sport	GO HAN
Cocoa news	GO CNS-15
Coffee news	GO CNS-15
College cost program	GO TCB-6
Color computer (SIG)	GO PCS-126
Color graphics	GO LIS-61
Columbus area:	
Banks	GO HOM-45
Chamber of Commerce	GO CCC
Encyclopedia	GO CCC
SIG	GO CCC-150
Command level	GO PCS-71
Commentaries:	
Video	GO VIF
Commodities calendar	GO HCM-7
Commodities future	GO CNS-12
Commodities glossary	GO HCI-230
Commodity News Service:	
Agricultural news	GO CNS-14
Commodity prices	GO CNS-12
Economic news	GO CNS
Futures industry news	GO FIN-13
Futures market prices	GO CNS-12
World news	GO CNS-15
Weather	GO CNS-17
Commodore news etc	GO CBM
Commodore VIC (SIG)	GO PCS-116

Comm Industry Forum	GO SFP-35
CompuServe commands	GO CIS-11
CompuU Store	GO CUS
Computer aided learning	
CompuServe	GO PCS-121
Edutech	GO CAI
Computer Art (SIG)	GO PCS-157
Computer books	GO SAM
Computer club news	
Computers & electronics	GO CEM
Computer Magazine Index	GO PER
Computers & Electronics	GO CEM
Concentration game	GO GAM-32
Consumer items for sale	GO CUS
Consumer news:	
Software	GO PSP-101
Continuing education	GO TCB-13
Cooking (SIG)	GO HOM-109
Corporate news release	GO TBW
Corporations	GO INC
Copper futures prices	GO CNS-12
Copper news	GO CNS-15
Corn futures prices	GO CNS-12
Cotton news	GO CNS-14
Court cases, aircraft	GO AVL
Cross Assemblers	GO PCS-75
Currant rates	GO CIS-53
Database how to use	GO CIS-11
Database searches	GO IFT
dataFamilies	GO PFL
Decwars game	GO GAM-18
DEFALTs setting	GO CIS-6
Department of State	GO DOS
Diamond System	GO RDC
Discounted goods	GO SAV
Disk sale	GO PCS-71
Document delivery	GO IOD
Document retrieval	GO IFT
Documentation ordering	GO CIS-8
Dress	GO GAN
Drugs, medicine	GO GPO-399
EMI Flight Plans	GO EMI
Earnings forecasts	GO FIN-4
Economic news	GO FIN-10
Economy:	
Forecasts	GO MMS
Editorials	
Washington Post	GO TWP-17
Education:	
Academic Encyclopedia	GO AAE
Clarke School for Deaf	GO CSD
Edutech (R.off)	GO CAI
The College Board	GO TCB
The Multiple Choice	GO TMC
Education, family	GO PFL
Educational games:	
Super Brain Challenge	GO TMC-19
Why Worlds	GO TMC-18
Educators (SIG)	GO HOM-137
Edutech (R.off)	GO CAI
Electronic banking	GO HOM-45
Electronic Bounce Back	GO EBB
Electronic Heath Catalog	GO HTH
Electronic mail	GO EMA
Electronic shopping	GO CUS
EMAIL program	GO EMA
EMAIL	GO EMA
Emergencies, auto	GO HOM-1081
Employee benefits	GO IDS-242
Encyclopedia	GO AAE
Energy conservation:	
General information	GO GPO-9
Product Science	GO MSC
Energy news	GO CNS-15
Entertainment:	
AP Videotext Wire	GO APV
Music, Code solution	GO GAM
Hollywood Hotline	GO HHL
Entertainment (SIG)	GO HOM-29
Environmental Forum	GO SFP-38
Equipment, mining	GO MIN-100
European weather	GO CNS-17
Executive terminal	GO PCS-103
Expert, music	GO MUS
FAA reports	GO ASI-12
FAA rule changes	GO AVR
FOI News line	GO FOI
Facts, general	GO AAE

Family budget	GO IDS-6
Family life	GO PFL
Family Matters Forum	GO HOM-144
Fantasy game	GO GAM-16
Farming	GO CNS-14, SFP-10, VIC
Fashions	GO GAN
Federal gov't news:	
Washington Post	GO TWP
Federal publications	GO GPO
Fedwatch newsletter	GO MMS
Feedback, CompuServe	GO CIS-8
Fifth Avenue Shopper	GO FTH
FILCE instructions	GO PCS-121
Finance	GO FIN
Financial advice	GO TWP-12
Financial aid, college	GO TCB-14
Financial forecasts	GO FIN-4
Financial information	GO FIN-20
Financial insurance	GO IDS-5
Financial news (AP)	GO IND-52
Financial planning	GO IDS-581
Financial services	GO FIN-20
Fire Fighters (SIG)	GO SFP-36
Fire prevention	GO SFP-10
Firecracks, firewood	GO GPO-9
Firstworld Travel Club	GO TVL
Fitness	GO GPO-5
Flight operations	GO ASI-11
Flight plans	GO EMI
Flowers & Perfume, order	GO FTH
Focal	GO PCS-76
Food & Drug Admin.	GO FOI
Food Buying (SIG)	GO HOM-151
Food information:	
FOI	GO FOI
Food storage	GO GPO-7
For fitness	GO GPO-5
Freezing	GO GPO-7
Meats	GO VIC, GPO
Football game	GO GAM-27
For Sale	
Bulletin Board	GO HOM-30
Clothing, sport	GO HAN
Consumer goods	GO CUS
Foreign Exchange:	
Analysis	GO MMS
Fortran (XF4)	GO PCS-80
Funds Management	GO UMC
Fur Trader game	GO GAM-36
Futures industry news	GO FIN-13
Futures prices	GO CNS-12
Games, computer:	
Adventure	GO GAM-11
Astrology	GO GAM-45
Backgammon	GO GAM-31
Banshi	GO GAM-30
Biorhythms	GO GAM-29
Blackjack	GO GAM-13
Bridge	GO GAM-18
Chess	GO GAM-34
Civil War	GO GAM-14
Concentration	GO GAM-32
Decwars	GO GAM-19
Dice	GO GAM-33
Enigma	GO GAM-15
Fantasy	GO GAM-16
Fax racing	GO GAM-17
Football	GO GAM-27
Fur Trader	GO GAM-36
Golf	GO GAM-21
Gomoku	GO GAM-22
Hammurabi	GO GAM-37
Hangman	GO GAM-23
Kesmai	GO GAM-46
Lunar Lander	GO GAM-24
Magic Code solution	GO GAM-15
Maze	GO GAM-38
Megawars	GO GAM-20
Megawars II	GO GAM-55
Mugwump	GO GAM-39
New Adventure	GO GAM-12
Real Time Star Trek	GO GAM-41
Reverse	GO GAM-40
Roulette	GO GAM-42
Schick Adams	GO GAM-36
Shambles	GO GAM-43
Space War	GO GAM-25
Star Trek	GO GAM-26

Trivia test	GO TMC
Wumpus	GO GAM-44
Games Scorpio (SIG)	GO GAM-310
GenesIG Archives	GO GSA
Gandolf's Reports	GO GAN
Gardening	GO VIC
Gasoline, saving	GO GPO-1131
General banking	GO HOM-45
Gold	
Future prices	GO FIN-4, CNS-12
News	GO FIN-4, CNS-15
Golf, Belmont Golf Assn	GO BEL
Golf, Official PGA Tour:	
Biographies	GO PGA
Players	GO PGA
Statistics	GO PGA
Golf (SIG)	GO HOM-129
Gomoku game	GO GAM-22
Good Earth (SIG)	GO HOM-145
Grain prices	GO HCI-10
Grains futures	GO CNS-12
Grolier's Encyclopedia	GO AAE
Ground water	GO WWA
Hammurabi game	GO GAM-37
HamNet (SIG)	GO HOM-11
Handicapped, deaf	GO CSD
Health and fitness	GO GPO-5
Heath Users Group	GO PCS-48
Healthkit Catalog	GO HTH
Heinold Commodities	GO HCI
Help	GO CIS-162
Help (documentation)	GO CIS-8
Hi-Tech Forum	GO CCC-150
High tech news	GO ALT
Hollywood Hotline	GO HHL
Home banking	GO HOM-45
Home finance	GO HOM-80
Home management programs:	
Auto re a loan	GO HOM-17
Calculate a raise	GO HOM-15
Checkbook balancer	GO HOM-14
Net worth	GO HOM-18
Home services	GO HOM
Horticulture	GO SFP-10, VIC
House plants	GO VIC
Howard Sams Books	GO SAM
Human Sexuality	GO HSX
Humor, satire	GO KCS
Huntington bank	GO HNB
Husbandry	GO SFP-10
IBM-PC (SIG)	GO PCS-131
IDS	GO IDS
IRA	GO IDS-547
Immigration	GO PAN, ESC
Incorporating Guide	GO INC
Index:	
AAMSI Journals	GO AAM
CompuServe	GO IND
Computer Periodical	GO PER
Stock Market	GO FIN-4
Industries, farming	GO SFP-10
Information, music	GO MUS
Information on Demand	GO IOD
Information Retrieval Ser	GO IFT
Insurance:	
Dental	GO IDS-263
Disability	GO IDS-277
Employee Benefits	GO IDS-257
Health	GO IDS-269
Life	GO IDS-587, 192, 260
Miscellaneous	GO IDS-286
Insurance, aircraft	GO AVL
Intelligence test	GO TMC-28
Interest rate	GO MMS
Investment news	GO FIN-10
Investments:	
Diamond	GO RDC
MicroQuote	GO FIN-20
Quick Quote	GO FIN-20
Tickerscreen	GO TKR
Investors Diversified	GO IDS
Job, in the home	GO HOM-146
Jobs:	
St. Louis Post-Dispatch	GO SPD-1002
Jumbled words test	GO TMC-43
Kesmai	GO GAM-46
Kitbuilding	GO HTH
LSI (SIG)	GO PCS-48

CompuServe

Languages on CompuServe:

Basic	GO PCS-74
FORTRAN	GO PCS-75
Fortran	GO PCS-80
Macro	GO PCS-76
Pascal	GO PCS-77
Snobol	GO PCS-79

Legal:

Forum	GO SFP-40
Incorporating Services	GO INC
Library, electronic	GO AAE
Lineprinter art	GO HOM-101
Liquid Green	GO UMC
Literary (SIG)	GO PCS-112
Livestock futures	GO CNS-12
Livestock prices	GO HCI-10
MMS Financial Analysts	GO MMS
MNET-11 (SIG)	GO PCS-53
Macro	GO PCS-76
Macroeconomics	GO MMS
Magazine advertisers	GO EBB
Magic Cube solution	GO GAM-35
Mainstreaming	GO CSD
Maintenance equip	GO MIN-100
Manuals documentation	GO CIS-8
Manufacturer's newsletters:	
Commodore	GO CBM
RCA	GO RCA
Tandy	GO TRS
Maps, road travel	GO TRV
Marine weather	GO WEA
Market prices	GO FIN-20
Market research	GO IOD
Massachusetts, banking	GO SHW
Max Ule's Tickerscreen	GO TKR
Medical:	
AAMSI Forum	GO SFP-5
ASCMD Forum	GO SFP-7
FDI Newsline	GO FOI
Medical newsletter	GO AAM
Metals futures prices	GO CNS-12
Metals prices	GO HCI-10
Microcomputers:	
General	GO PCS-10
RCA	GO RCA
Tandy	GO TRS
MicroQuote	GO FIN-20
Microsoft (SIG)	GO PCS-145
Mine-Equip	GO MIN-100
Money market	GO UMC
Monthly charges	GO CIS-176
Mortgage budgeting	GO GPO-4
Movie reviews:	
CompuServe	GO NMM-1
Hollywood Hotline	GO HHL
Short Time Catalog	GO MOV
Multi-Player Game SIG	GO GAM-300
Multiple Choice, the	GO TMC
Music	GO MUS
Music Forum	GO MUS
Music Information Service	GO MUS
Musus-Pascal (SIG)	GO CSD
Mutual Funds	GO IDS-245, PCS 55
NASA	GO WIT
NIPSIG	GO HOM-112
NOAA weather	GO WEA, GO AWX
NTSB cases (aviation)	GO AVR
NWS aviation (weather)	GO AWX
NYSE prices (MQUOTE)	GO FIN-20
Names of users	GO HOM-4
National issues (SIG)	GO HOM-132
National Water Well Assn.	GO WWA
National Weather Service	GO AWX
Netwits	GO WIT
Netwits (SIG)	GO WIT-100
New issues (securities)	GO TKR-40
New product news:	
Popular Science	GO PSP
New services	GO NEW
News, CB	GO CUP
Newsletters:	
AAMSI Communications	GO AAM
Atariment	GO ALT
Commodore	GO CBM
RCA	GO RCA
Tandy	GO TRS
Newspapers	GO HOM-13
Node locations	GO CVP-46

North American weather	GO CNS-17
Notices (Bullet)	GO HOM-23
Nutritional analysis	GO GPO-401
OK eval	GO PCS-71
OTC prices (MQUOTE)	GO FIN-20
Office supplies	GO SAV
Official Airline Guide	GO OAG
Ohio, banking	GO HNB
Ohio Scientific (SIG)	GO PCS-125
Options stock	GO FIN-4
Orch-90 archives	GO ORC
Orch-90 music (SIG)	GO HOM-13
PGA Official Tour Guide	GO PGA
PLG (Panasonic SIG)	GO PCS-114
Pan Am	GO PAN
Panasonic (SIG)	GO PCS-114
Parenting & Family Life	GO PFL
Pascal (SIG)	GO PCS-55
Password changes	GO CIS-175
Peak Delay Guide	GO PDG
Pensions	GO INC
Periodical Guide	GO PER
Personal computing	GO PCS
Personal development	GO AES
Personal finance:	
Alternative education	GO AES
Government publications	GO GPO-4
Home Management	GO HOM-90
Investors Diversified	GO IDS-8
Personality profile	GO TMC-17
Pets	GO SFP-37
Pilot weather	GO AWX
Plants	GO VIC
Politics:	
AP Viewdata Wire	GO APV
Washington Post	GO TWP-15
Popular Science Magazine:	
Automotive News	GO PSC
New products	GO PSP
Science & Technology	GO PSE
Software reviews	GO PSP
Pork prices	GO CNS-12
Portfolio valuation	GO FIN-4
PowerSoft's XTRA-80	GO PCS-58
Precious metals	GO CNS-12
Precious metals news	GO CNS-15
Prescriptions	GO GPO-399
Prime interest Rates	GO HNB
Primetime Radio Classics	GO PRC
Professional:	
Agriculture database	GO IFT
Eng Technical database	GO IFT
Environmental database	GO IFT
Programmer's SIG	GO PCS-158
Programming area	GO PCS-71
Programming languages	GO PCS-72
Programs for sale	GO PCS-45
Programs from users	GO PCS-46
Programs, medical	GO AAM
Public access	GO PCS-46
Quick Quote	GO FIN-20
RCA Newsletter	GO CSD
RCA (SIG)	GO PCS-57
Radio:	
Amateur	GO HOM-11
Old radio shows	GO PRC
Radio Shack computers	GO TRS
Rainbow Reviews	GO WIT
Rates, CompuServe	GO CIS-53
Real estate, ads:	
St. Louis Post-Dispatch	GO SPD-1002
Recipes (SIG)	GO HOM-109
Recordkeeping, home	GO GPO-228
Reference guide	GO AAE
Referral Service, isa	GO SFP-40
Regulatory Affairs Prof	GO FOI
Reservations, airline:	
Firstworld Travel	GO TVL
Resource, water	GO WWA
Retirement	GO INC
Reviews, games	GO GSA
Reviews, software:	
Popular Science	GO PSP-121
SAT test information	GO TCB-15
SIGS	
AAMSI	GO SFP-5
ASCMD	GO SFP-7
AvSIG	GO SFP-6

Arcade	GO HOM-138
Ask Mr Fed	GO MMS-20
Atari	GO PCS-132
Authors	GO PCS-117
CBIG	GO HOM-9
CEMSIG	GO CEM-450
Commodore	GO PCS-160
Commodore Pet	GO PCS-116
Commodore 64	GO PCS-156
Commodore VIC 20	GO PCS-155
Communications	GO SFP-33
Computer Art	GO PCS-157
Class, underground	GO HOM-109
CEM Group	GO PCS-47
Educators	GO HOM-137
Entertainment	GO FIN-20
Environmental	GO SFP-38
Family Matters	GO HOM-144
Fisher	GO SFP-36
Food Buyline	GO HOM-151
Games, Scorpia	GO GAM-310
Golf	GO HOM-129
Good Earth	GO HOM-145
HamNet	GO HOM-11
HiTech	GO CCC-150
HUG (Health)	GO PCS-48
IBM PC	GO PCS-131
Legal	GO SFP-40
Literary	GO HOM-136
LSI Users	GO PCS-49
MAUG, Apple	GO PCS-51
Microsoft	GO PCS-145
MNET-11	GO PCS-53
MNET&C TRS-80	GO PCS-54
Multi-Player Games	GO GAM-300
Music	GO HOM-150
Musus-Pascal	GO PCS-55
Netwits	GO WIT-100
Orch-90	GO HOM-13
OSI	GO PCS-125
PowerSoft's XTRA-80	GO PCS-56
Programmers	GO PCS-158
PLG (Panasonic)	GO PCS-114
RCA Group	GO PCS-57
Scace	GO HOM-127
Sports	GO HOM-110
Telecomm	GO PCS-52
Travel	GO HOM-157
TRS-80 color	GO PCS-126
TRS-80 Model 100	GO PCS-154
Veterinarians	GO SFP-37
Work-at-Home	GO HOM-146
St. Louis Post-Dispatch	GO SPD
Same, Howard Books	GO SAM
Satire	GO KCS
Saving Accounts	GO HOM-45
Saving-Scan	GO SAV
Scott Adams games	GO GAM-28
Scramble game	GO GAM-43
Self-employment	GO SBR
Services for the Deaf	GO CSD
Sexuality	GO HSX
Shawmut, bank	GO SHW
Shop-at-home	GO HOM-40
Shopping:	
Cars	GO ATC
Fifth Avenue Shopper	GO FTH
Musical	GO MUS
Radio shows	GO PRC
Saving-Scan	GO SAV
Sho-Time Movie Catalog	GO MOV
Shuttle, space	GO HOM-127
Silly Billies	GO TMC-41
Silver futures prices	GO CNS-12
Silver news	GO CNS-15
Ski conditions	GO AEA
Small business reports	GO SBR
Smoking and health	GO GPO-398
Snobol	GO PCS-79
Soaps, television	GO HHL
SOFTEX	GO PCS-45
Software Authors SIG	GO PCS-117
Software Exchange	GO PCS-40
Software reviews:	
Popular Science	GO PSP-121
South America weather	GO CNS-17
Space (SIG)	GO HOM-127

Special Interest Groups:

Access to	GO HOM-50, PCS-50
Commercial	GO PCS-50
Descriptions of	GO HOM-50, PCS-50
General	GO HOM-50
Hardware related	GO PCS-50
Instructions	GO HOM-51, PCS-50
Software related	GO PCS-50
Sports news:	
Golf	GO PGA
St. Louis Post-Dispatch	GO SPD-1005
Sports quiz	GO TMC-42
Sports (SIG)	GO HOM-110
Spotlight, CBers	GO CUP
Standard & Poors	GO FIN-20
Star Trek game	GO GAM-26
State capital games	GO TMC-44
Stereos for sale	GO CUS
Stevens Business Reports	GO SBR
Stocks, bonds:	
MicroQuote	GO FIN-20
Quick Quote	GO FIN-20
Tickerscreen	GO TKR-10
TMC for kids	GO TMC-27
TRS-80 color (SIG)	GO PCS-126
TRS-80 computers	GO TRS
TRS-80, MNET80 (SIG)	GO PCS-54
TRS-80 Model 100 (SIG)	GO PCS-154
TRS-80, programs for	GO PCS-45
TV soap opera summaries	GO HHL
Tandy Corp news	GO TRS
Technical books	GO TRS
Technical research	GO IOD
TeleComm (SIG)	GO PCS-52
Telephone access	GO CIS-177
Tennessee, banking	GO HOM-141
Terminal parameters	GO CIS-4
Terminal software	GO PCS-103
Terminal types	GO CIS-4
Tests, children	GO TMC-27
Tests, interactive	GO TMC-4
Tests, SAT	GO TCB-18
Text editors	GO PCS-82
The College Board:	
Adult education	GO TCB-13
Choosing a college	GO TCB-17
Financial aid	GO TCB-12
Publications of	GO TCB-15
SAT test information	GO TCB-18
The National Satirist	GO KCS
Tickerscreen	GO TKR
Time used	GO CIS-176
TODAY advertisers	GO EBB
Trading, commodities	GO FIN-10
Travel:	
Department of State	GO DOS
Firstworld Travel Club	GO TVL
Official Airline Guide	GO OAG
Pan Am	GO PAN
Travel Fax	GO ESC
Travel-Scan	GO TRV
Worldwide Exchanges	GO WWX
Travel, abroad:	
Department of State	GO DOS
Firstworld Travel Club	GO TVL
Official Airline Guide	GO OAG
Pan Am	GO PAN
Travel Fax	GO ESC
Travel advisories	GO DOS
Travel airline guide	GO OAG
Travel Fax	GO ESC
Travel (SIG)	GO HOM-157
Traveler airport guide	GO PDG
Travelvision	GO TRV
Treasury bills, yields	GO FIN-4
Trivia:	
Kids	GO TMC-45
Movie	GO HHL
Radio	GO PRC
Unlimited test	GO TMC-16
Tutorials:	
Ed-tech	GO CAI
Personal Computing	GO PCS-12
UCSD Pascal Group	GO PCS-58
USDA Grades	GO GPO-18

USDA standards:

Meat	GO GPO-1340
Poultry	GO GPO-1405
U.S. Department of State	GO DOS
U.S. News:	
St. Louis Post-Dispatch	GO SPD-1005
Washington Post	GO TWP
United American Bank	GO HOM-152
Used cars, buying	GO GPO-1199
User directory	GO HOM-4
User information	GO CIS-4
User's programs	GO PCS-30
VIC 20 (SIG)	GO PCS-116
Vacationing	GO WWX
Value Line Database	GO FIN-20
Vegetables	GO VIC
Veterinarians Forum	GO SFP-37
Victory Garden	GO VIC
Video information	GO VIF
Videotex, views on	GO CVP-154
VIDTEX executive	GO PCS-103
Viewpoint, CompuServe	GO CVP-5
Want ads (Bullet)	GO HOM-23
War games:	
Conquest	GO GAM-19
Microwars	GO GAM-20
Space War	GO GAM-25
Washington, D.C. area:	
St. Louis Post-Dispatch	GO SPD-1005
Washington Post	GO TWP-12
Washington Post	GO TWP
Water, ground	GO WWA
Waterlines	GO WWA
Weather:	
AP Viewdata Wire	GO APV
African weather	GO CNS-17
Asian weather	GO CNS-17
Australian weather	GO AWX
European weather	GO CNS-17
Extended forecasts	GO WEA
N. American weather	GO CNS-17
S. American weather	GO CNS-17
Sports forecasts	GO WEA
State forecasts	GO WEA
What's New	GO NEW
Wheat prices	GO CNS-12
Wine guide	GO VIN
Wine service news:	
(see Associated Press Access)	
Word processors	GO PCS-86
Work-at-Home (SIG)	GO HOM-146
World news:	
AP Viewdata Wire	GO APV
Associated Press	GO AND-52
Washington Post	GO TWP-15
Worldwide Exchanges	GO WWX
Yachts	GO WWX
Associated Press News Access	
Financial wire	
St. Louis Post-Dispatch	GO SPD
Washington Post	GO TWP
Sports:	
St. Louis Post-Dispatch	GO SPD
Washington Post	GO TWP
U.S. News:	
St. Louis Post-Dispatch	GO SPD
Washington Post	GO TWP
Washington News:	
St. Louis Post-Dispatch	GO SPD
Washington Post	GO TWP
World News:	
St. Louis Post-Dispatch	GO SPD
Washington Post	GO TWP

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Exhibit 2

Dialindex Database Categories and File Content

CATEGORY (ACRONYM)	CATEGORY (ACRONYM)	CATEGORY (ACRONYM)

AGRICULTURE/FOOD   (AGRICULT)
- 10 AGRICOLA 79–
- 110 AGRICOLA 70–78
- 50 CAB ABSTRACTS
- 60 CRIS USDA

AGRICULTURE/BIOLOGICAL SCIENCES   (AGRIA)
- 5 BIOSIS PREVIEWS 81–
- 55 BIOSIS PREVIEWS 77–80
- 255 BIOSIS PREVIEWS 69–76
- 10 AGRICOLA 79–
- 110 AGRICOLA 70–78
- 50 CAB ABSTRACTS
- 60 CRIS USDA
- 76 LIFE SCIENCES COLLECTION
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

AGRICULTURE/MARINE SCIENCES   (AGRIB)
- 10 AGRICOLA 79–
- 110 AGRICOLA 70–78
- 28 OCEANIC ABSTRACTS
- 44 AQUATIC SCI & FISH ABS
- 50 CAB ABSTRACTS
- 60 CRIS USDA
- 112 AQUACULTURE
- 116 AQUALINE
- 117 WATER RESOURCES ABSTRACTS

ASSOCIATIONS   (ASSNS)
- 114 ENCY OF ASSOCIATIONS
- 169 ENERGYNET

BIOGRAPHIES   (BIOGRAPH)
- 88 BIOGRAPHY MASTER INDEX
- 162 CAREER PLACEMT REG EXPERIENCED
- 163 CAREER PLACEMT REG STUDENT
- 234 MARQUIS WHO'S WHO
- 236 AMER MEN & WOMEN OF SCIENCE

BIOSCIENCES   (BIOSCI)
- 5 BIOSIS PREVIEWS 81–
- 55 BIOSIS PREVIEWS 77–80
- 255 BIOSIS PREVIEWS 69–76
- 34 SCISEARCH* 81–
- 94 SCISEARCH* 78–80
- 186 SCISEARCH* 74–77
- 76 LIFE SCIENCES COLLECTION
- 185 ZOOLOGICAL RECORD
- 238 TELEGEN*
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

BOOKS   (BOOKS)
- 421 REMARC PRE–1900
- 422 REMARC 1900–1939
- 423 REMARC 1940–1959
- 424 REMARC 1960–1969
- 425 REMARC 1970–
- 426 LC MARC
- 470 BOOK IN PRINT

BUSINESS COMPANIES   (BUSCO)
- 17 PTS ANNUAL REPORTS ABS
- 22 EIS INDUSTRIAL PLANTS
- 92 EIS NONMANUFACT ESTABS
- 100 DISCLOSURE™ II
- 132 STANDARD & POOR'S NEWS
- 169 ENERGYNET*
- 226 TRADEMARKSCAN™
- 516 D&B–DUN'S MARKET IDEN*
- 517 D&B–MILLION DOLLAR DIRECT*
- 518 D&B–PRINC INT'L BUSINESSES*
- 540 DISCLOSURE™ SPECTRUM OWNERSHIP*
- 545 INVESTEXT*

BUSINESS NEWS   (BUSNEWS)
- 47 MAGAZINE INDEX™
- 111 NATIONAL NEWSPAPER INDEX™
- 132 STANDARD & POOR'S NEWS
- 148 TRADE & INDUSTRY INDEX™
- 211 NEWSEARCH™
- 262 CANADIAN BUS & CURRENT AFFAIRS*

PREDICASTS–MARKET RESEARCH   (BUSPTS)
- 16 PTS PROMT
- 17 PTS ANNUAL REPORTS ABS
- 18 PTS F&S INDEXES 79–
- 19 CHEMICAL INDUSTRY NOTES
- 80 PTS DEFENSE MARKETS & TECH*
- 98 PTS F&S INDEXES 72–78

BUSINESS STATISTICS   (BUSSTAT)
- 81 PTS U.S. FORECASTS
- 82 PTS U.S. TIME SERIES
- 83 PTS INT'L FORECASTS
- 84 PTS INT'L TIME SERIES

BUSINESS (BIBLIOGRAPHIC)   (BUSTEXT)
- 15 ABI INFORM*
- 49 PAIS
- 75 MANAGEMENT CONTENTS*
- 90 ECONOMIC ABSTRACTS
- 139 ECONOMIC LITERATURE INDEX
- 148 TRADE & INDUSTRY INDEX™
- 151 HEALTH PLANNING & ADMIN
- 168 INSURANCE ABSTRACTS
- 189 HARFAX INDUSTRY DATA
- 262 CANADIAN BUS & CURRENT AFFAIRS*

CAS REGISTRY NUMBERS   (CASREGNO)
- 23 CLAIMS™ U.S. PATENTS 50–70
- 24 CLAIMS™ U.S. PATENTS 71–81
- 25 CLAIMS™ U.S. PATENTS 82–
- 45 APTIC
- 74 INT'L PHARMACEUTICAL ABS
- 138 CHEMICAL EXPOSURE
- 154 MEDLINE 80–
- 174 CHEMICAL REGS & GUIDELINES
- 197 CHEMLAW
- 308 CA SEARCH 67–71
- 309 CA SEARCH 72–76
- 320 CA SEARCH 77–79
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

CHEMISTRY   (CHEM)
- 308 CA SEARCH 67–71
- 309 CA SEARCH 72–76
- 320 CA SEARCH 77–79
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

CHEMICAL LITERATURE   (CHEMLIT)
- 34 SCISEARCH* 81–
- 94 SCISEARCH* 78–80
- 186 SCISEARCH* 74–77
- 308 CA SEARCH 67–71
- 309 CA SEARCH 72–76
- 320 CA SEARCH 77–79
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

CHEMICAL SUBSTANCES   (CHEMSUBS)
- 30 CHEMSEARCH™
- 52 TSCA
- 300 CHEMZERO™
- 301 CHEMNAME*
- 328 CHEMSIS™ 67–71
- 329 CHEMSIS™ 72–76
- 330 CHEMSIS™ 77–81
- 331 CHEMSIS™ 82–

CITED REFERENCES   (CITE)
- 7 SOCIAL SCISEARCH*
- 34 SCISEARCH* 81–
- 94 SCISEARCH* 78–80
- 186 SCISEARCH* 74–77

COMPUTER SCIENCE   (COMPSCI)
- 6 NTIS
- 8 COMPENDEX
- 12 INSPEC 69–76
- 13 INSPEC 77–
- 165 EI ENGINEERING MEETINGS™
- 232 INT'L SOFTWARE DATABASE
- 233 MICROCOMPUTER INDEX™
- 239 MATHFILE
- 275 COMPUTER DATABASE

CURRENT NEWS (daily updates)   (CURRENT)
- 132 STANDARD & POOR'S NEWS
- 211 NEWSEARCH™
- 261 UPI NEWS DAILY

EDUCATION   (EDUC)
- 1 ERIC
- 9 AIM·ARM
- 11 PSYCINFO
- 46 NICEM
- 53 IRIS
- 54 EXCEPTIONAL CHILD EDUC
- 70 NICSEM·NIMIS

ENERGY   (ENERGY)
- 6 NTIS
- 8 COMPENDEX
- 12 INSPEC 69–76
- 13 INSPEC 77–
- 63 TRIS
- 69 ENERGYLINE*
- 89 GEOREF
- 103 DOE ENERGY
- 165 EI ENGINEERING MEETINGS™
- 169 ENERGYNET*
- 241 ELECTRIC POWER DATABASE
- 310 CA SEARCH 80–81
- 311 CA SEARCH 82–

ENGINEERING   (ENGINEER)
- 6 NTIS
- 8 COMPENDEX
- 12 INSPEC 69–76
- 13 INSPEC 77–
- 14 ISMEC
- 32 METADEX
- 96 BHRA FLUID ENGINEERING
- 99 WELDASEARCH
- 113 STANDARDS & SPECIFICATIONS
- 165 EI ENGINEERING MEETINGS™

ENVIRONMENT/POLLUTION   (ENVIRMTA)
- 28 OCEANIC ABSTRACTS
- 40 ENVIROLINE*
- 41 POLLUTION ABSTRACTS
- 44 AQUATIC SCI & FISH ABS
- 45 APTIC
- 53 IRIS
- 68 ENVIRONMENTAL BIBLIOGRAPHY
- 116 AQUALINE

*FORTHCOMING FILE

CATEGORY (ACRONYM)	CATEGORY (ACRONYM)	CATEGORY (ACRONYM)
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Exhibit 3

Questions Used in Interviews of Information Providers

1. Why did your organization enter the electronic arena?

2. How did your organzation enter the electronic arena?

3. How is the electronic system operated? Where is the data base maintained? How is it updated?

4. Who is the market for your electronic product? Businesses? Consumers? Why do people use your electronic product? Is use among consumers likely to influence use among businesses? Vice-versa?

5. What systems/networks is your information service on? Why did you choose to be on these systems? National versus local trade-offs? Pricing on different systems? Ads?

6. How do you measure success? In dollars? By the number of subscribers?

7. Does your organization have competition in the electronic arena?

8. How does the electronic business fit in with your organization's other business segments (if any)? What additional resources were needed to launch/maintain the electronic business?

9. What are your organization's future plans in the electronic arena?

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